Variation and Biology

The core of biology is variation - of genes, phenotypes, species, ecosystems. This is a major difference from the so-called exact sciences. Carl Pantin (1968) has written of the latter, "physics and chemistry have been able to become exact and mature just because much of the wealth of natural phenomena is excluded from their study". He goes on, "There is no need for the physicist as such to go to biology for data until in the last resort he has to take into account the fact that the observer is a living creature. I would call such sciences 'restricted'. In contrast, biology and geology are 'unrestricted'. Men of science devoted to these fields must be prepared to follow the analysis of their problems into every other kind of science. If they wish to advance their subject they cannot possibly say, "I will not burden my mind with chemistry, physics, or anything but my special interest".

Variation - or biodiversity as it now tends to be called - may occur at the individual, intraspecific, specific or community/ecosystem level, or in DNA, cell, phenotype or population. It is inseparable from the effective study of biology. In past centuries, advances in biology were limited by the assumption that organisms were analogous to physical machines, and this restriction persisted until the thrall of Plato's essences were lifted and the invariant species of Carl Linnaeus became first the polytypic species of the late nineteenth century, and thence the clinally varying, highly polymorphic metapopulation of the mid twentieth century (Mayr,
1982; Gilpin, 1987). Molecular biology is built upon techniques to recognize variation at the chemical level, but from the point of view of evolution, conceptually it is no more than that practised by the old-time naturalists in their study of natural systems.

Attempts to remove variation from biology must be resisted in the interests of seeking truth on the one hand and advancing science on the other. It is ironic that T H Huxley, "Darwin's bulldog", the man who did so much to challenge the negative reactions to evolutionary ideas following the publication of the Origin of Species, stimulated the unhealthy practice of teaching by "types" and hence avoiding having to cope with variation. He confessed, "I am afraid there is very little of the genuine naturalist in me. I never collected anything, and species work was always a burden to me; what I cared for was the architectural and engineering part of the business, the working out of the wonderful unity of plan in the thousands and thousands of diverse living constructions, and the modification of similar apparatuses to serve diverse ends" (Huxley, 1890).

Do not be seduced by the common misapprehensions about reductionism, on the grounds that science is properly reductionist, in contrast to the confused wooliness of "holism". We must distinguish between methodological reductionism which is a necessary part of scientific inference and experiment, and which clearly recognizes its simplifying premises; and ontological reduction, which involves a dogmatic assumption that complex wholes are 'nothing but' their component parts (Ayala, 1974; Barnett, 1988). Biology cannot be reduced to molecules.

Evolutionary Synthesis and Re-Synthesis

Evolutionary thinking is impossible when variation is ignored; it was Darwin's genius to show that linking inherited variation to a struggle for existence leads to natural selection. Ospovat (1981) has pointed out the pre-1859 assumption of a perfect adaptation of organisms to their environment led to a