

# Professor Robert McNeill Alexander, CBE, FRS.

## Publications

### Books:

- 1967      Functional Design in Fishes Hutchinson, London.  
second and third editions 1970, 1974
- 1968      Animal Mechanics Sidgwick & Jackson, London.  
Russian translation 1970  
second edition 1983. Blackwell, Oxford.  
Identified as a "Citation Classic" in Current Contents  
20 (16), 1989 (various editions)
- 1971      Size and Shape Edward Arnold, London.
- 1975      The Chordates Cambridge University Press, London.  
second edition 1981. Selected for the British National Corpus, 1993
- 1975      Biomechanics Chapman & Hall, London.  
Japanese translation 1976  
Spanish translation 1982
- 1977      (R.McN. Alexander & G. Goldspink, editors)  
Mechanics and Energetics of Animal Locomotion  
Chapman & Hall, London.
- 1979      The Invertebrates Cambridge University Press,  
Cambridge.  
Italian translation 1983
- 1982      Locomotion of Animals Blackie, Glasgow.
- 1982      Optima for Animals Arnold, London.  
revised edition 1996, Princeton University Press
- 1986      (editor) The Collins Encyclopaedia of Animal Biology  
Collins, London.  
Swedish translation 1987  
Japanese translation 1987
- 1986      P. Slater & R.McN. Alexander (editors)  
The Encyclopaedia of Animal Biology and Behaviour  
Grolier International.  
Italian translation 1989
- 1988      Elastic Mechanisms in Animal Movement

Cambridge University Press, Cambridge.

- 1989 Dynamics of Dinosaurs and other Extinct Giants  
Columbia University Press, New York.  
Japanese translation 1992
- 1990 Animals Cambridge University Press
- 1992 The Human Machine Natural History Museum Publications and  
Columbia University Press.
- 1992 (editor) The Mechanics of Animal Locomotion  
Springer-Verlag.
- 1992 Exploring Biomechanics : Animals in Motion Scientific American  
Library. Japanese translation 1992.
- 1994 Bones : The Unity of Form and Function Macmillan, New York and  
Weidenfeld & Nicholson, London.
- 1999 Energy for Animal Life Oxford University Press, Oxford.
- 2003 Principles of Animal Locomotion Princeton University Press
- 2005 Human Bones Pi Press, New York.

#### Multimedia CD-ROM

- 1995 How Animals Move Discovery Channel. This CD-ROM received Emma  
awards for “best natural history” and “best general reference” at the  
Frankfurt Book Fair, 1995.

#### Papers:

- 1 1951 Behaviour of the robin during laying.  
British Birds 44: 389-90.
- 2 1959 The physical properties of the swimbladder in intact Cypriniformes. J. exp. Biol. 36: 315-32.
- 3 1959 The densities of Cyprinidae. J. exp. Biol. 36: 333-40.
- 4 1959 The physical properties of the isolated swimbladder in Cyprinidae. J. exp. Biol.  
36 : 341-6.
- 5 1959 The physical properties of the swimbladders of fish other than Cypriniformes.  
J. exp. Biol. 36: 347-55.

- 6 1961 The physical properties of the swimbladders of some South American Cypriniformes. J. exp. Biol. 38: 403-10.
- 7 1961 Visco-elastic properties of the tunica externa of the swimbladder in Cyprinidae. J. exp. Biol. 38: 747-57.
- 8 1962 The structure of the Weberian apparatus in the Cyprini. Proc.zool. Soc. Lond. 139: 451-73.
- 9 1962 Illustrations as analogues. Med. biol. Illustr. 12: 184-90.
- 10 1962 Visco-elastic properties of the body-wall of sea anemones. J.exp. Biol. 39: 373-86.
- 11 1963 Frontal foramina and tripodes of the characin Crenuchus. Nature, Lond. 200 : 1225.
- 12 1963 The evolution of the basilisk. Greece and Rome (ser.2) 10: 170-81.
- 13 1964 Visco-elastic properties of the mesogloea of jelly fish. J. exp. Biol. 41: 363-9.
- 14 1964 The structure of the Weberian apparatus in the Siluri. Proc. zool. Soc. Lond. 142: 419-40.
- 15 1964 The evolution of the Weberian apparatus in the Cobitidae. Proc. zool. Soc. Lond. 143: 177-90.
- 16 1964 Adaptation in the skulls and cranial muscles of South American characinoid fish. J. Linn. Soc. (Zool.) 45: 169-90.
- 17 1965 The lift produced by the heterocercal tails of Selachii. J. exp. Biol. 43: 131-38.
- 18 1966 Structure and function in the catfish. J. Zool., Lond. 148: 88-152.
- 19 1966 Physical aspects of swimbladder function. Biol. Rev. 41: 141-76.
- 20 1966 Rubber-like properties of the inner hinge-ligament of Pectinidae. J. exp. Biol. 44: 119-30.
- 21 1966 Lift produced by the heterocercal tail of Acipenser. Nature, Lond. 210: 1049-50.
- 22 1966 The functions and mechanisms of the protrusible upper jaws of two species of cyprinid fish. J. Zool., Lond. 149: 288-96.

