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BIBLIOGRAPHY: Plant Chemical Defenses

Becerra, J. X. Insects on plants: macroevolutionary chemical trends in host use. Science 276:253-256

This paper uses molecular phylogenies to compare the evolution of insect herbivores and the development of terpenoid compounds in host plants. The author concludes that host plant chemistry has a greater influence than host plant phylogeny in the evolution of host use for the particular insect groups studied.

Berenbaum, M. 1983, Coumarins and caterpillars: a case for coevolution. Evolution 37(1), pp. 163-179.

Berenbaum examines Erlich's proposed steps of coevolution in the context of this specific plant/herbivore interaction. Through studying biosynthetic pathways and the presence of secondary compounds she finds support for coevolution and for the role of coevolution in the diversification of plant and herbivore groups. In addition, the author suggests that apparent taxonomical aberrations in plant/insect systems that seem to dispute coevolution may be examining phylogenetic relationships of plants rather than biochemical "relatedness".

Berenbaum, M. 1978. Toxicity of a furanocoumin to armyworms: a case of biosynthetic escape from insect herbivores. Science 201: 532-533.

This paper looks at the transformation of a nontoxic chemical to a toxic compound in the presence of UV radiation and proposes a pathway by which this defense mechanism may have evolved in plants. It also points out that behavior of particular herbivores (ie. leaf rollers) permits them to feed on plants containing secondary compounds that require UV radiation to be activated.

Cornell, H.V. and B.A Hawkins. 2002. Herbivore responses to plant secondary compounds: a test of phytochemical coevolution theory.

This literature review addresses the coevolution debate by synthesizing four specific predictions from Erlich's coevolution theory and then using existing information of bioassay tests of plants and plant herbivores to test the predictions. Through their literature review they concluded that patterns in host plant use, although not consistent for all groups reviewed, did provide support for Erlich's coevolution theory.

Erlich, P. R. and P. H. Raven.1964. Butterflies and plants: a study in coevolution. Evolution 18:586-608.

This paper is the foundation of coevolution theory. Most studies up until this paper had dealt with individual evolution but had not examined the reciprocal effect of interactions between species. They found correlations between butterfly and their plant hosts in a "stepwise" reciprocal evolution and proposed *coevolution to be a possible mechanism for diversity in certain climates and in particular plant groups.*

Howe, H. F. and L. C. Westley. 1988. Ecological relationships of plants and animals. Chapters 3-5. Oxford University Press.
These chapters give an excellent overview of "plant defense and animal offense", the "ecology of herbivory", and "evolution and herbivory" including specifics of plant chemical groups, mechanisms of detoxification and the historical progression of evolutionary theory highlighted with case studies..

Jermy, T. 1984. Evolution of insect/host plant relationships. The American Naturalist 124 (5): 609-630
Jermy strives to complete another examination of insect/plant relationships to challenge the validity of the coevolution theory. Jermy concludes that while plants may exert an active force on the evolution of insects, insects do not exert a consistent enough selective pressure on plants to effect the evolutionary trajectories of plants.

Rausher, M. D., K. Iwao, E. Simms, N. Ohsaki and D. Hall. 1993. Induced resistance in *Ipomoea purpurea*. Ecology 74(1): 20-29
The goal of this experiment was to detect changes in the foliage of a morning glory in response to damage from herbivores. The experiment used insects that naturally forage on this species and used a specialist as well as several generalists to detect changes in foraging amounts in previously damage and undamaged plants. The experimenters specifically looked for patterns that would indicate "diffuse" or "pairwise" selection by herbivores on plant resistance.

Stinchcombe, J. R. and M. Rausher. 2001. Diffuse selection on resistance to deer Herbivory in the ivyleaf morning glory, *Ipomoea hederacea*. The American Naturalist. 158(4): 376-388.
This is another examination of the diffuse vs. pairwise response to herbivore selection. Analysis was based on genetic correlation and examined plant response to insect, fungal and mammalian herbivores. For all types of herbivores, nonadditive effects on fitness appeared to be the primary mechanism of resistance, implying diffuse selection on plant defense.

Stinchcombe, J. R. and M. Rausher. 2002. The evolution of tolerance to deer herbivory: modifications caused by the abundance of insect herbivores. Proc. R. Soc. Lond. 269: 1241-1246.
This paper outlines three requirements to discriminate between pairwise and diffuse coevolution. Two of the three requirements entail that a plant response to herbivore pressure remains the same, physically and genetically, in the absence or presence of other species. They found that the response of the plant to herbivore pressure corresponded to diffuse selective pressure dependent on which herbivores were present. Especially interesting because of the examination of response to very different types of herbivores (ie. large mammal and insects) but be warned, it involves some very complex genetic analysis. Related findings to

the role that biotic forces have in the formation of geographical mosaics in community composition.