Pablo Catalán Fernández

Postdoctoral researcher
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Career summary

I just finished my PhD in theoretical evolutionary biology under the supervision of Professor José A. Cuesta. We were interested in understanding the complexities of the genotype-phenotype map and their consequences on the dynamics of the evolutionary process. To this end, we developed toyLIFE, a computational model that integrates molecular, regulatory and metabolic processes, and that will allow us to study the construction and evolution of complex phenotypes.

For my postdoctoral research I plan on continuing working on toyLIFE, but also expand my research to tackle questions in antibiotic resistance and systems biology.

Education

Sep 2013—present: BSc in Mathematics (4-year degree, currently studying 4$^{\text{th}}$ year)
Universidad Española de Educación a Distancia (UNED)

Sep 2011—Oct 2012: PhD in Mathematical Engineering
Universidad Carlos III de Madrid (UC3M)
Graduated *cum laude* || *Thesis*: Models in molecular evolution: the case of toyLIFE

Sep 2011—Oct 2012: MSc in Modelling and Physics of Complex Systems
Universidad Rey Juan Carlos I de Madrid (URJC)
GPA: 3.45 || *Thesis*: Mutation-selection equilibrium in finite populations playing a Hawk-Dove game

Sep 2006—Jun 2011: BSc+MSc in Biology (5-year degree)
Universidad Complutense de Madrid (UCM)
GPA: 3.66 (Graduated with honors)

Additional formation

Jul 2016 XXIIIth International Summer School "Nicolás Cabrera"
Organized by Universidad Autónoma de Madrid

Sept 2013 Third Summer School on Physics of Complex and Small Systems
Organized by GEFENOL and IFISC

Awards

Mar 2016 MINECO Short-Term Fellowship: 60 days visit to Robert Beardmore's lab, University of Exeter.

Mar 2015 EMBO Short-Term Fellowship: 90 days visit to Andreas Wagner's lab, University of Zurich.

Professional Experience

Apr 2017—present: Postdoctoral researcher
Department of Mathematics, Universidad Carlos III de Madrid (UC3M)
Research topic: Models in molecular evolution
Supervisor: Prof. José A. Cuesta

Dec 2016—Feb 2017: Predoctoral researcher
Department of Mathematics, Universidad Carlos III de Madrid (UC3M)
Research topic: Models in molecular evolution
Supervisor: Prof. José A. Cuesta

Dec 2012—Dec 2016: Predoctoral fellow (FPI fellowship)
Department of Mathematics, Universidad Carlos III de Madrid (UC3M)
Research topic: Models in molecular evolution
Supervisor: Prof. José A. Cuesta

Oct 2010—Jun 2011: Assistant scholar
Department of Ecology, Universidad Complutense de Madrid (UCM)
Research topic: Reproductive allocation strategies in *Cistus ladanifer*
Supervisor: Dr. Juan Antonio Delgado

Jun 2010—Sep 2010: Research assistant
Department of Ecosystem Biogeochemistry, Institute of Natural Resources (CSIC)
Research topic: Biogeochemistry in lakes
Supervisor: Prof. Salvador Sánchez-Carrillo

Dec 2008—Jun 2010: Excellency scholar
Department of Ecology, Universidad Complutense de Madrid (UCM)
Research topic: Reproductive allocation strategies in *Cistus ladanifer*
Supervisor: Dr. Juan Antonio Delgado

Teaching

2015-2016: Linear Algebra (problems)
One semester course, taught to first year students in the Degree in Industrial Technology Engineering
Universidad Carlos III de Madrid

Languages

English: Full professional proficiency (C2).

French: Elementary proficiency (A2).

Publications

7. Catalán, P., Arias, C.F., Cuesta, J. A. and Manrubia, S. **2017** Adaptive multiscapes: an up-to-date metaphor to visualize molecular adaptation. ***Biology Direct* 12:7**.