- 23 1967 (G.M. Yazdani & R.McN. Alexander) Respiratory currents of flatfish. Nature, Lond. 213: 96-7.
- 24 1967 The functions and mechanisms of the protrusible upper jaws of some acanthopterygian fish. J. Zool., Lond. 151: 43-64.
- 25 1967 Mechanisms of the jaws of some atheriniform fish. J. Zool., Lond. 151: 233-55.
- 26 1969 The orientation of muscle fibres in the myomeres of fish. J. mar. biol. Ass. U.K. 49: 263-90.
- 27 1969 Mechanics of the feeding action of a cyprinid fish. J. Zool., Lond. 159: 1-15.
- 28 1970 Mechanics of the feeding action of various teleost fishes. J. Zool., Lond. 162: 145-56.
- 29 1970 Swimbladder gas secretion and energy expenditure in vertically migrating fishes. In G.B. Farquhar (edit.) Proceedings of an International Symposium on Biological Sound Scattering in the Ocean. 74-85. Department of the Navy, Washington.
- 30 1971 Anatomy and engineering. University of Leeds Review 14: 171-87.
- 31 1972 The energetics of vertical migration by fishes. Symp. Soc. exp. Biol. 26: 273-94.
- 32 1973 Muscle performance in locomotion and other strenuous activities. In L. Bolis, K. Schmidt-Nielsen & S.H.P. Maddrell (edit.) Comparative Physiology. North Holland, Amsterdam.
- 33 1973 (L.J. Calow & R.McN. Alexander) A mechanical analysis of a hind leg of a frog (Rana temporaria). J. Zool., Lond. 171: 293-321.
- 34 1973 Jaw mechanisms of the coelacanth Latimeria Copeia 1973: 156-8.
- 35 1974 The mechanics of jumping by a dog (Canis familiaris). J. Zool., Lond. 173: 549-73.
- 36 1975 Evolution of integrated design. Am. Zool. 15: 419-25.
- 37 1975 (J. Clark & R.McN. Alexander) Mechanics of running by quail (Coturnix). J. Zool., Lond. 176: 87-113.
- 38 1975 (R. McN. Alexander & A. Vernon) Mechanics of hopping by kangaroos (Macropodidae). J. Zool., Lond. 177: 265-303.
- 39 1975 (R. McN. Alexander & A. Vernon) The dimensions of knee and ankle muscles and the forces they exert. J. Human Movement Studies 1: 115-23.

- 40 1976 Mechanics of bipedal locomotion. In P. Spencer-Davies (edit.) Perspectives in experimental Biology 1: 493-504. Pergamon, Oxford.
- 41 1976 Estimates of speeds of dinosaurs. Nature, Lond. 261: 129-130.
- 42 1976 Factors affecting muscle size and structure. In D. Lister, D.N. Rhodes, V.R. Fowler & M.F. Fuller (edits.). Meat Animals, Growth and Productivity 151-157. Plenum, New York.
- 43 1976 (O. Milburn & R.McN. Alexander) The performance of the muscles involved in spitting by the archerfish, Toxotes. J. Zool., Lond. 180: 243-251.
- 44 1977 Mechanics and scaling of terrestrial locomotion. In T.J. Pedley (edit.) Scale Effects in Animal Locomotion 93-110. Academic Press, London.
- 45 1977 (T. Weis-Fogh & R. McN. Alexander) The sustained power output obtainable from striated muscle. In T.J. Pedley (edit.) Scale Effects in Animal Locomotion 511-525. Academic Press, London.
- 46 1977 (R. McN. Alexander & H.C. Bennet-Clark) Storage of elastic strain energy in muscle and other tissues. Nature, Lond. 265: 114-117.
- 47 1977 Allometry of the limbs of antelopes (Bovidae). J. Zool., Lond. 183: 125-146.
- 48 1977 (R. McN. Alexander, V.A. Langman & A.S. Jayes) Fast locomotion of some African ungulates. J. Zool., Lond. 183: 291-300.
- 49 1977 Terrestrial locomotion, Swimming and Flight. Chapters in R.McN. Alexander and G. Goldspink (edits.). Mechanics and Energetics of Animal Locomotion pages 168-203, 222-248 and 249-278. Chapman & Hall, London.
- 50 1977 The progress of animal mechanics. Ergebn. Biol. 24 : 3-11.
- 51 1977 The flight of birds. Yearbook of Science and the Future, 1978. Encyclopaedia Britannica, Inc., Chicago.
- 52 1978 (R.McN. Alexander & A.S. Jayes) Vertical movements in walking and running. J. Zool., Lond. 185: 27-40.
- 53 1978 (W.G. Cuming, R.McN. Alexander & A.S. Jayes) Rebound resilience of tendons in the feet of sheep. J. exp. Biol. 74: 75-81.
- 54 1978 (A.S. Jayes & R.McN. Alexander) Mechanics of locomotion of dogs (Canis familiaris) and sheep (Ovis aries). J. Zool., Lond. 185: 289-308.
- 55 1978 (R.McN. Alexander & A.S. Jayes) Optimum walking techniques for idealized animals. J. Zool., Lond. 186: 61-81.

