

Sustainable future: building on the study of natural systems

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COMPETITION



**OR
COOPERATION?**



Charles Darwin: Origin of species

What are the pillars of natural
selection and evolution?



1. COMPETITION – struggle for life



FOOD



TERRITORY



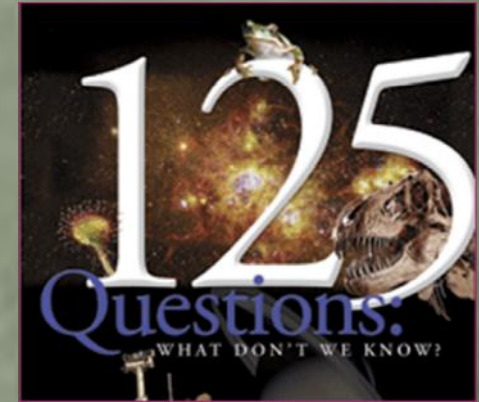
FAMILY

2. SELECTION – the survival of the fittest



3. MUTATION – variation and diversity





How could cooperative
behaviour evolve?

What if I gave you my
DNS, and you give me
yours?

Why not?

Cooperation started with the origin of Life

Just don't take it too
seriously.

Prisoners' dilemma

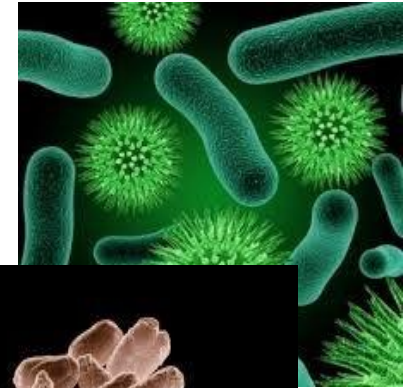
prisoner A

		prisoner B			
		DEFECT		COOPERATE	
prisoner A	DEFECT	 5 yrs	 5 yrs	 0 yrs	 20 yrs
	COOPERATE	 20 yrs	 0 yrs	 1 yrs	 1 yrs

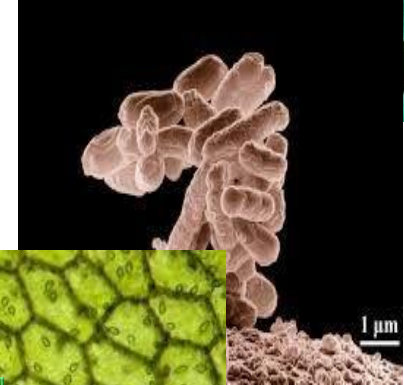


Bioshpere

Unicellular



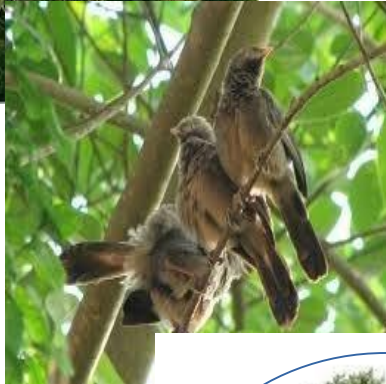
Multicellular



Ecosystem



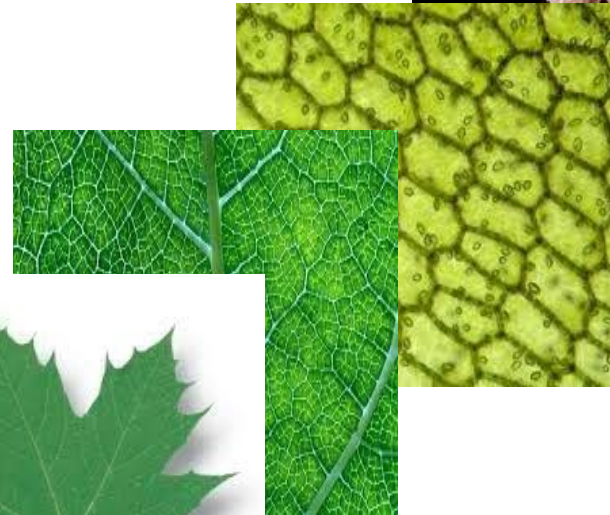
Population



ORGANIZATION

Tissue

Organ



#1 KIN SELECTION: Interaction between genetic relatives (Hamilton, Dawkins)



#2 DIRECT RECIPROcity

„I help you, you will help me”

(Axelrood)





**#3 INDIRECT
RECIPROCITY „I help
you, somebody helps
me” (Dunbar)**

#4 GROUP SELECTION
„Out-compete other
groups.”
(E.O Wilson, Darwin)





