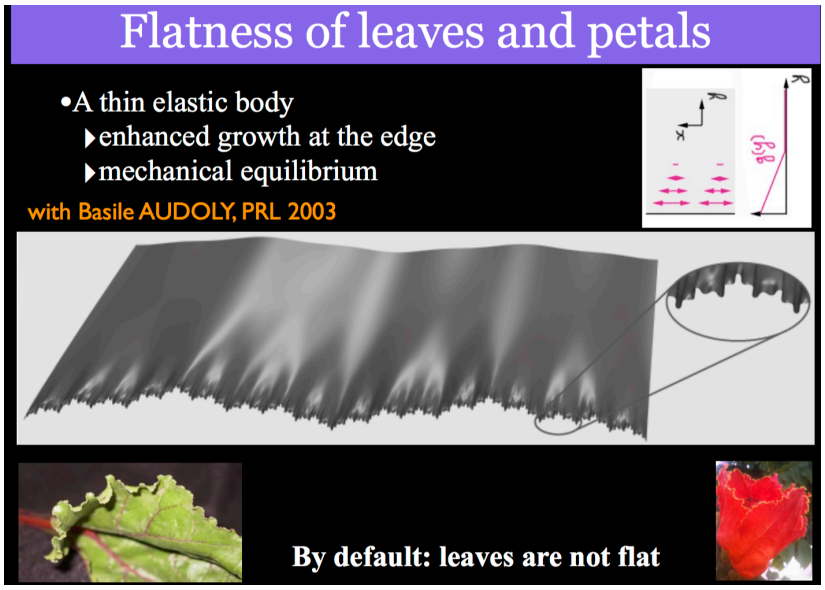
Professor Arezki Boudaoud



From: Audoly, B., and Boudaoud, A., 2003, "Self-Similar Structures Near Boundaries in Strained Systems," Phys. Rev. Lett., 91, p. 086105.

See:
http://physics.aps.org/authors/arezki_boudaoud
http://www.lps.ens.fr/~boudaoud/
http://www.ens-lyon.eu/recherche/arezki-boudaoud-iuf-junior-2013-199723.kjsp?RH=ENS-LYON-FR-RECH-FAI
http://www.cnrs.fr/insb/recherche/erc/STG-2012-Boudaoud.html
http://translate.google.com/translate?hl=en&sl=fr&u=http://www.cnrs.fr/insb/recherche/erc/STG-2012-Boudaoud.html&prev=search

Laboratoire Joliot-Curie & Laboratoire de Reproduction et Développement des Plantes
École Normale Supérieure de Lyon (ENS de Lyon)

Short Biography in English:
Arezki Boudaoud obtained a Ph.D. in 2001 from Université Pierre et Marie Curie, Paris. After a postdoctoral stay at MIT, he was hired as a CNRS Research scientist at Ecole Normale Supérieure, Paris. He initially worked in nonlinear and statistical physics, notably addressing pattern formation in thin solid and liquid sheets, and gradually switched to morphogenesis in living systems. He joined the Department of Biology at Ecole Normale Supérieure de Lyon in 2009. His team currently investigates the biomechanics of morphogenesis in plants and in animals, as well as the mechanisms that make the shape of organisms reproducible.

A Second Biography in English:
(1) Reproduction and development of plants (RDP) - CNRS / INRA / ENS Lyon / Université Claude Bernard Lyon: After initial training in physics, a PhD in statistical physics carried Laboratory (LPS) of Ecole Normale Supérieure (ENS) in Paris and supported at the University Pierre et Marie Curie, then a postdoc at Department of Mathematics the Massachusetts Institute of Technology (MIT) in the US, Arezki Boudaoud returns to LPS to work as a research fellow. His research focuses on thin films, liquids and solids. In parallel, he became

interested in the morphogenesis in the living and clarifies certain aspects of the role of mechanical forces in the yeast growth and development of plants. It completely switches to the biological sciences in 2009, when he joined the Biology Department of ENS Lyon. Since then, he leads the interdisciplinary team 'Biophysics and development ", jointly laboratory RDP and Joliot-Curie Laboratory (YOA). The team seeks to decipher the mechanisms of morphogenesis in plants, by combining the tools of biology and physics.

(2) Biophysical basis of morphogenesis in plants (PhyMorph): Morphogenesis is the remarkable process by which a living body acquires its shape and pass from an egg to an animal or a seed to a whole plant. While molecular biology and genetics have enabled major advances in understanding the cellular basis of development, the genesis of forms remains a mystery. The shape is determined by the structural elements used in the construction of the body such as the cytoskeleton and the extracellular matrix to the cell level, the skeleton organization-wide ... The study of morphogenesis must also identify how cells control the mechanical properties of these elements and how it leads to well-defined shape changes. The "PhyMorph" aims specifically to answer the following questions: the state of cell differentiation there is a mechanical identity? The mechanical properties of cells they predict changes in shape? How the variability of cell behavior-leaves she place reproducible forms from one individual to another? Researchers combine physical, molecular biology, tissue imaging and mathematical models of tissue engineering, to elucidate the mechanisms of morphogenesis at the shoot apex of the model plant Arabidopsis thaliana.