- 56 1978 Fish swimming: size and shape related to energy consumption. Proc. Zodiac Symp. on Adaptation 44-47. (Centre for Agricultural Publishing and Documentation, Wageningen).
- 57 1979 (G.M.O. Maloiy, R.McN. Alexander, R. Njau & A.S. Jayes) Allometry of the legs of running birds. J. Zool., Lond. 187: 161-167.
- 58 1979 (R.McN. Alexander, G.M.O. Maloiy, R. Njau & A.S. Jayes) Mechanics of running of the ostrich (Struthio camelus). J. Zool., Lond. 187: 169-178.
- 59 1979 (R.McN. Alexander, G.M.O. Maloiy, B. Hunter, A.S. Jayes & J. Nturibi) Mechanical stresses in fast locomotion of buffalo (Syncerus caffer) and elephant (Loxodonta africana). J. Zool., Lond. 189: 135-44.
- 60 1979 (R.McN. Alexander, A.S. Jayes, G.M.O. Maloiy & E.M. Wathuta) Allometry of the limb bones of mammals from shrews (Sorex) to elephant (Loxodonta). J. Zool., Lond. 189: 305-14.
- 61 1980 (R.McN. Alexander, A.S. Jayes & R.F. Ker) Estimates of energy cost for quadrupedal running gaits. J. Zool., Lond. 190: 155-92.
- 62 1980 (R.McN. Alexander & A.S. Jayes) Fourier analysis of forces exerted in walking and running. J. Biomechan. 13: 383-90.
- 63 1980 Forces in animal joints. Engineering in Medicine 9: 93-7.
- 64 1980 (A.S. Jayes & R.McN. Alexander) The gaits of chelonians: walking techniques for very low speeds. J. Zool., Lond. 191: 353-78.
- 65 1980 Optimum walking techniques for quadrupeds and bipeds. J. Zool., Lond. 192: 97-117.
- 66 1980 The mechanics of walking. In H.Y. Elder & E.R. Trueman (edits.). Aspects of animal movement 221-34. Cambridge University Press.
- 67 1980 Analysis of force platform data to obtain joint forces. In D. Dowson & V. Wright (edits.). Introduction to the biomechanics of joints and joint replacement 30-35. Mechanical Engineering Publications, Bury St. Edmunds.
- 68 1980 News and Views. Hopping and running on two legs or four. Nature 187: 187.
- 69 1980 Mechanics of walking and running. In H. Reul (edit.). Perspectives in Biomechanics 1: 355-379. Harwood Academic Publishers, Chur, Switzerland.
- 70 1981 Elasticity in the locomotion of mammals. In K. Smidt-Nielsen, L. Bolis & C.R. Taylor (edits.). Comparative physiology; primitive mammals 220-230. Cambridge University Press, New York.

- 71 1981 Mechanics of the skeleton and tendons. In V.B. Brooks (edit.). Handbook of Physiology - The Nervous System (ed.2) 2: 17-42. American Physiological Society, Bethesda.
- 72 1981 (R.McN. Alexander & A.S. Jayes) Estimates of the bending moments exerted by the lumbar and abdominal muscles of some mammals. J. Zool., Lond. 194: 291-303.
- 73 1981 Locomotion. in D. McFarland (edit.). The Oxford companion to animal behaviour 347-356. Oxford University Press.
- 74 1981 Factors of safety in the structure of animals. Sci. Progr. 67: 109-310.
- 75 1981 The gaits of tetrapods: adaptations for stability and economy. Symp. Zool. Soc. 48: 269-287.
- 76 1981 (R.McN. Alexander, A.S. Jayes, G.M.O. Maloiy & E.M. Wathuta) Allometry of the leg muscles of mammals. J. Zool., Lond. 194: 539-552.
- 77 1981 (J.L. van Leeuwen, A.S. Jayes & R.McN. Alexander) Estimates of mechanical stresses in tortoise leg muscles during walking. J. Zool., Lond. 195: 53-69.
- 78 1981 (A. Biewener, R.McN. Alexander and N.C. Heglund) Elastic energy storage in the hopping of kangaroo rats (Dipodomys spectabilis). J. Zool., Lond. 195: 369-383.
- 79 1981 (O. Mathieu, R. Krauer, H. Hoppeler, P. Gehr, S.L. Lindstedt, R.McN. Alexander, C.R. Taylor & E.R. Weibel) Design of the mammalian respiratory system VII. Scaling mitochondrial volume in skeletal muscle to body mass. Resp. Physiol. 44: 113-28.
- 80 1982 Size, shape and structure for running and flight. In C.R. Taylor, K. Johansen & L. Bolis (edits.). A companion to animal physiology 309-324. Cambridge University Press.
- 81 1982 (R.McN. Alexander, G.M.O. Maloiy, R.F. Ker, A.S. Jayes & C.N. Warui) The role of tendon elasticity in the locomotion of the camel (Camelus dromedarius). J. Zool., Lond. 198: 293-313.
- 82 1982 (A.S. Jayes & R.McN. Alexander) Estimates of mechanical stresses in leg muscles of galloping greyhounds (Canis familiaris). J. Zool., Lond. 198: 315-328.
- 83 1982 Servos and regulators in the control of leg muscles. (A comment on a paper by R.B. Stein). Behav. Brain Sci. 5: 542.
- 84 1983 (G. Hayes & R.McN. Alexander) The hopping gaits of crows (Corvidae) and other bipeds. J. Zool., Lond. 200: 205-213.

- 85 1983 Allometry of the leg bones of moas (*Dinornithes*) and other birds. J. Zool., Lond. 200: 215-231.
- 86 1983 (R.McN. Alexander & A.S. Jayes). A dynamic similarity hypothesis for the gaits of quadrupedal mammals. J. Zool., Lond. 201: 135-152.
- 87 1983 On the massive legs of a moa (*Pachyornis elephantopus*, *Dinornithes*). J. Zool., Lond. 201: 363-376.
- 88 1983 History of fish mechanics. in P.W. Webb & D. Weihs (edits.). Fish biomechanics: 1-35. Praeger, New York.
- 89 1984 Stride length and speed for adults, children and fossil hominids. Am. J. Phys. Anthropol. 63: 23-27.
- 90 1984 Elastic energy stores in running vertebrates. Am. Zool. 24: 85-94.
- 91 1984 (R.McN. Alexander & G.M.O. Maloiy) Stride lengths and stride frequencies of primates. J. Zool., Lond. 202: 577-582.
- 92 1984 The gaits of bipedal and quadrupedal animals. Internat. J. Robotics Res. 3: 49-59.
- 93 1984 Human walking and running. J. Biol. Educn. 18: 135-140.
- 94 1984 (R.McN. Alexander, A. Brandwood, J.D. Currey & A.S. Jayes) Symmetry and precision of control of strength in limb bones of birds. J. Zool., Lond. 203: 135-143.
- 95 1984 Optimum strengths for bones liable to fatigue and accidental fracture. J. theor. Biol. 109: 621-636.
- 96 1984 Walking and Running: our movements are subtly adapted to minimize energy costs. Am. Sci. 72: 348-354.
- 97 1985 Body size and limb design in primates and other mammals (Chap.17). In W.L. Jungers (edit.). Size and scaling in primate biology, 337-343. Plenum, New York.
- 98 1985 Mechanics of posture and gait of some large dinosaurs. Zool. J. Linn. Soc. 83: 1-25.
- 99 1985 The best ways of living. Math. Spectrum 17: 72-76.
- 100 1985 The legs of ostriches (*Struthio*) and moas (*Pachyornis*). Acta Biotheoretica 34: 165-74.
- 101 1985 The maximum forces exerted by animals. J. exp. Biol. 115: 231-238.



