Also see: Nesse RM. Evolutionary and proximate explanations.
In: Scherer K, Sander D, editors. The Oxford Companion to Emotion and the Affective Sciences.
Oxford: Oxford University Press. p. 158-9, 2009. Available at http://nesse.us

The Four Areas of Biology

Randolph Nesse

Citation: Randolph M. Nesse, Tinbergen's Four Questions Organized, http://nesse.us, 2000.

Based on Tinbergen,[1] Mayr, [2] and others

The Four Areas of Biology

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

1. Tinbergen, N., *On the aims and methods of ethology.* Zeitschrift fur 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.