GEORG TOEPFER g.toepfer@gmx.de

Organism

Gatherings in Biosemiotics 3 July, 2003

Evolution

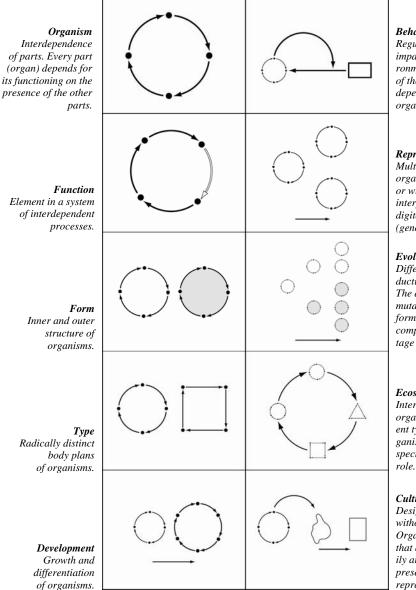
# Representing Life: Graphical Models for the Fundamental Concepts of Biology

## Systematic Grouping of Basic Concepts in Biology

Development

Organism	Development	Evolution
Biology	Developmental Biology	<b>Evolutionary Biology</b>
Life	Growth	Phylogeny
Organization	Morphogenesis	Homology
Self-organization	Life-history	Adaptation
Individual	Metamorphosis	Mutation
Whole	Alternation of generations	Modification
Environment	Aging	Recombination
Disease	Death	Polymorphism
		Selection
Function		Progress
Physiology	Behaviour	Fossil
Analogy	Ethology	
Organ	Instinct	
Metabolism	Learning	Ecosystem
Regulation	Need	Ecology
Regeneration	Perception	Biotope
Self-preservation	Nutrition	Community
	Predation	Niche
Form	Parasitism	Symbiosis
Morphology	Protection	Competition
Information	Communication	Coexistence
Hierarchy	Sociality	Diversity
Cell	Play	Biosphere
Tissue	Hypobiosis	
Type		Culture
Taxonomy	Reproduction	Cultural Studies
Life-form	Genetics	Man
Species	Gene	Emotion
Virus	Population	Intelligence
Bacterium	Genotype/Phenotype	Consciousness
Protist	Sex	Values
Plant	Display	Artificial Life
Fungus	Fertilization	
Animal	Parental care	

Graphical models for the fundamental concepts of biology. An arrow that links two items signifies a causal influence and a dependency: the item to which the arrow points depends in its existence on the item at its starting point. An arrow underneath the items indicates a temporal succession.



### Behaviour

Regulating the impact of the environment. The effect of the environment depends on the organism's activity.

#### Reproduction

Multiplying the organization, with or without the interplay of a digital phase (genotype).

#### Evolution

Differential reproduction of forms. The appearance of a mutation to a new form results in a comparative advantage of this variant.

#### Ecosystem

Interdependence of organisms of different types. Each organism plays a special functional

#### Culture

Designing the world without feedback. Organismic actions that do not necessarily aim at selfpreservation or reproduction.