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Seminar: Stuart McDaniel '94: Using moss model systems to clarify patterns of biodiversity

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Using moss model systems to clarify patterns of biodiversity

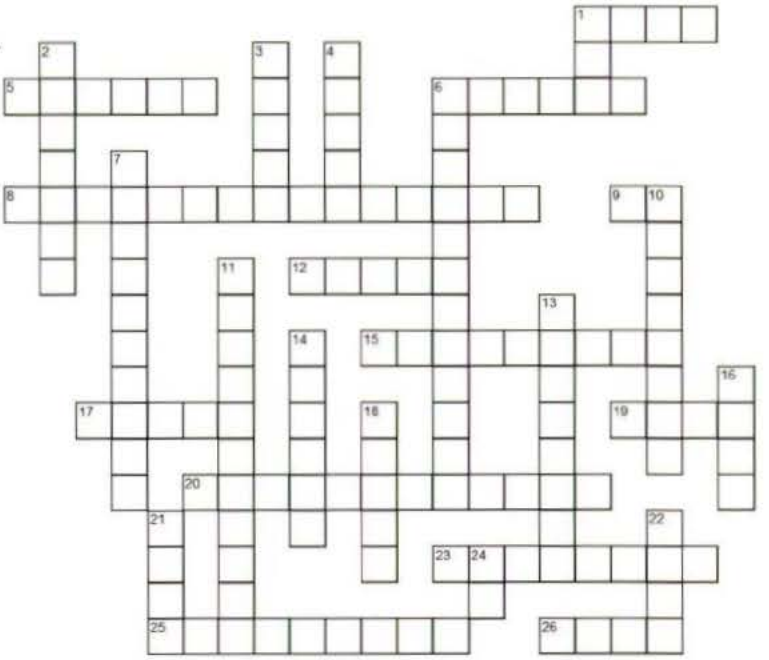
By Sesha Nandyal

On February 10th, Stuart McDaniel (OC '94), a fourth generation Obie and current Assistant Biology Professor at the University of Florida, presented a riveting description of his research concerning the evolution of reproductive isolation in moss species. After getting his Ph.D. from Duke University in 2005, he decided to continue with his research in the genetics of adaptation and reproductive variation. He is currently working on the exploration and identification of genes involved in sex-ratio distortion, adaptive life-history variation among populations, and the consequences involved in crossing divergent populations and species.

Physcomitrella patens and *Ceratodon purpureus*, two interesting moss model systems, have convenient haploid genetics and highly developed gene targeting tools that simplify McDaniel's research of genetic distortion. Using these strains of moss, sampled from the East Coast, he and his team of postdoctoral researchers study variation. His presentation, titled *Genomic and macroevolutionary consequences of dioecy: insights from moss model systems*, highlighted the ability of certain organisms to change sexual systems within a species over time. These sexual systems, namely dioecy and monoecy, respectively consist of: 1) two sexes, male and female, offering the promise of genetic diversity, and 2) hermaphroditism, which carries the benefit of reproductive assurance.

By using phylogenetic reconstructions for hermaphroditic mosses and checking them by identifying sister groups, McDaniel found that 60 percent of switches were from single sex to two sexes. This showed a slight trend toward diversification by sexual dimorphism. McDaniel then proceeded to grow different strains of moss under ideal conditions for crossing and finally achieved a cross that supported the pattern. This led him to conclude that the benefits of sexual dimorphism outweigh those of hermaphroditic systems. According to McDaniel's research, this phenomenon fuels the evolution of mating systems in certain moss species.

For further information on his project, check out his most recent article, *An experimental method to facilitate the identification of hybrid sporophytes in the moss Physcomitrella patens using fluorescent tagged lines.*



ACROSS

1 Oberlin's resident developmental biologist
5 Opposite of ventral
6 Alliterative phrase, "_____ Tough!"; refers to a material discussed in this issue
8 A hormone largely involved in chronic and acute stress
9 A unit of sound frequency
12 O_3 in the atmosphere
15 A bioluminescent bacterium
17 Whose free energy?
19 What dissipates from your hand when you stick it into cold water
20 A type of genetic "tree"
23 An organism which does a "waggle-dance"
25 Someone who studies the structure of living organisms
26 A color which often depicts oxygen in NASA photographs

DOWN

1 An aldehyde functional group. Also, like a sneeze when coupled with "A" and "O"
2 A part of the inner ear
3 What a computer programmer's first program says (or prints) to the world; a greeting
4 In $E = mc^2$, c = the speed of _____
6 Dr.David Eagleman's self-titled role in the neuroscience community
7 Current Oberlin environmental competition
10 Ginger's genus name
11 A neurological "blending of the senses"
13 Cl_2; a compound you might out in your pool
14 The skies have a "Crab" one
16 Abbreviation for a certain non-stick surface
18 What igneous rocks are made from
21 A receptor type involved in long-term potentiation
22 An organic material which is the focus of Dr. Fuchsman's research
24 A functional group which creates an alcohol

References, full interviews, and applications to join our fall staff (available May 1) can be found at **TheSynapseMagazine.com**

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