- 102 1985 (R.McN. Alexander & N.J. Dimery) The significance of sesamoids and retro-articular processes for the mechanics of joints. J. Zool., Lond. (A) 205: 357-371.
- 103 1985 (R.McN. Alexander & N.J. Dimery) Elastic properties of the fore foot of the donkey, Equus asinus. J. Zool., Lond. (A) 205: 511-524.
- 104 1985 (Nicola J. Dimery, R.McN. Alexander & Katherine A. Deyst) Mechanics of the ligamentum nuchae of some artiodactyls. J. Zool., Lond. (A) 206: 341-351.
- 105 1985 (Nicola J. Dimery & R.McN. Alexander) Elastic properties of the hind foot of the donkey, Equus assinus. J. Zool., Lond. (A) 207: 9-20.
- 106 1985 (R.McN. Alexander, Nicola J. Dimery & R.F. Ker) Elastic structures in the back and their role in galloping in some mammals. J. Zool., Lond. (A) 207: 467-482.
- 107 1985 The ideal and the feasible: Physical constraints on evolution. Biol. J. Linn. Soc. 26: 345-358.
- 108 1985 (J.D. Currey & R.McN. Alexander) The thickness of the walls of tubular bones. J. Zool., Lond.
- 109 1985 Body support, scaling and allometry. In M. Hildebrand, D.M. Bramble, K.F. Liem & D.B. Wake (eds.) Functional Vertebrate Morphology 26-37. Plenum, New York.
- 110 1986 Drawings of vertebrate animals from the collection of Charles Hamilton Smith (1776-1859). Archives of natural History 13: 39-70.
- 111 1986 (Nicola J. Dimery, R.F. Ker & R.McN. Alexander) Elastic properties of the feet of deer (Cervidae). J. Zool., Lond. (A) 208: 161-169.
- 112 1986 (R.F. Ker, Nicola J. Dimery & R.McN. Alexander) The role of tendon elasticity in hopping in a wallaby (Macropus rufogriseus). J. Zool., Lond. (A) 208: 417-428.
- 113 1986 Animal movement. Carolina Biology Readers, No.164. Carolina Biological Supply Company, Burlington.
- 114 1986 News and Views. Making headway in Africa. Nature 319, 623-624.
- 115 1986 News and Views. Three kinds of flying in animals. Nature 321: 113-114.
- 116 1986 Locomotion, terrestrial. In B. Campbell & E Lack (eds.) A Dictionary of Birds. 329-330. Poyser, Calton.

- 117 1986 Biomechanics. In T.F. McAinsh (ed.) Physics in Medicine & Biology:Encyclopaedia 57-60. Pergamon Press.
- 118 1986 (Brandwood, A., Jayes, A.S. & Alexander, R.McN.) Incidence of healed fracture in the skeletons of birds, molluscs and primates. J. Zool., Lond. (A) 208: 55-62.
- 119 1986 Do legs have surplus degrees of freedom? (Commentary on a paper by Berkenblit, Feldman & Fukson). Behav. Brain Sci. 9: 600 only.
- 120 1986 (R.McN. Alexander, M.B. Bennett & R.F. Ker) Mechanical properties and function of the paw pads of some mammals. J. Zool., Lond. (A) 209: 405-419.
- 121 1986 (M.B. Bennett, R.F. Ker, Nicola J. Dimery and R.McN. Alexander) Mechanical properties of various mammalian tendons. J. Zool., Lond. (A) 209: 537-548.
- 122 1986 (Nicola J. Dimery, R.McN. Alexander and R.F. Ker) Elastic extensions of leg tendons in the locomotion of horses (Equus caballus). J. Zool., Lond. 210: 415-425.
- 123 1987 (M.B. Bennett, R.F. Ker & R.McN. Alexander) Elastic properties of structures in the tails of cetaceans (Phocaena and Lagenorhynchus), and their effect on the energy cost of swimming. J. Zool., Lond. 211: 177-192.
- 124 1987 (R.McN. Alexander & M.B. Bennett) Some principles of ligament function, with examples from the tarsal joints of the sheep (Ovis aries). J. Zool., Lond. 211: 487-504.
- 125 1987 (M.B. Bennett & R.McN. Alexander) Properties and functions of extensible ligaments in the necks of turkeys (Meleagris gallopavo) and other birds. J. Zool., Lond. 212: 275-281.
- 126 1987 Bending of cylindrical animals with helical fibres in their skin or cuticle. J. theor. Biol. 124: 97-110.
- 127 1987 (Alice G. Sinclair & R.McN. Alexander) Estimates of forces exerted by the jaw muscles of some reptiles. J.Zool., Lond. 213: 107-115.
- 128 1987 (R.F. Ker, M.B. Bennett, S.R. Bibby, R.C. Kester & R.McN. Alexander) The spring in the arch of the human foot. Nature 325: 147-149.
- 129 1987 (J.D. Bryant, M.B. Bennett, J. Brust & R.McN Alexander) Forces exerted on the ground by galloping dogs (Canis familiaris). J.Zool., Lond. 213: 193-203.
- 130 1987 The spring in your step. New Scientist 114(1558): 42-44.

