·40 principles of Biology (Mini case collection)



No	Principle	Case study	No	Principle	Case study
1	Segmentation .	- Bacterial - amoeba	21	Skipping	Animal nerve movement
2	Taking out	 Plant roots Blood Components 	22	Blessing in disguise	Antibodies to diseases
3	Local quality	Animal and plant organs	23	Feedback	Metabolic cycle
4	Asymmetry	Fertilized egg	24	Intermediary	Function of enzyme
5	Merging	Fertilized egg of sex cells	25	Self-service	Regeneration of organization
6	Universality	 Breathing • Diversity functions such as metabolis 	26	Copying	DNA modeling
7	Nested doll	Pregnancy - Descendants	27	Cheap short-living objects	Use of mineral substances in plants
8	Anti-weigh	Bones and muscles	28	Mechanics substitution / Another Sense	Animal cartilage
9	Preliminary anti-action	Hormonal regulation and animal and plant stress	29	Pneumatics and hydraulics	Water absorption
10	Preliminary action	Subcutaneous fat and carbohydrates of animalsSaliva for digestion	30	Flexible shells and thin films	Cell membrane
11	Beforehand cushioning	Blood flow check valve	31	Porous materials	Sponge-like tissue of plants
12	Equipotentiality	Bird bones are hollow to fly	32	Color changes	Skin pigment change
13	The other way round	Catabolism and assimilation	33	Homogeneity	Stable growth
14	Sphericity- Curvature	Cytoplasmic network structure	34	Discarding and recovering	 Removal of different damaged tissue
15	Dynamics	Phototropism	35	Parameter changes	 Changes in scientific parameters during digestion
16	Partial or excessive actions	-Add HCI for digestion	36	Phase transitions	Cytoplasmic phase transition
17	Another dimension	Resistance to stress	37	Thermal expansion	Thermal expansion of Araceae plants
18	Mechanical vibratio	Vibration of insect wings	38	Strong oxidants	Oxidase in respiration
19	Periodic action	- Seasonal changes	39	Inert atmosphere	- Blood synthesis
20	Continuity of useful action	• photosynthesis	40	Composite materials	Organic materials

References: 40 Inventive Principles and Biological Models, Triz-journal