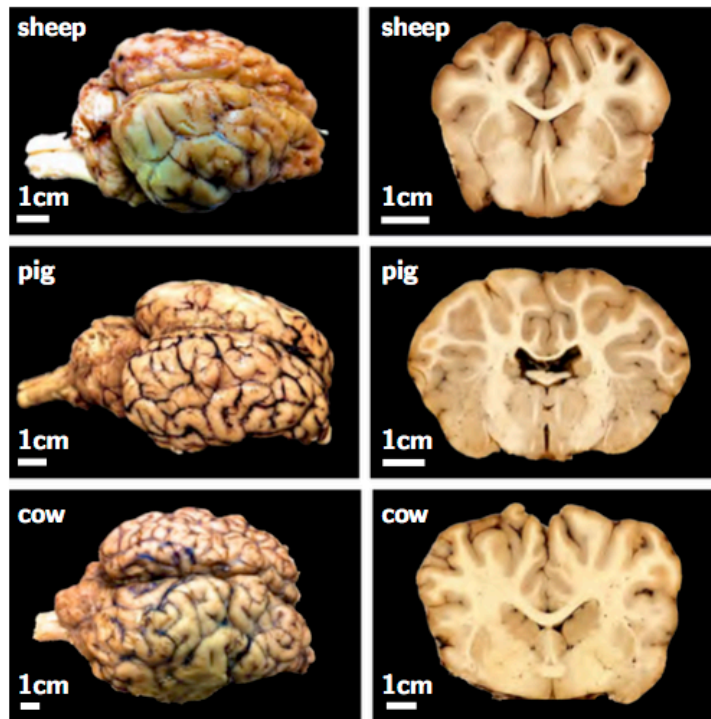




**Professor Alain Goriely**



**Fig. 9** Surface morphology of the mammalian brain. Larger mammals have larger and more folded brains: The bovine brain (*bottom*) is larger and more folded than the porcine brain (*middle*) which is larger and more folded than the ovine brain (*top*). The cortical thickness is relatively similar in all mammals

From: A. Goriely, J.A.W. van Dommelen, M.G.D. Geers, G. Holzapfel, J. Jayamohan, A. Jérusalem, S. Sivaloganathan, W. Squier, S. Waters, E. Kuhl, Mechanics of the brain: Perspectives, challenges, and opportunities, *Biomech. Model. Mechanobiol.*, 14 (5) (2015), pp. 931–965 (Cortex outer folds form via more outer growth than inner growth.)

See:

<https://www.maths.ox.ac.uk/people/alain.goriely>

<http://www.ox.ac.uk/news-and-events/find-an-expert/professor-alain-goriely>

<https://www0.maths.ox.ac.uk/groups/occam/people/faculty>

[https://www.researchgate.net/profile/Alain\\_Goriely/info](https://www.researchgate.net/profile/Alain_Goriely/info)

<https://scholar.google.co.uk/citations?user=qbgZB6IAAAAJ&hl=en>

Director of the Oxford Centre for Collaborative Applied Mathematics (OCCAM)  
Mathematical Institute  
University of Oxford, UK

### Research Interests:

- Methods of Applied Mathematics (differential equations, dynamical systems,...)
- Discrete and continuum mechanics, elasticity, plasticity.
- Application of mechanics and mathematics to biology.
- Mathematical modeling in physics and engineering.
- Interesting and otherwise unclassifiable mathematical problems.

