Pablo Catalán

Ramón Areces Postdoctoral Fellow
Biosciences
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Education

2017: PhD in Mathematical Engineering
Carlos III University of Madrid (UC3M) || Graduated *cum laude*, awarded extraordinary prize
Thesis: Models in molecular evolution: the case of toyLIFE

2017: BSc in Mathematics (4-year degree)
National Distance Education University (UNED) || GPA: 9.5 (out of 10)
Studied simultaneously with PhD

2012: MSc in Modelling and Physics of Complex Systems
King Juan Carlos I University of Madrid (URJC) || GPA: 9.75 (out of 10)
Thesis: Mutation-selection equilibrium in finite populations playing a Hawk-Dove game

2011: BSc+MSc in Biology (5-year degree)
Complutense University of Madrid (UCM) || GPA: 9.74 (out of 10) (Graduated with honors)

Work Experience

Sep 2018—present: Visiting researcher
Biosciences, University of Exeter
Research topic: Mathematical models in antibiotic resistance
Supervisor: Prof. Robert Beardmore

Apr 2017—Jul 2018: Postdoctoral researcher
Department of Mathematics, Carlos III University of Madrid
Research topic: Models in molecular evolution
Supervisor: Prof. José A. Cuesta

Mar 2016—May 2016: Visiting researcher
Biosciences, University of Exeter
Research topic: Mathematical models in antibiotic resistance
Supervisor: Prof. Robert Beardmore

Mar 2015—Jul 2015: Visiting researcher
Institute of Evolutionary Biology and Environmental Studies, Univeristy of Zurich
Research topic: Models in molecular evolution
Supervisor: Prof. Andreas Wagner

Dec 2012—Feb 2017: FPI Predoctoral Fellow
Department of Mathematics, Carlos III University of Madrid
Research topic: Models in molecular evolution
Supervisor: Prof. José A. Cuesta

Oct 2008—Jun 2011: Assistant researcher (undergraduate)
Department of Ecology, Complutense University of Madrid
Research topic: Reproductive allocation strategies in *Cistus ladanifer*
Supervisor: Dr. Juan Antonio Delgado

Awards

Oct 2018 Ramón Areces Postdoctoral Fellowship: 1 year fellowship to carry out research at the University of Exeter (22 awarded that year by the Ramón Areces Foundation).

Jan 2018 Best poster award at the 6th meeting of the Spanish Society for Evolutionary Biology (Palma de Mallorca, Spain).

Mar 2016 Short-Term Fellowship for a 60 days visit to Robert Beardmore's lab, University of Exeter (awarded by the Spanish Ministry of Economy).

Mar 2015 Short-Term Fellowship for a 120 days visit to Andreas Wagner's lab, University of Zurich (awarded by EMBO)

Dec 2012 FPI PhD Fellowship: 4 year fellowship to carry out a PhD at Carlos III University (awarded by the Spanish Ministry of Economy).

Sep 2010 Assistant scholarship: 1 year fellowship to collaborate in research as an undergraduate (awarded by Complutense University of Madrid).

Sep 2009 Excellency scholarship: 1 year fellowship to collaborate in research as an undergraduate (awarded by the Regional Government of Madrid).

Sep 2008 Excellency scholarship: 1 year fellowship to collaborate in research as an undergraduate (awarded by the Regional Government of Madrid).

Teaching

2015-2016, 2017-2018: Linear Algebra (problems)
One semester course, taught to first year students in the Degree in Industrial Technology Engineering at Carlos III University of Madrid

Languages

English: Full professional proficiency (C2).

French: Elementary proficiency (A2).

Publications

10. García-Martín, J.A., CATALÁN, P., Manrubia, S. and Cuesta, J. A. **2018**. Statistical theory of phenotype abundance distributions: a test through exact enumeration of genotype spaces. ***Europhysics Letters*** **123:2800**.

9. Aguirre, J., CATALÁN, P., Cuesta, J. A. and Manrubia, S. **2018**. On the networked architecture of genotype spaces and its critical effects on molecular evolution. ***Open Biology*** **8:180069.**

8. CATALÁN, P., Wagner, A., Manrubia, S. and Cuesta, J. A. **2018**. Adding levels of complexity enhances robustness and evolvability in a multi-level genotype-phenotype map. ***Journal of the Royal Society Interface*** **15:20170516**.

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*, 151:316-322**.

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**. tOYLIFE: 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

Talks

5. CATALÁN, P., Manrubia, S. and Cuesta, J.A. **2018**. Non-Markovian jumping times and evolutionary irreversibility in a computational genotype-phenotype map. **XXII Congreso de Física Estadística (FISES '18). October 18-20th 2018, Madrid (Spain)**.

4. CATALÁN, P. **2016**. tOYLIFE, 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**. tOYLIFE: 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**. tOYLIFE: 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**. tOYLIFE: a toy Universe for gaining insight into evolution. **4th SESBE Meeting. November 27-29th 2013, Barcelona (Spain)**.

Posters

8. CATALÁN, P., Nieto, C., Prat, S. and Ares, S. **2018**. A non-linear model to explain how plants integrate light and temperature to decide how much to grow. **XXII Congreso de Física Estadística (FISES '18). October 18-20th 2018, Madrid (Spain)**.

7. CATALÁN, P., Manrubia, S. and Cuesta, J. A. **2018**. Adding levels of complexity enhances robustness and evolvability in a multi-level genotype-phenotype map. **6th SESBE Meeting. January 17-19th 2018, Palma de Mallorca (Spain)**.

6. CATALÁN, P., Manrubia, S. and Cuesta, J. A. **2017**. The evolution of pattern formation in tOYLIFE, a multi-level model of the genotype-phenotype map. **EMBO Conference Quantitative Principles in Biology. 2-4 Noviembre 2017. Heidelberg (Germany)**.

5. CATALÁN, P., Manrubia, S. and Cuesta, J. A. **2017**. Evolutionary dynamics on shifting environments suggest new antibiotic therapies. **Gordon Research Conference: Molecular Mechanisms in Evolution. June 11-17th 2017, Easton (USA)**.

4. CATALÁN, P., Fernández-Arias, C. and Cuesta, J. A. **2014**. tOYLIFE: 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)**.