

CURRICULUM VITAE

NAME Michael I. Coates
POSITION: Associate Professor
Department of Organismal Biology & Anatomy
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DEGREES

- 1988: Ph.D. Thesis title: A new fauna of actinopterygian fishes from the Namurian (Upper Carboniferous) of Bearsden Glasgow. University of Newcastle Upon Tyne, UK
1982: B.Sc. (Hons) Zoology. University of Newcastle Upon Tyne, UK

CAREER

- 2001 + Associate Professor, Department of Organismal Biology & Anatomy, University of Chicago.
2000 - 2001 Reader in Vertebrate Zoology, Department of Biology, University College London, UK.
1995 - 2000 Senior Research Fellow, Department of Biology, University College London
1994 - 1995 Research Fellow, Department of Zoology, University of Cambridge.
1989 - 1994. Postdoctoral Research Associate. Department of Zoology, University of Cambridge.

AWARDS

- 1999 - Advanced Research Fellowship, Biotechnology and Biological Sciences Research Council.
1994 Advanced Research Fellowship, Biotechnology and Biological Sciences Research Council.
1992 Discretionary merit award, General Board of the University of Cambridge.
1990 The President's award, Palaeontological Association
1982 The Young prize for Zoology, University of Newcastle Upon Tyne

RESEARCH SUMMARY

Vertebrate phylogeny and palaeobiology; integrative approaches to evolutionary and developmental biology.

The origin of vertebrate fins and limbs; the origin and early evolutionary radiations of tetrapods.

The early shark-like fishes and the origin of jawed vertebrates.

Phylogenetic interrelationships of primitive actinopterygian (ray-finned) fishes.

PROFESSIONAL COMMITMENTS & AFFILIATIONS

Co-founder & Deputy Editor: *Evolution & Development*.

Editorial Board: *The Journal of Experimental Zoology Part B: Molecular and Developmental Evolution*. 2003+

Council Member, European Society for Evolutionary Developmental Biology. 2006+

Faculty of 1000: contributing member.

Fellow of the Linnean Society of London.

Member, Society of Vertebrate Paleontology.

Member, Palaeontological Association.

PUBLICATIONS

PEER-REVIEWED JOURNALS AND BOOK CHAPTERS

1. Dick, J.R.F., Coates, M.I. & Rolfe, W.D.I. 1986. **Fossil Sharks**. GEOLOGY TODAY **2**: 82-85.
2. Milner, A.R., Smithson, T.R., Milner, A.C., Coates, M.I. & Rolfe, W.D.I. 1986. **The search for early tetrapods**. MODERN GEOLOGY **10**: 1-28.
3. Coates, M.I. & Clack, J.A. 1990. **Polydactyly and the earliest known tetrapod limbs**. NATURE **347**: 66-69.
4. Coates, M.I. & Clack, J.A. 1991. **Fish-like gills and breathing in the earliest tetrapod**. NATURE **352**: 234-236.
5. Coates, M.I. 1991. **New palaeontological contributions to limb ontogeny and phylogeny**. In DEVELOPMENTAL PATTERNING OF THE VERTEBRATE LIMB Hinchliffe, (eds J.R., Hurle, J.M. & Summerbell, D.), NATO ASI Series A: 205: 325-338. New York: Plenum Press.
6. Coates, M.I. 1993. **New actinopterygian fish from the Namurian Manse Burn Formation of Bearsden Glasgow**. PALAEONTOLOGY **36**: 123-146.
7. Coates, M.I. 1993. **Hox genes, fin folds and symmetry**. NATURE **364**: 195-196.
8. Coates, M.I. 1993. **Ancestors and homology**. ACTA BIOTHEORETICA **41**: 411-424.
9. Coates, M.I. 1994. **Actinopterygian and acanthodian fishes from the Viséan of East Kirkton, Westlothian, Scotland**. TRANSACTIONS OF THE ROYAL SOCIETY OF EDINBURGH, EARTH SCIENCES **84**: 317-328.