- 131 1987 (M.B. Bennett, R.F. Ker, S.R. Bibby, R.C. Kester & R.McN. Alexander) Elastic properties of the human foot and their significance for running. In Institution of Mechanical Engineers. Biomechanics in sport 113-116. Mechanical Engineering Publications, London.
- 132 1987 (M.B. Bennett, R.F. Ker, S.R. Bibby, R.C. Kester & R.McN. Alexander) Elastic properties of the human foot. In D.J. Pratt & G.R. Johnson (eds.) Biomechanics and orthotic management of the foot. Biological Engineering Society.
- 133 1987 Wallabies vibrate to breathe. Nature 328: 477 only.
- 134 1988 Why mammals gallop. Am.Zool. 28, 237-245.
- 135 1988 A dissection guide to the roast lamb. In N. Kurti (ed.) But the Crackling was Superb 77-81. Hilger, Bristol.
- 136 1988 (R.F. Ker, R.McN. Alexander & M.B. Bennett) Why are mammalian tendons so thick? J.Zool., Lond. 216: 309-324.
- 137 1988 The scope and aims of functional and ecological morphology. Neth.J.Zool. 38: 3-22.
- 138 1988 The risks of the chase. Behav. Brain Sci. 11: 130 only.
- 139 1988 (L.C. Rome, R.P. Funke, R.McN. Alexander, G. Lutz, H. Aldridge, F. Scott & M. Freadman) Why animals have different muscle fibre types. Nature 335: 824-827.
- 140 1989 (R.McN. Alexander & G.M.O. Maloiy) Locomotion of African mammals. Symp.zool.soc.Lond. 61, 163-180.
- 141 1989 On the synchronization of breathing with running in wallabies (Macropus spp.) and horses (Equus caballus). J.Zool., Lond. 218: 69-85.
- 142 1989 Energy-saving mechanisms in terrestrial locomotion. In W. Weiser & E. Gnaiger (eds) Energy Transformation Cells and Organisms. 170-174. Thieme, Stuttgart.
- 143 1989 Mechanics of fossil vertebrates. J. geol. Soc. 146: 41-52.
- 144 1989 The spring in your step: the role of elastic mechanisms in human running. Biomechanics XIA, 17-25.
- 145 1989 (M.B. Bennett, R.F. Ker & R.McN. Alexander) Elastic strain energy storage in the feet of running monkeys. J. Zool., Lond. 217: 469-475.
- 146 1989 (R.McN. Alexander & Christine L. Trestik) Bistable properties of the hock joint of horses. J. Zool., Lond. 218: 383-391.

- 147 1989 Optimization and gaits in the locomotion of vertebrates. Physiol. Rev. 69: 119-1227.
- 148 1990 Size, speed and buoyancy adaptations in aquatic animals. Am. Zool. 30: 189-196.
- 149 1989 (R.McN. Alexander & M.B. Bennett) How elastic is a running shoe? New Scientist. 123 (1673) : 45-46.
- 150 1989 Simple calculations of joint forces. Proc. Sports Biomech. Sect., Brit. Ass. Sports Sci. 14, 12 pages.
- 151 1989 Dinosaur engineering. Speculations in Science & Technology. 12: 293-298.
- 152 1989 Muscles for the job. New Scientist 122 (1660): 50-53.
- 153 1989 (R.F. Ker, M.B. Bennett, R.C. Kester & R.McN. Alexander) Foot strike and the properties of the human heel pad. Proc. Instn. Mech. Engrs. 203: 191-196.
- 154 1989 Elastic mechanisms in the locomotion of vertebrates. Neth. J. Zool. 40, 93-105.
- 155 1989 (R.McN. Alexander, R.F. Ker and M.B. Bennett) Optimum stiffness for leg bones. J. Zool., Lond. 222, 471-478.
- 156 1989 Gibbons swing stress away. Nature 342: 229 only.
- 157 1989 Dynamic similarity in the analysis of animal movement. in N. Schmidt-Kittler & K. Vogel (eds) Constructional morphology and biomechanics. Springer, Berlin. 71-79.
- 158 1989 Sequential joint extension in jumping. Human Movt Sci. 8, 339-345.
- 159 1990 (R.McN. Alexander & R.F. Ker) Running is priced by the step. Nature 346, 220-1.
- 160 1990 Optimum take-off techniques for high and long jumps. Phil. Trans. roy. Soc. B 329: 3-10.
- 161 1990 (L.C. Rome, R.P Funke & R.McN. Alexander) The influence of 'temperature on muscle velocity sustained performance in swimming carp. J. exp. Biol. 154, 163-178.
- 162 1990 (R.McN. Alexander and R.F. Ker) The Architecture of Leg Muscles in J.M. Winters & S.L-Y Woo (eds) Multiple muscle systems : biomechanics and movement organisation. 568-577. Springer, New York.
- 163 1990 Three uses for springs in legged locomotion. Int. J. Robotics Res. 9: 53-61.