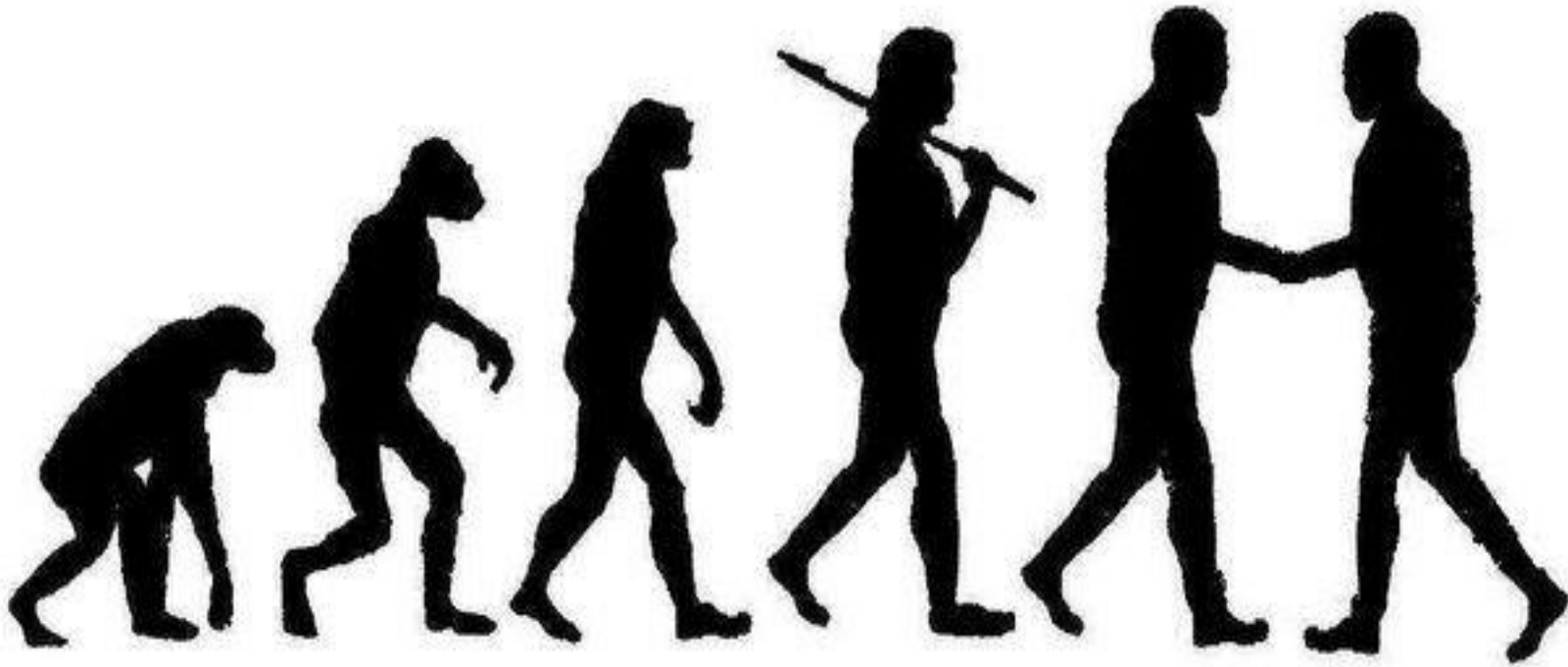
FOOD



TERRITORY

FAMILY





**COMPETITION + SELECTION + MUTATION
+ COOPERATION
= EVOLUTION**



Biosphere

Individuals



Global economy?



Team



Group



Local economy?



ORGANIZATION



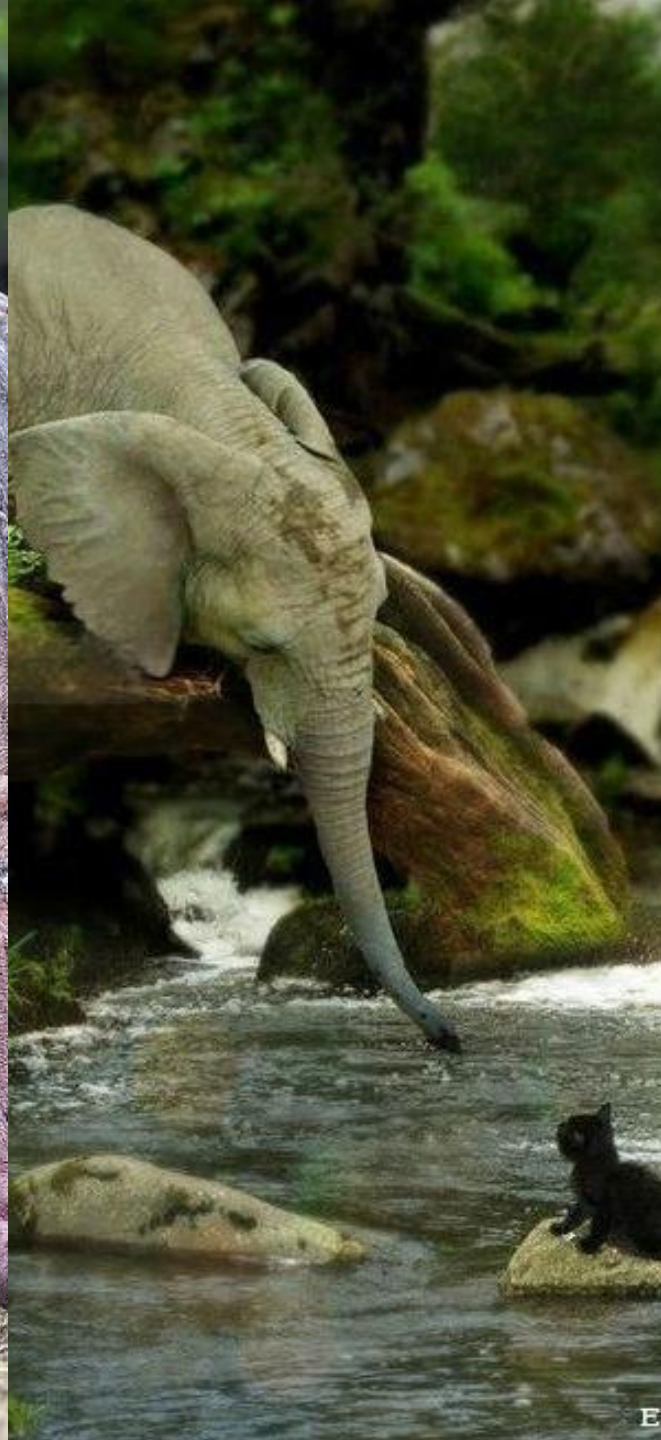


**CAPITAL
RESOURCES**



TECHNOLOGY





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