10. Clarkson, E.N.K., Milner, A.R. & Coates, M.I. 1994. **Palaeoecology of the Viséan of East Kirkton, Westlothian, Scotland.** TRANSACTIONS OF THE ROYAL SOCIETY OF EDINBURGH, EARTH SCIENCES **84**: 417-426.
11. Coates, M.I. 1994. **The origin of vertebrate limbs.** In THE EVOLUTION OF DEVELOPMENTAL MECHANISMS (eds Akam, M., Holland, P., Ingham, P. & Wray, G.). DEVELOPMENT 1994 Supplement: 169-180.
12. Coates, M.I. 1995. **Fish fins or tetrapod limbs - a simple twist of fate?** CURRENT BIOLOGY **5**: 844-848.
13. Lebedev, O.A. & Coates, M.I. 1995. **The postcranial skeleton of the Devonian tetrapod *Tulerpeton curtum*, Lebedev.** ZOOLOGICAL JOURNAL OF THE LINNEAN SOCIETY **114**: 307-348.
14. Coates, M.I. & Clack, J.A. 1995. **Romer's Gap: tetrapod origins and terrestriality.** BULLETIN DU MUSÉUM NATIONAL D'HISTOIRE NATURELLE, PARIS **17**: 373-388.
15. Clack, J.A. & Coates, M.I. 1995. ***Acanthostega gunnari*, a primitive, aquatic tetrapod?** BULLETIN DU MUSÉUM NATIONAL D'HISTOIRE NATURELLE, PARIS **17**: 359-372.
16. Coates, M.I. 1996. **The Devonian tetrapod *Acanthostega gunnari* Jarvik: postcranial anatomy, basal tetrapod interrelationships and patterns of skeletal evolution.** TRANSACTIONS OF THE ROYAL SOCIETY OF EDINBURGH, EARTH SCIENCES **87**: 363-422.
17. Ahlberg, P. E. & Coates, M.I. 1997. **There's a shark in our cellar.** GEOLOGY TODAY **13**: 20-23.
18. Richardson, M.K., Minelli, A., Coates, M.I. & Hanken, J. 1998. **Phylogentic stage theory.** TRENDS IN EVOLUTION AND ECOLOGY **13**: 158.
19. Smith, M.M. & Coates, M.I. 1998. **Evolutionary origin of the vertebrate dentition: phylogenetic patterns and developmental evolution.** EUROPEAN JOURNAL OF ORAL SCIENCES. **106**: 482-500.
20. Coates, M.I. 1998. **Actinopterygians from the Namurian of Bearsden, Scotland, with comments on early actinopterygian neurocrania.** ZOOLOGICAL JOURNAL OF THE LINNEAN SOCIETY **122**: 27-60.
21. Coates, M.I. & Cohn, M. 1998. **Fins, limbs, and tails: outgrowth and axial patterning in vertebrate evolution.** BIOESSAYS. **20**: 371-381.
22. Coates, M.I., Sansom, I.J., Sequeira, S.E.K. & Smith, M.M. 1998. **Spines, teeth and histology: novel structures and tissues in ancient sharks.** NATURE **396**: 729-730.
23. Coates, M.I. & Sequeira, S. E. K. 1998. **The braincase of a primitive shark.** TRANSACTIONS OF THE ROYAL SOCIETY OF EDINBURGH, EARTH SCIENCES. **89**: 63-85.