- 164 1990 The lessons from animal studies. In P.R. Cavanagh (ed.) The Biomechanics of Distance Running. 187-201. Human Kinetics Books, Champaign, III.
- 165 1990 The dependence of gait on size, speed and gravity. In: F.K. Jouffroy, M.H. Stack & C. Niemitz (eds) Gravity posture and locomotion in primates. pp79-85 Il Sedecismo, Florence.
- 166 1991 Characteristics and advantage of human bipedalism. In J.M.V. Rayner & R.J. Wootton (ed.) Biomechanics in Evolution. 255-266. Cambridge University Press.
- 167 1991 The spring in your step. Proc. Roy. Inst. 62: 1-14.
- 168 1991 Elastic mechanisms in primate locomotion. Z. Morph. Anthropol. 78: 315-320.
- 169 1991 Apparent adaptation and actual performance. Evol. Biol. 25, 357-373.
- 170 1991 Doubts and assumptions in dinosaur mechanics. Interdisciplinary Sci. Rev. 16: 175-181.
- 171 1991 Better safe than sorry. Biol. Sci. Rev. 3(4) : 23-25.
- 172 1991 Optimum timing of muscle activation for simple models of throwing. J. theor. Biol. 150: 349-372.
- 173 1991 (A. Cutts, R.McN. Alexander & R.F. Ker) Ratios of cross-sectional areas of muscles and their tendons in a healthy human forearm. J. Anat. 176 : 133-137.
- 174 1991 How dinosaurs ran. Were large dinosaurs lumbering monsters or formidable running machines? Scientific American 264 (4) : 62-68.
- 175 1991 (X.T. Wang, M.R. De Ruijter, R.McN. Alexander & R.F. Ker) Effects of temperature on tendon properties. J. Zool. 223 : 491-497.
- 176 1991 Energy-saving mechanisms in walking and running. J. exp. Biol. 160, 55-69.
- 177 1991 It may be better to be a wimp. Nature. 353, 696 only.
- 178 1991 Optimization of gut structure and diet for higher vertebrate herbivores. Phil. Trans. R. Soc. B 333: 249-255.
- 179 1992 Simple models of walking and jumping. Human Movt Sci. 11: 3-9.
- 180 1992 (R.McN. Alexander & C.M. Pond) Locomotion and bone strength of the White rhinoceros, Ceratotherium simum. J. Zool., 227 : 63-69.

- 181 1992 (I.S. Young, R.McN Alexander, A.j. Woakes, P.J. Butler & L. Anderson) The synchronisation of ventilation and locomotion in horses (Equus caballus). J. exp. Biol. 166 : 19-31.
- 182 1992 Human posture and locomotion. In R.D. Martin, D. Pilbeam and S. Jones (eds.) The Cambridge Encyclopaedia of Human Evolution. 80-85 Cambridge University Press, Cambridge.
- 183 1993 (W.F. Walker, R.McN. Alexander and others) Muscles and muscle systems. Encyclopaedia Britannica (ed. 15) 24 : 452-479.
- 184 1992 Cinematography in the study of animal locomotion. In A. Capozzo, M. Marchetti & V. Tosi (eds) Bioloocomotion : a century of research using moving pictures. 243-254. Promograph, Rome.
- 185 1992 Simple models of the mechanics of walking. In R.B. Stein, H. Peckham & D.B. Popovic (eds) Neuroprostheses : replacing motor function after disease or disability. 191-201. Oxford University Press.
- 186 1992 Comparative aspects of human activity in N.G. Norgan (edit) Physical activity and health. 7-19, Cambridge University Press.
- 187 1992 The work that muscles can do. Nature 357 : 360-361.
- 188 1992 Optimization of skeletal structure in vertebrates. Belg. J. Zool. 122 : 23-29.
- 189 1992 A model of bipedal locomotion on compliant legs. Phil Trans roy Soc B. 338 : 189-198.
- 190 1992 (R.McN. Alexander & I.S. Young) Dynamic models of breathing. In Oxygen Transport in Biological Systems. ed. S. Egginton and H.F. Ross 45-56. Cambridge University Press.
- 191 1992 Energy-saving mechanisms in human and animal movement. In Trends in Comparative Physiology and Biochemistry 3-8. Faculty of Science, University of Tokyo.
- 192 1993 Legs and locomotion of Carnivora. Symp. zool. Soc. Lond. 65: 1-13.
- 193 1993 Gaits of mammals and turtles. J. Robotics Soc. Japan 11: 314-319.
- 194 1993 Joints and muscles of hands and paws. In H. Preuschoft & D.J. Chivers (eds) Hands of Primates 199-205. Springer, Wien.
- 195 1993 The energetics of coprophagy: a theoretical analysis. J. Zool. 230: 629-637.
- 196 1993 Energy-saving mechanisms in animal movement. In S.R. Bodner, J. Singer, A. Solan & Z. Hashin (eds). Theoretical and applied mechanics 177-186. Elsevier, Amsterdam.