### **Selected Publications:**

- A. Goriely, *Integrability and Nonintegrability of Dynamical Systems*, Advanced Series on Nonlinear Dynamics, World Scientific 2001 (436 pages)
- J. McMahon, A. Goriely, and M. Tabor, 2010 Nonlinear morphoelastic plates II: Exodus to buckled states *Mathematics and Mechanics of Solids* (To be published).
- J. McMahon, A. Goriely, and M. Tabor, 2010 Nonlinear morphoelastic plates I: Genesis of residual stress *Mathematics and Mechanics of Solids* (To be published).
- M. Detsrade, A. Goriely, G. Saccomondi, 2010 Scalar evolution equations for shear waves in incompressible solids: a simple derivation of the Z, ZK, KZK, and KP equations. *Proc. Roys. Soc. A* (to be published)
- A. Goriely, D. Moulton, and R. Vandiver, 2010 Elastic cavitation, tube hollowing, and differential growth in plants and biological tissues *Europhys. Lett.* (to be published)
- D. Moulton and A. Goriely, 2010 Anticavitation and differential growth in elastic shells *J. Elasticity* (To be published).
- D. Ambrosi, G. A. Ateshian, E. M. Arruda, M. Ben Amar, S. C. Cowin, J. Dumais, A. Goriely, G. A. Holzapfel, J. Humphrey, R. Kemkemer, E. Kuhl, J. Ma, J. E. Olberding, L. A. Taber, R. Vandiver, and K. Garikipati, 2010 Perspectives on biological growth and remodeling *J. Mech. Phys. Solids* (to be published).
- M. A. Beauregard, A. Goriely, and M. Tabor, 2010 The nonlinear dynamics of elastic tubes conveying a fluid *International Journal of Solids and Structure*, 47 161-168.
- Peter S. Stewart, Sarah L. Waters, Tamer El Sayed, Dominic Vella and Alain Goriely, “Wrinkling, creasing, and folding in fiber-reinforced soft tissues”, *Extreme Mechanics Letters*, available online 4 November 2015
- A. Goriely, J.A.W. van Dommelen, M.G.D. Geers, G. Holzapfel, J. Jayamohan, A. Jérusalem, S. Sivaloganathan, W. Squier, S. Waters, E. Kuhl, *Mechanics of the brain: Perspectives, challenges, and opportunities*, *Biomech. Model. Mechanobiol.*, 14 (5) (2015), pp. 931–965
- A. Goriely, M. Tabor, Rotation, inversion and perversion in anisotropic elastic cylindrical tubes and membranes, *Proc. R. Soc. A*, 256 (2013), p. 2153
- Chirat, R., Moulton, D. E. & Goriely, A. Mechanical basis of morphogenesis and convergent evolution of spiny seashells. *Proc. Natl Acad. Sci. USA* 110, 6015–6020 (2013).
- Moulton, D. & Goriely, A. 2011 Circumferential buckling instability of a growing cylindrical tube. *J. Mech. Phys. Solids* 59, 525–537.
- A. Goriely, M. Tabor, Spontaneous rotational inversion in phycomyces, *Phys. Rev. Lett.*, 106 (2011), Article 138103
- Riccardo De Pascalis, Michel Destrade and Alain Goriely, “Nonlinear Correction to the Euler buckling formula for compressed cylinders with guided-guided end conditions”, *Journal of Elasticity*, Vol. 102, No. 2, pp 191-200, February 2011
- A. Goriely, R. Vandiver, On the mechanical stability of growing arteries, *IMA J. Appl. Math.*, 75 (4) (2010), pp. 549–570
- Goriely A. and Moulton D., *New trends in the Physics and Mechanics of Biological Systems*, Lecture Notes of the Les Houches Summer School, edited by Ben Amar M., Goriely A., Mueller M. M. and Cugliandolo L. F., Vol. 92 (Oxford University Press, Oxford) 2009.
- Goriely A, Robertson-Tessi M, Tabor M, Vandiver R (2008) Elastic growth models. *Appl Optim* 102: 1–44
- Alain Goriely, Rebecca Vandiver and Michel Destrade, “Nonlinear Euler Buckling”, *Proceedings of the Royal Society A*, Vol. 464, No. 2099, pp. 3003-3019, November 2008
- A. Goriely, M. Destrade and M. Ben Amar, “Instabilities in elastomers and in soft tissues”, arXiv:0711.4664v1 [cond-mat.soft] 29 Nov 2007
- Chouaieb N., Goriely A., Maddocks J.H.: Helices. *Proc. Natl. Acad. Sci. USA* 103, 9398–9430 (2006)

Ben Amar, M. & Goriely, A. Growth and instability in elastic tissues. *J. Mech. Phys. Solids*. 53, 2284–2319 (2005).

Ben Amar M, Goriely A, 2005 Growth and instability in soft tissues. *J. Mech. Phys. Solids*. 53, 2284 \_2319. doi:10.1016/j.jmps.2005.04.008.

Alain Goriely and Martine Ben Amar, “Differential Growth and Instability in Elastic Shells”, *Phys. Rev. Lett.* 94, 198103 (2005)

A. Goriely and M. Ben Amar, “On the Definition and Modeling of Incremental, Cumulative, and Continuous Growth Laws in Morphoelasticity,” ENS-LPS Report No. BA2005-1, 2005

Goriely A., Tabor M.: Spontaneous helix-hand reversal and tendril perversion in climbing plants. *Phys. Rev. Lett.* 80, 1564–1568 (1998)