24. Coates, M.I. 1999. **Endocranial preservation of a Carboniferous actinopterygian from Lancashire, U.K., and the interrelationships of primitive actinopterygians.** PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B. **354**: 435-462.
25. Coates, M.I. & Cohn, M.J. 1999. **Vertebrate axial and appendicular patterning: the early development of paired appendages.** AMERICAN ZOOLOGIST. **39**: 676-685.
26. Richardson, M.K., Minelli, A. & Coates, M.I. 1999. **Some problems with typological thinking in evolution and development.** EVOLUTION & DEVELOPMENT. **1**: 5-7.
27. Basden, A.M., Young, G.C., Coates, M.I. & Ritchie, A. 2000. **The most primitive osteichthyan braincase?.** NATURE **403**: 185-188.
28. Sequeira, S. E. K. & Coates, M. I. 2000. **Reassessment of 'Cladodus' neilsoni Traquair: a primitive shark from the Lower Carboniferous of East Kilbride, Scotland.** PALAEONTOLOGY **43**: 153-172.
29. Coates, M.I., Milner, A.R. and Ruta, M. 2000. **Early tetrapod evolution: a comment on Laurin, Girondot and de Ricqlès.** TRENDS IN ECOLOGY AND EVOLUTION **15**: 327-328.
30. Smith, M.M. & Coates, M.I. 2000. **Evolutionary Origins of Teeth and Jaws: Developmental Models and Phylogenetic Patterns.** In: DEVELOPMENT, FUNCTION AND EVOLUTION OF TEETH (eds Teaford, Ferguson & Smith). New York: Cambridge University Press, pp 133-151.
31. Coates, M.I. & Ruta, M. 2000. **Nice snake, shame about the legs.** TRENDS IN ECOLOGY AND EVOLUTION **15**: 503-508.
32. Coates, M. I. & Sequeira, S. E. K. 2001. **Early sharks and primitive gnathostome interrelationships.** In: MAJOR EVENTS IN EARLY VERTEBRATE EVOLUTION: PALAEONTOLOGY, PHYLOGENY AND DEVELOPMENT. (ed. Ahlberg, P.E.). London: Taylor & Francis, pp 241-262.
33. Smith, M.M. & Coates, M.I. 2001. **The evolution of vertebrate dentitions: phylogenetic pattern and developmental models.** In: MAJOR EVENTS IN EARLY VERTEBRATE EVOLUTION: PALAEONTOLOGY, PHYLOGENY AND DEVELOPMENT. (ed. Ahlberg, P.E.). Systematics Association Special Volume. London: Taylor & Francis, pp 223-240.
34. Coates, M.I. and Sequeira, S.E.K. 2001. **A new stethacanthid chondrichthyan from the Lower Carboniferous of Bearsden, Scotland.** JOURNAL OF VERTEBRATE PALEONTOLOGY **21**: 438-459.
35. Coates, M.I. 2001. **The origin of tetrapods.** In: PALAEOBIOLOGY II (eds Briggs, D.E.G. & Crowther, P.R.). Oxford: Blackwell Science, pp 74-79..
36. Richardson, M.K., Jeffery, J.E., Coates, M.I. & Bininda-Emonds, O.R.P. 2001. **Comparative Methods in Developmental Biology.** ZOOLOGY **104**: 278-283.

37. Ruta, M, Milner, A.R. & Coates, M.I. 2002. **The tetrapod *Caerorhachis bairdi* Holmes and Carroll from the Lower Carboniferous of Scotland.** TRANSACTIONS OF THE ROYAL SOCIETY OF EDINBURGH: EARTH SCIENCES. **92**: 229-261.
38. Cohn, M.J., Lovejoy, C.O., Wolpert, L., & Coates, M.I. 2002. **Branching, segmentation and the metapterygial axis: pattern versus process in the vertebrate limb.** BIOESSAYS. **24**: 460-465.
39. Jeffery J.E., Richardson M.K., Coates M.I., & Bininda-Emonds O.R.P. 2002. **Analyzing Developmental Sequences Within a Phylogenetic Framework.** SYSTEMATIC BIOLOGY **51**: 478-491.
40. Jeffery, J.E., Bininda-Emonds, O.R.P., Coates, M.I., & Richardson, M.K. 2002. **Analyzing evolutionary patterns in amniote embryonic development.** EVOLUTION & DEVELOPMENT. **4**: 292-302.
41. Coates, M.I., Jeffery, J.E., & Ruta, M. 2002. **Fins to limbs: what the fossils say.** EVOLUTION & DEVELOPMENT. **4**: 390-401.
42. Bininda-Emonds O.R.P., Jeffery J.E., Coates M.I., Richardson M.K. 2002. **From Haeckel to event-pairing: The evolution of developmental sequences.** THEORY IN BIOSCIENCE. **121**: 297-320.
43. Ruta, M., Coates, M.I. & Quicke, D.L.J. 2003. **Early tetrapod relationships revisited.** BIOLOGICAL REVIEWS. **78**: 251-345.
44. Coates, M.I. 2003. **The Evolution of Paired Fins.** THEORY IN BIOSCIENCE. **122**: 266-287.
45. Ruta, M., Jeffery, J.E., & Coates, M.I. 2003. **A supertree of early tetrapods.** PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON: BIOLOGICAL SCIENCES **270**: 2507-2516.
46. Ruta, M., & Coates, M.I. 2003. **Bones, molecules, and crown-tetrapod origins.** In: TELLING THE EVOLUTIONARY TIME: BONES, MOLECULES AND MORPHOLOGY. (eds Donoghue, P.J.C. & Smith, P.M.). Systematics Association Special Volume. London: Taylor & Francis. pp. 224-262.
47. Shubin, N.H., Daeschler, E.B. & Coates, M.I. 2004. **The Early Evolution of the Tetrapod Humerus.** SCIENCE **304**: 90-93.
48. Coates, M.I. 2004. **The Evolution of Paired Fins.** In: EVOLUTIONARY MORPHOLOGY: FROM CARL GEGENBAUR TO THE PRESENT. (eds Hoßfeld U., Olsson L., Breidbach O. & Levit G.S.). Elsevier. pp. 158-183.
49. Coates, M.I., Shubin, N.H., & Daeschler, E.B. 2004. **Response to technical comment on The Early Evolution of the Tetrapod Humerus.** SCIENCE **304**.