- 197 1993 Buoyancy. In D.H. Evans (edit.) The Physiology of Fishes 75-97. CRC Press, Boca Raton, Florida.
- 198 1993 Optimization of structure and movement of the legs of animals. J. Biomechan. 26, suppl.1, 1-6.
- 199 1993 Breathing while trotting. Science 262 : 196-197.
- 200 1993 The relative merits of foregut and hindgut fermentation. J. Zool. 231 : 391-401.
- 201 1994 Optimum gut structure for specified diets. In D.J. Chivers & P. Langer (eds) The Digestion System in Mammals : Food, Form and Function. 54-62. Cambridge University Press, Cambridge
- 202 1994 The flight of the pterosaur. Nature 371 : 12-13.
- 203 1994 Human elasticity. Physics Edn. 29 : 358-362.
- 204 1995 Leg design and jumping technique for humans, other vertebrates and insects. Phil. Trans. roy. Soc. B. 347 : 235-248.
- 205 1995 Big flies have bigger cells. Nature 375 : 20.
- 206 1995 Springs for wings Science 268 : 50-51.
- 207 1995 (X.T. Wang, R.F. Ker & R.McN. Alexander) Fatigue rupture of wallaby tail tendons. J. exp. Biol. 198 : 847-852.
- 208 1995 Running and jumping by athletes and animals. Physiol. Zool. 68 (suppl.) : 3-9.
- 209 1995 Evolutionary biology. McGraw-Hill Yearbook of Science and Technology, 1995 : 151-153.
- 210 1995 (P. Aerts, R.F Ker, D. de Clercq, D.W. IIsley & R.McN. Alexander) The mechanical properties of the human heel pad : a paradox resolved. J. Biomechan. 28 : 1299-1308.
- 211 1995 Simple models of human movement. Appl. Mech. Rev. 48 : 461-470.
- 212 1995 Standing, walking and running. In P.L. Williams (edit.) Gray's Anatomy ed. 38, pp. 898-900. Churchill Livingstone, Edinburgh.
- 213 1995 Hydraulic mechanisms in locomotion. In G. Lanzavecchia, R. Valvassori & M.D. Candia Carnevali (eds.) Body cavities : function and phylogeny pp. 187-198. Mucchi, Modena.
- 214 1996 *Tyrannosaurus* on the run. Nature **379**: 121 only.

- 215 1996 Tendon elasticity and positional control. *Behavioural and Brain Sciences* **18**: 745 only.
- 216 1996 ( R H Crompton, Y Li, R McN Alexander, W Wang & M M Gunther ) Segment inertial properties of primates: New techniques for laboratory and field studies of locomotion. *American Journal of Physical Anthropology* **99**: 547-570.
- 217 1996 Walking and running. *Mathematical Gazette* July 1996. 1-6.
- 218 1996 Biophysical problems of small size in vertebrates. *Symposia of the Zoological Society of London* **69**: 3-14.
- 219 1996 Hans Werner Lissmann 30 April 1909 - 21 April 1995. *Biographical Memoirs of the Royal Society* **42**: 234-245.
- 220 1996 Smokescreen lifted on insect flight. *Nature* **384**: 609-610.
- 221 1996 (Li, Y., Crompton, R. H., Alexander, R. McN., Gunther, M. M. and Wang, W. J.) Characteristics of ground reaction forces in normal and chimpanzee-like bipedal walking by humans. *Folia Primatologica* **66**: 137-159.
- 222 1997 Invited editorial on "Interaction of leg stiffness and surface stiffness during human hopping. *Journal of Applied Physiology* **82**: 13-14.
- 223 1997 ( M H E de Lussanet and R McN Alexander ) A simple model for fast planar arm movements; optimising mechanical activation and moment-arms of uniarticular and biarticular arm muscles. *Journal of Theoretical Biology* **184**: 187-201.
- 224 1997 A theory of mixed chains applied to safety factors in biological systems. *Journal of Theoretical Biology* **184**: 247-252.
- 225 1997 Optimum muscle design for oscillatory movement. *Journal of Theoretical Biology* **184**: 253-259.
- 226 1997 A minimum energy cost hypothesis for human arm trajectories. *Biological Cybernetics*. **76**: 97-105.
- 227 1997 Leaning trees on sloping ground. *Nature* **386**: 327-329.
- 228 1997 ( A. E. Minetti and R. McN. Alexander ). A theory of metabolic costs for bipedal gaits. *Journal of Theoretical Biology*. **186**: 467-476.
- 229 1997 Elasticity in human and animal backs. In A. Vleeming, V. Mooney, C. J. Snijders, T. A. Dorman and R. Stoeckart (eds) *Movement, Stability and Low*



*Back Pain: the Essential Role of the Pelvis* pp. 227-230. Churchill Livingstone, New York.

- 230 1997 The U, J and L of bird flight. *Nature* **390**: 13 only.
- 231 1997 Optimizing tendon compliance for cyclic movements. *Journal of Applied Biomechanics* **13**: 416-418.
- 232 1997 Simple models of human locomotion. *Journal of Theoretical Medicine* **2**: 129-135.
- 233 1998 News of chews: the optimization of mastication. *Nature* **391**: 329 only
- 234 1998 ( S. K. S. Thorpe, Y. Li, R.H. Crompton and R. McN. Alexander ) Stresses in human leg muscles in running and jumping determined by force plate analysis and from published magnetic resonance images. *Journal of Experimental Biology* **201**: 63-70.
- 235 1998 Symmorphosis and safety factors. In E. R. Weibel, C. R. Taylor and L. Bolis (eds) *Principles of Animal Design: the Optimization and Symmorphosis Debate*, pp. 28-35. Cambridge University Press, Cambridge.
- 236 1998 All-time giants: the largest animals and their problems. *Palaeontology* **41**: 1231-1245.
- 237 1998 When is migration worthwhile, for animals that run, swim or fly? *Journal of Avian Biology* **29**: 387-394.
- 238 1998 Locomotion and Mammalian life history. In Ulijaszek, S. J., Johnston, F. E. and Preece, M.A. (eds) *The Cambridge Encyclopaedia of Human Growth and Development*. p.98. Cambridge University Press, Cambridge.
- 239 1998 Biomechanical constraints. In P. Calow (ed.) *The Encyclopaedia of Ecology and Environmental Management*. pp. 88-89. Blackwell, Oxford.
- 240 1998 Muscle geometry. *Journal of Physiology* **512**: 315.
- 241 1998 Elastic structures: their importance for human locomotion. *Journal of Physiology* **506P**: S5-S6.
- 242 1999 One price to run, swim or fly? *Nature* **397**: 651-653.
- 243 1999 Designed for action. *Biologist* **46**: 61-64.
- 244 1999 Engineering approaches to chewing and digestion. *Science Progress* **82**: 171-184.
- 245 1999 (S. K. S. Thorpe, R. H. Crompton, M. M. Günther, R. F. Ker and R. McN. Alexander). Dimensions and moment arms of the hind- and forelimb muscles

of common chimpanzees (*Pan troglodytes*). *American Journal of Physical Anthropology* **110**: 179-199.

