



Plant - Animal Interactions

Bot 456

<http://www.botany.hawaii.edu/faculty/daehler/BOT456/bot456.htm>

Instructor: Curt Daehler
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Text: Howe, H. F., and L. C. Westley. 1992. *Ecological relationships of plants and animals*.
Oxford University Press, New York, 273 p

Required materials: I-clicker.

Learning outcomes:

- Identify and appreciate different types and degrees of interdependence among plants and animals.
- Describe and explain plant-animal interactions in the context of ecological and evolutionary theory
- Describe how understanding of plant-animal interactions can be applied to benefit human interests
- Demonstrate proficiency in interpreting and critiquing primary literature on plant-animal interactions.
- Develop skills in scientific inquiry, research and collaboration.

GRADES -- The +/- system will be used.

Midterm I	27.5%
Midterm II	27.5%
Pre- and post-class assignments	20%
Class/Team participation	5%
Simulation write-up	5%
Team research project	15% (Includes final report = final exam)

- Assignments are due at the start of class and should be turned in as hardcopies.
- Up to two absences and/or missing pre/post class assignments will not affect your grade
- Pre/post class assignments may be submitted up to 48 hours late for half-credit.

CLASS SCHEDULE

DATE	DAY	SUBJECT	READING
		CARNIVOROUS PLANTS	
August 25	Tues	Syllabus delivery by email, no class meeting	
27	Thurs	CARNIVOROUS PLANTS (VIDEO)	Ellis and Midgley 1996
Sept 1	Tues.	Class Overview, carnivorous plants discussion	
3	Thurs.	POLLINATION Intro. to pollination, syndromes	H+W 108-116 Weiss 1991
8	Tues	Characteristics of pollinators	H+W pp. 131-144
10	Thurs	Pollinator specialization	Kremen et al 2002
15	Tues.	Pollinators in Hawaii	Cox-Foster et al 2007
17	Thurs.	PLANT DISPERSAL Intro. to dispersal, syndromes	H+W 117-126 Olesen and Valido 2003
22	Tues	Costs and benefits of animal dispersal	H+W 144-154 Bond and Slingsby 1984
24	Thurs	PLANT MUTUALISMS Evolution of mutualisms	H+W 161-163
29	Tues.	Ants - Indirect interactions with plants	Currie et al. 1999
Oct 1	Thurs.	Mutualisms – extrafloral nectaries, leaf domatia	H+W 126-130 Willmer and Stone 1997
Oct 6	Tues	Midterm I	
8	Thurs	Guest presentation	
13	Tues.	HERBIVORY Introduction to herbivory	H+W 29-40 Lev-Yadun et al 2009
15	Thurs.	Induced defenses	Karban et al 2000
20	Tues	Herbivore counter-defenses, coevolution?	H+W 40-57 Janzen 1980
22	Thurs	Herbivory as a mutualism? Specialized herbivores: galls	Owen and Weigert 1976 Schwachtje et al 2006
27	Tues.	Theories of plant defense	H+W 58-87 Cook 1911
29	Thurs.	Genetic variation and breeding resistance to herbivores, effects of environment, hybridization on resistance	H+W 88-103 Brown 2001
Nov 3	Tues.	Forgotten aspects of herbivory: below ground herbivory and effects of herbivory on male plant fitness	Blouin 2005
5	Thurs.	Plant-herbivore population outbreaks, cycles	H+W 200-225 Kurle et al 2008
10	Tues	Climate change and herbivory	Hughes et al 2007

12	Thurs	Plant-animal competition? Midterm II	
17	Tues	Plant-herbivore simulation	
19	Thurs	Plant-herbivore simulation	
24	Tues.	Defenses in Island Plants Intro to Team research - herbivore damage to native versus introduced plants Write-up of plant-herbivore simulation due	Bowen and VanVuren 1997
26	Thurs.	THANKSGIVING HOLIDAY	
Dec 1	Tues	Team research	
3	Thurs	Team research	
8	Tues.	Team research	
10	Tues.	Team research	