50. Jeffery, J.E., Beninda-Emonds, O.R.P., Coates M.I. & Richardson, M.K. 2005. **A new technique for identifying sequence heterochrony.** SYSTEMATIC BIOLOGY. **54**: 230-240.
51. Friedman, M. & Coates, M. I. 2006. **A newly recognized fossil coelacanth highlights the early morphological diversification of the clade.** PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON: BIOLOGICAL SCIENCES. **273**: 245-250.
52. Ruta, M, Wagner P. J., & Coates, M. I. 2006. **Evolutionary patterns in early tetrapods. I. Rapid initial diversification followed by decrease in rates of character change.** PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON: BIOLOGICAL SCIENCES. **273**: 2107-2111.
53. Wagner, P. J., Ruta, M., & Coates, M. I. 2006. **Evolutionary patterns in early tetrapods. II. Differing constraints on available character space among clades.** PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON: BIOLOGICAL SCIENCES. **273**: 2113-2118.
54. Gess, R., Coates, M. I. & Rubidge, B. 2006. **A lamprey from the Devonian period of South Africa.** NATURE **443**: 981-984.
55. Hurley, I. A., Lockeridge-Mueller, R., Dunn, K. A., Schmidt, E. J., Friedman, M., Ho, R. K., Prince, V. E., Yang, Z., Thomas, M. G., and Coates, M. I. 2007. **A new time-scale for ray-finned fish evolution.** PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON: BIOLOGICAL SCIENCES **274**: 489-498.
56. Coates, M.I. & Ruta, M. 2007. **Skeletal Changes in the Transition from Fins to Limbs.** In: FINS TO LIMBS (ed. Hall, B.K.). University of Chicago Press. pp. 15-38.
57. Ruta, M. & Coates, M.I. 2007. **Dates, Nodes and Character Conflict: Addressing the Lissamphibian Origin Problem.** JOURNAL OF SYSTEMATIC PALAEONTOLOGY. **5**: 54pp
58. Coates, M.I., Ruta, M. & Wagner, P. J. 2007. **Using patterns of fin and limb phylogeny to test developmental-evolutionary scenarios.** In: TINKERING: THE MICROEVOLUTION OF DEVELOPMENT (eds. Bock, G., Goode, J.). Novartis Foundation Symposium 284. John Wiley & Sons Ltd. pp. 245-261.
59. Friedman, M., Coates, M.I., & Anderson, P. 2007. **First discovery of a primitive coelacanth fin fills a major gap in the evolution of lobed fins and limbs.** EVOLUTION & DEVELOPMENT **9**: 329-337
60. Coates, M. I. & Gess, R. W. 2007. **A new reconstruction of *Onychoselache traquairi*, comments on early chondrichthyan pectoral girdles and hybodontiform phylogeny.** PALAEONTOLOGY **50**: 1421-1446.