Biography in French (no translation available):
Actuellement professeur de Biologie à l'École Normale Supérieure de Lyon, Arezki Boudaoud est chercheur au Laboratoire Joliot-Curie & au Laboratoire de Reproduction et Développement des Plantes. Son domaine de recherche : Biophysique et développement. Signe particulier : ce physicien a été recruté par un laboratoire de biologie (Laboratoire de reproduction et développement des plantes (RDP). Il exerce également ses activités de recherche au sein du laboratoire transdisciplinaire Joliot-Curie (LJC). Nous avons déjà parlé d'Arezki Boudaoud à plusieurs reprises notamment pour une publication dans CELL, mais également parce qu'il est un grand vulgarisateur : « Pourquoi l'œuf a-t-il la tête dure ? ». et un grand questionneur *« Comment les végétaux poussent-ils ? »*.

Après un doctorat de physique à l'École Normale Supérieure de Paris, Arezki Boudaoud fait son post-doctorat au Département de Mathématiques du prestigieux MIT (Massachussets Institute of Technology). Il revient ensuite au Laboratoire de Physique Statistique de l'ENS Ulm comme Chargé de recherche. Ses travaux portent alors sur les films liquides et solides minces. En parallèle, il commence à s'intéresser à la morphogenèse dans le vivant et identifie des contributions des forces mécaniques à la croissance de la levure et au développement des plantes.

C'est en 2009 que ce physicien bascule complètement vers la biologie : il rejoint l'École Normale Supérieure de Lyon comme Professeur au Département de biologie et anime depuis une équipe interdisciplinaire au laboratoire Reproduction et Développement des Plantes (RDP) et au Laboratoire Joliot-Curie (LJC). L'équipe, intitulée *« Biophysique et Développement »*, travaille à la compréhension des mécanismes de la morphogenèse chez les plantes, en combinant outils de la biologie et de la physique. En 2012, Arezki Boudaoud est lauréat d'une *Consolidated Grant* de l'European research Council (ERC) pour son projet : *The physical basis of morphogenesis in plants* (voir article web).

L'équipe d'Arezki Boudaoud, rattachée conjointement au RDP et au Laboratoire Joliot-Curie de l'ENS de Lyon,

collabore déjà avec celle de Jan Traas *Développement du méristem floral*, lauréat d'une advanced grant ERC 2011 pour son projet *Morphodynamics in Plants: from gene to shape LS3 (Cellular and Developmental Biology)*.

Selected Publications:

Boudaoud A, Patricio P, Couder Y, Ben Amar M. Dynamics of singularities in a constrained elastic plate. Nature 2000;407:718–20.

Audoly, B., and Boudaoud, A., 2003, "Self-Similar Structures Near Boundaries in Strained Systems," Phys. Rev. Lett., 91, p. 086105.

Boudaoud, A., and Chaïeb, S., 2003, "Mechanical Phase Diagram of Shrinking Cylindrical Gels," Phys. Rev. E, 68, p. 021801.

Mora, T., and Boudaoud, A., 2006, "Buckling of Swelling Gels," Eur. Phys. J. E, 20, pp. 119–124.

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"The buckling of a swollen thin gel layer bound to a compliant substrate", J. Applied Mechanics, Vol. 75, September 2008, pp. 051002-1 – 051002-5, doi: 10.1115/1.2936922

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"Buckling of a stiff film bound to a compliant substrate—Part I: Formulation, linear stability of cylindrical patterns, secondary bifurcations", Journal of the Mechanics and Physics of Solids, Vol. 56, No. 7, July 2008, pp.2401-2421, doi:10.1016/j.jmps.2008.03.003

Audoly, B., Boudaoud, A., 2008a. Buckling of a thin film bound to a compliant substrate—Part II: A global scenario for the formation of herringbone pattern. J. Mech. Phys. Solids, in press, doi:10.1016/j.jmps.2008.03.002.

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Chopin J, Vella D, Boudaoud A. The liquid blister test. Proc R Soc Lond Ser A. 2008;464:2887–2906.

Dominic Vella, Jose Bico, Arezki Boudaoud, Benoit Roman and Pedro M. Reis, "The macroscopic delamination of thin films from elastic substrates", Proc Natl Acad Sci USA, Vol. 106(27), 2009, DOI: 10.1073/pnas.0902160106

Boudaoud, A., 2010. An introduction to the mechanics of morphogenesis for plant biologists. Trends Plant Sci. 15, 353–360.

Vella D, Ajdari A, Vaziri A, Boudaoud A. (OCCAM, Mathematical Institute, University of Oxford, 24-29 St Giles', Oxford, OX1 3LB, United Kingdom), “Wrinkling of pressurized elastic shells”, Phys. Rev. Lett., Vol. 107, No. 17, 174301, October 2011

Brau, F., Vandeparre, H., Sabbah, A., Poulard, C., Boudaoud, A., Damman, P., 2011. Multiple-length-scale elastic instability mimics parametric resonance of nonlinear oscillators. Nat. Phys. 7, 56–60

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“Anisotropic Blistering Instability of Highly Ellipsoidal Shells”, Phys. Rev. Lett. 112, 094302 – Published 6 March 2014,
DOI: http://dx.doi.org/10.1103/PhysRevLett.112.094302