6. Catalán, P., Delgado, J.A., Jiménez, M.D. and Balaguer, L. **2016**. Sink strength manipulation in branches of a Mediterranean woody plant suggests sink-driven allocation of biomass in fruits but not of nutrients in seeds. ***Acta Physiologiae Plantarum* 38:193**.

5. Planchuelo, G., Catalán, P. and Delgado, J.A. **2016**. Gone with the wind and the stream: Dispersal in the invasive species *Ailanthus altissima*. ***Acta Oecologica* 73:31-37**.

4. Planchuelo, G., Catalán, P., Delgado, J.A. and Murciano A. **2016**. Estimating wind dispersal potential in *Ailanthus altissima*: The need to consider the three-dimensional structure of samaras. ***Plant Biosystems***, DOI: 10.1080/11263504.2016.1174170.

3. Catalán, P., Seoane, J.M. and Sanjuán, M.A.F. **2015**. Mutation-selection equilibrium in finite populations playing a Hawk-Dove game. ***Communications in Nonlinear Science and Numerical Simulations*** **25:66-73**.

2. Arias, C.F., Catalán, P., Manrubia, S.M. and Cuesta, J.A. **2014**. t$_{OY}$LIFE: a computational framework to study the multi-level organization of the genotype-phenotype map. ***Scientific Reports*** **4: 7549**.

1. Catalán, P., Vázquez de Aldana, B.R., De las Heras, P., Fernández-Seral, A. and Pérez-Corona, M.E. **2013**. Comparing the allelopathic potential of exotic and native plant species on understory plants: are exotic plants better armed? ***Anales de Biología*** **35: 65-74**.

Conference contributions

Posters

4. Catalán, P., Fernández-Arias, C. and Cuesta, J. A. **2014**. t$_{OY}$LIFE: un universo de juguete para comprender mejor la evolución. **XIX Congreso de Física Estadística (FISES '14). April 2-4th 2014, Ourense (Spain)**.

3. Catalán, P., Jiménez, M.D., Delgado, J.A. and Balaguer, L. **2011**. Variation in sink strength affects size-mediated competition within the crown. **12 th EEF Congress. September 25-29th 2011, Ávila (Spain)**.

2. Pérez-Corona, M.E., Catalán, P., Fernández-Seral, A., De las Heras, P., Castro-Díez, P. and Vázquez de Aldana, B.R. **2011**. Effect of riverine invasive species in germination and radicle growth of understory species. **12 th EEF Congress. September 25-29th 2011, Ávila (Spain)**.

1. Pérez-Borrero, B., Catalán, P., Aguilar, E.Y., Fontecha, G., Trabanino, R., Gallego, F.J., Figueiras, A.M. and Benito, C. **2010**. Identificación con diferentes marcadores moleculares de cepas de Beauveria bassiana utilizadas en la lucha biológica contra la broca del café (Hypothenemus hampei). **XII Congreso Internacional de manejo integrado de plagas / XX reunión anual de la Sociedad americana de fitopatología (APS-CD). August 24-27th 2010, Managua (Nicaragua)**.

Talks

4. Catalán, P. **2016**. t$_{OY}$LIFE, or the importance of being promiscuous. **International Workshop on Genotype-Phenotype Maps 2016 (IWGP 2016). 8-9 September 2016, Cambridge (UK)** (invited talk).

3. Catalán, P. **2015**. t$_{OY}$LIFE: the complexities of the genotype-phenotype map. **Modelling Biological Evolution 2015 (MBE '15), April 28-May 1 2015, Leicester (UK)** (invited talk).

2. Catalán, P. **2014**. t$_{OY}$LIFE: a toy Universe for gaining insight into biological evolution. **XI GISC Workshop, February 7th 2014, Madrid (Spain)**.

1. Catalán, P., Fernández-Arias, C. and Cuesta, J. A. **2013**. t$_{OY}$LIFE: a toy Universe for gaining insight into evolution. **4th SESBE Meeting. November 27-29th 2013, Barcelona (Spain)**.