

The Four Areas of Biology
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Based on Tinbergen,¹ Mayr,² and others

The Four Areas of Biology		Two Different Objects of Explanation	
		<u>Developmental/Historical</u> Explanation of current form in terms of a sequence	<u>Single Form</u> Explanation of one form of a species
Two Different Kinds of Questions	<u>Proximate</u> Explains how organisms work by describing their structures and mechanisms and their ontogeny	<u>Ontogeny</u> Description of an organism's development, from DNA code to the forms of different life stages <i>Developmental explanations</i> for sequential changes in individuals across the lifespan	<u>Mechanism</u> Description of an organism's structure and how its mechanisms work <i>Mechanistic explanations</i> for <i>what</i> an organism's structures are like and <i>how</i> they work
	<u>Evolutionary</u> Explains why organisms are the way they are by describing how selection shaped current forms and their phylogeny	<u>Phylogeny</u> Description of the history of a species as reconstructed from its fossil precursors and DNA evidence <i>Phylogenetic explanations</i> for sequential changes in a species across time	<u>Adaptation</u> Explanation for the characteristics of a species based on how they give a selective advantage <i>Evolutionary explanations</i> for <i>why</i> an organism is the way it is.

1. Tinbergen, N., *On the aims and methods of ethology*. Zeitschrift für Tierpsychologie, 1963. **20**: p. 410-463.
2. Mayr, E., *The Growth of Biological Thought: Diversity, Evolution, and Inheritance*. 1982, Cambridge, Massachusetts: The Belknap Press of Harvard University Press.