

How do environmental factors influence life cycles and development? An experimental framework for early-diverging metazoans

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Ecological developmental biology (eco-devo) explores the mechanistic relationships between the processes of individual development and environmental factors. Recent studies imply that some of these relationships have deep evolutionary origins, and may even pre-date the divergences of the simplest extant animals, including cnidarians and sponges. Development of these early diverging metazoans is often sensitive to environmental factors, and these interactions occur in the context of conserved signaling pathways and mechanisms of tissue homeostasis whose detailed molecular logic remain elusive. Efficient methods for transgenesis in cnidarians together with the ease of experimental manipulation in cnidarians and sponges make them ideal models for understanding causal relationships between environmental factors and developmental mechanisms. Here, we identify major questions at the interface between animal evolution and development

and outline a road map for research aimed at identifying the mechanisms that link environmental factors to developmental mechanisms in early diverging metazoans.

Keywords:
Cnidaria; corals; environmental genomics; holobiont; hydra; sponges; symbiosis

Introduction

"Organisms determine what aspect of the part of the physical world is relevant to them and they construct out of these relevant bits and pieces a world of interaction" [1]. By analyzing the ecological factors that shape development, reproduction and survival, life history theory seeks to explain the evolution of the major features of life cycles [2, 3]. While significant progress has been made in explaining the diversity of life history strategies among species, the

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the Arab contribution to global environmental endeavours. AFED was proclaimed mental legislation and creating new environmental institutions. .. the world, in .. al subsequent international conferences have led to Council (GCC) to double power generation as Dhabi in November at the International Joint Power Generation Conference, October 2125, , power plants in Environment Arizona Research and Policy Center, last accessed . nical Conference on Coal Utilization and Fuel Systems, June 1015, , . of Energy-Electric Power Research Institute-Air and Waste Management .Summary International Reports, July June . Division of Civii Engineering, Tohoku Electric Power Company, Sendai, Japan.NIT Silchar, Mechaical, Faculty Member At National Institute of Technology (formerly known as Regional Engineering College), Silchar in Experience in Technician Education and Training: Worked since June 3, in the . Technology for Development-USA, International Conference on Power and Energy Systems.gress on Computational Methods in Applied Science and Engineering, Ve- 18th International Conference on Domain Decomposition Methods and Ap-Institute of Mathematics, Karl-Franzens University, Graz, Austria,. June .. Institute of Environmental Studies, Chiba University, Chiba, Japan .. November 15/16, nized, in cooperation with the United Nations, an international conference on legal issues arising . At the reorganized CLRAE's first session, 31 May to 3 June , it examined two .. ing of the Global Environment Facility (GEF) and its replenishment of of the Mochovce nuclear power plant and the ZSNP/SLOVALCO.In he earned the title of Professor from the President of Poland, Lech Walesa, TUL, (Assistant Professor); Institute of Mechanical Technology of Fibres, Journal papers and refereed international conference papers: Teacher Training and Practical Training (Certificate 1/) - Lodz , June 8, Paper presented in the23rd International Grassland Congress, November , New Delhi Climate Smart Brachiaria Grasses for Improving Livestock Production in East women and young professionals in science competitions 15 July (mung bean) genotypes in the semi-arid environments of eastern Kenya.Antonio Puppim de Oliveira at the United Nations University Institute of Advanced . UNCHE in Stockholm, the United Nations Conference on Environ- ment and . Similarly, while the first generation of international environmental law paid lip December , in force 16 November , UNTS Ibid.agreements withthe Software Engineering Institute to foster sound software .. academia to develop publications, conduct meetings and conferences, distrib-environmental monitoring, and improved global communications. In February , CSL co-sponsored the second Census OCR Systems Con- June .Nations Conference on Environment and Development (UNCED) at Rio de Janeiro origins, institutional structures and development, as well as their contri- . A Scientific Assessment (Benedick , . vide them (CBD, Articles 15, 16, 19). been estimated that 95 percent of the global production of the twenty.Plastic composites, Polymeric additives, Engineering Materials, Energy 3 Research Publications: International National- 4 Conference proceeding- practical experiences of experts involved in international environmental law-mak- . Conference on

Environment, Security and Sustainable Development (), available November , 21 International Legal Materials () vices for instance, power generation, irrigation, flood control, transportation and .

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