FINAL EXAM
Tuesday
Dec 15,
9:45 AM -
11:45 AM

Research presentations
Final Reports Due
(= “final exam”)

Discussion readings

- Blouin, M., Y. Zuily-Fodil, A.T. Pham-Thi, D. Laffray, G. Reversat, A. Pando, J. Tondoh, P. Lavelle 2005 Belowground organism activities affect plant aboveground phenotype, inducing plant tolerance to parasites. *Ecology Letters* 8:202-209.
- Bond, W., and P. Slingsby. 1984. Collapse of an ant-plant mutualism: the Argentine ant (*Iridomyrmex humilis*) and Myrmecochorous proteaceae. *Ecology* 65:1031-1037.
- Bowen, L., and D. VanVuren. 1997. Insular endemic plants lack defenses against herbivores. *Conservation Biology* 11:1249-1254.
- Brown, K. 2001. Seeds of concern. *Scientific American* (April) pp. 52-57.
- Cook, M. T. 1911. Some Problems in Cecidology. *Botanical Gazette* 52:386-390.
- Cox-Foster, D. L., et al. 2007. A Metagenomic Survey of Microbes in Honey Bee Colony Collapse Disorder. *Science* 318:283-287.
- Currie, C. R., J. A. Scott, R. C. Summerbell, and D. Malloch. 1999. Fungus-growing ants use antibiotic-producing bacteria to control garden parasites. *Nature* 398:701-704.
- Ellis, A. G., and J. J. Midgley. 1996. A new plant-animal mutualism involving a plant with sticky leaves and a resident hemipteran insect. *Oecologia* 106:478-481.
- Hughes, T. P., M. J. Rodrigues, D. R. Bellwood, D. Ceccarelli, O. Hoegh-Guldberg, L. McCook, N. Moltschanowskyj, M. S. Pratchett, R. S. Steneck, and B. Willis. 2007. Phase shifts, herbivory, and the resilience of coral reefs to climate change. *Current Biology* 17:360-365.
- Janzen, D. H. 1980. When is it coevolution. *Evolution* 34:611-612.
- Karban, R., I. T. Baldwin, K. J. Baxter, G. Laue, and G. W. Felton. 2000. Communication between plants: induced resistance in wild tobacco plants following clipping of neighboring sagebrush. *Oecologia* 125: 66-71.
- Koenig, W. D., and J. M. H. Knops. 2005. The mystery of masting in trees. *American Scientist* 93:340-347.
- Kremen, C., N. M. Williams, and R. W. Thorp. 2002. Crop pollination from native bees at risk from agricultural intensification. *Proceedings of the National Academy of Sciences USA* 99:16812-16816.
- Kurle C.M., Croll D.A. and Tershy B.R. 2008. Introduced rats indirectly change marine rocky intertidal communities from algae- to invertebrate-dominated. *Proceedings of the National Academy of Sciences*: 105:3800-3804
- Lev-Yadun, S., G. Ne'eman, and U. Shanas. 2009. A sheep in wolf's clothing: do carrion and dung odours of flowers not only attract pollinators but also deter herbivores? *BioEssays* 31:84-88.
- Olesen, J. M., and A. Valido. 2003. Lizards as pollinators and seed dispersers: an island phenomenon. *Trends in Ecology & Evolution* 18:177-181.
- Owen, D.F., and R. G. Weigert. 1976. Do consumers maximize plant fitness? *Oikos* 27:488-492.
- Schwachtje, J., P. E. H. Minchin, S. Jahnke, J. T. van Dongen, U. Schittko, and I. T. Baldwin. 2006. SNF1-related kinases allow plants to tolerate herbivory by allocating carbon to roots. *Proceedings of the National Academy of Sciences* 103:12935-12940.
- Weiss, M. R. 1991. Floral colour changes as cues for pollinators. *Nature* 354:227-229
- Willmer, P. G., and G. N. Stone. 1997. How aggressive ant-guards assist seed-set in Acacia flowers. *Nature* 388:165-167.