- 246 1999 (R. McN. Alexander, R. A. Fariña and S. F. Vizcaíno) Tail blow energy and carapace fractures in a large glyptodont (Mammalia, Xenarthra). *Zoological Journal of the Linnean Society* **126**: 41-49.
- 247 1999 (V. Papantoniou, P. Avlakitotis and R. McN. Alexander) Control of a robot dinosaur. *Philosophical Transactions of the Royal Society B* **354**: 863-868.
- 248 2000 Energy-minimizing choices of muscles and patterns of movement. *Motor Control* **4**: 45-47.
- 249 2000 Hovering and jumping: contrasting problems in scaling, in J. H. Brown and G. B. West (eds) *Scaling in Biology* pp.37-50, Oxford University Press.
- 250 2000 Walking and running strategies for humans and other mammals, in P. Domenici and R. W. Blake (eds) *Biomechanics in Animal Behaviour* pp.49-57, BIOS, Oxford.
- 251 2000 Storage and release of elastic energy in the locomotor system and the stretch-shortening cycle, in B. M. Nigg, B. R. MacIntosh and J. Mester (eds) *Biomechanics and Biology of Movement* pp.19-29, Human Kinetics, Champaign, IL.
- 252 2000 Optimization of muscles and movement for performance or economy of energy. *Netherlands Journal of Zoology* **50**: 101-112.
- 253 2000 (A.V.L. Pike, R.F. Ker and R.McN. Alexander). The development of fatigue quality in high- and low-stressed tendons of sheep (*Ovis aries*). *Journal of Experimental Biology* **203**: 2187-2193.
- 254 2001 Design by numbers (a *Concepts* article). *Nature* **412**: 591 only.
- 255 2001 Damper for bad vibrations (a *News and Views* article). *Nature* **414**: 855-857.
- 256 2001 Otto Egon Lowenstein. *Biographical Memoirs of Fellows of the Royal Society of London* **47**: 357-368.
- 257 2002 Stability and manoeuvrability of terrestrial vertebrates. *Integrative and Comparative Biology* **42**: 158-164.
- 258 2002 Energetics and optimization of human walking and running: The 2000 Raymond Pearl Memorial Lecture. *American Journal of Human Biology* **14**: 641-648.
- 259 2002 Tendon elasticity and muscle function. *Comparative Biochemistry and Physiology A* **133**: 1001-1011.

- 260 2002 (A V L Pike and R McN Alexander) The relationship between limb-segment proportions and joint kinematics for the hind limbs of quadrupedal mammals. *Journal of Zoology* **258**: 427-433.
- 261 2002 The merits and implications of travel by swimming, flight and running by animals of different sizes. *Integrative and Comparative Biology* **42**, 1060-1064.
- 262 2003 Modelling approaches in biomechanics. *Philosophical Transactions of the Royal Society B* **358**, 1429-1435.
- 263 2003 A rodent as big as a buffalo (a Perspective). *Science* **301**, 1678-1679.
- 264 2003 Functions of elastomeric proteins in animals. In P. R. Shewry, A. S. Tatham and A. J. Bailey (eds) *Elastomeric Proteins* pp. 1-14. Cambridge University Press, Cambridge.
- 265 2004 Hitching a lift hydrodynamically\_ in swimming, flying and cycling. *Journal of Biology* **3**, article 7.
- 266 2004 Bipedal animals, and their differences from humans. *Journal of Anatomy* **204**, 321-330.
- 267 2005 Models and the scaling of energy costs for locomotion. *Journal of Experimental Biology*. **208**, 1645-1652.
- 268 2005 Mechanics of animal movement. *Current Biology* **15**, R616-R619.
- 269 2005 Walking made easy (a Perspective). *Science* **308**, 58-59.
- 270 2005 Walking lessons from robots. *Biologist* **52**, 277-282.
- 271 2005 Energy saving in animal movement. *Biological Sciences Review* **18**(2), 2-5.
- 272 2005 Problems of scale for walking and climbing animals. In M. A. Armada and P. G. de Santos (eds) *Climbing and Walking Robots* pp. 47-54. Springer, Berlin.
- 273 2006 A new sense for muddy water (a JEB Classics article). *Journal of Experimental Biology* **209**, 200-201.
- 274 2006 Dinosaur biomechanics. *Proceedings of the Royal Society B* **273**, 1849-1855.
- 275 2006 Introduction to biotribology: animal locomotion. *Proceedings of the Institution of Mechanical Engineers Part J: Journal of Engineering Tribology* **220**, 649-656.
- 276 2007 Antennae as gyroscopes (a Perspective). *Science* **315**, 771-772.
- 277 2007 Biomechanics: stable running (a Dispatch). *Current Biology* **17**, R253-R255.

- 278 2007 Knut Schmidt-Nielsen (1915-2007) (an Obituary). *Nature* **446**, 744.
- 279 2007 (S.K.S.Thorpe, R.H.Crompton and R.McN.Alexander) Orangutans use compliant branches to lower the energetic cost of locomotion. *Biology Letters* **3**: 253-256.
- 280 2007 Flat and bouncy walking. *J. Physiol.* **582**(2), 474.