

IN THE INTERPLAY OF INDIVIDUAL AND SYSTEM,

# EVOLUTION

TAKES PLACE.

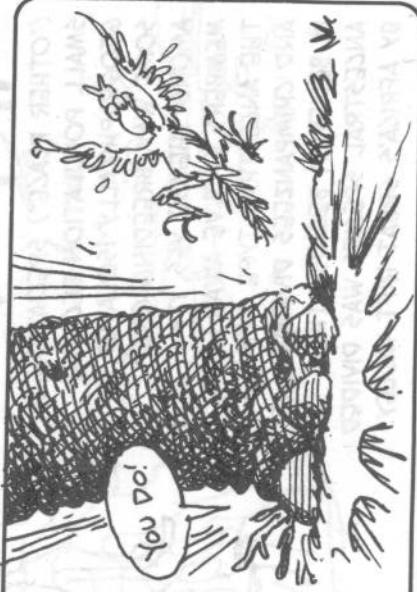
INDIVIDUALS COMPETE WITH EACH OTHER FOR RESOURCES. EVERY CREATURE TRIES TO SUSTAIN ITS OWN LIFE LONG ENOUGH TO REPRODUCE, AND IF THAT MEANS SOMEBODY ELSE GOES HUNGRY, TOO BAD!



THAT IS SO ENVIABLE.

THIS DOESN'T MEAN THAT CREATURES DON'T COOPERATE ALSO! SOMETIMES COOPERATING WITH OTHERS IS THE MOST EFFECTIVE WAY TO SURVIVE.

NOT ALL INDIVIDUALS ARE ALIKE: EACH ONE HAS A SLIGHTLY DIFFERENT COMBINATION OF GENETIC TRAITS, AND SOME OF THESE COMBINATIONS GIVE THEIR OWNERS A **SELECTIVE ADVANTAGE**: THE LUCKY ORGANISM IS BETTER ABLE TO GET FOOD, EVADE PREDATORS, WITHSTAND HEAT AND COLD, REPRODUCE, ETC.



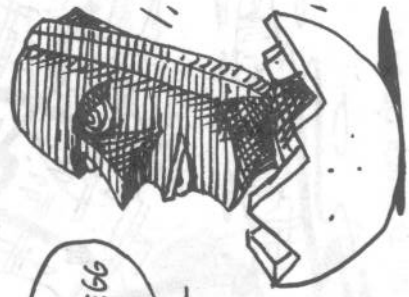
THE RESULT IS **DIFFERENTIAL REPRODUCTION**: THE FAVORED INDIVIDUALS BREED MORE OFFSPRING... SOME OF THEIR OFFSPRING INHERIT THE GOOD GENES, SO THEY BREED MORE PRODUCTIVELY TOO. AFTER SEVERAL GENERATIONS, THE BETTER-ADAPTED TYPE MAKES UP MOST OF THE POPULATION.



PART OF THE SYSTEM, THE INDIVIDUAL'S NEEDS ARE AS THE SYSTEM'S NEEDS. FOR EXAMPLE, AN **Y ONE TREE AT A TIME FOR FUEL OR SOCIAL SYSTEM NEEDED A FOREST TO RUN**

AGAIN:  
WE SET UP STATUES TO INCREASE CLAN PRESTIGE TO IMPROVE ACCESS TO RESOURCES SO YOU CAN REPRODUCE MORE SUCCESSFULLY.

THANK US.



A REAL CHICKEN-AND-EGG SITUATION!

EVOLVE INTO AN ENTIRELY NEW SPECIES.



GOOD NEWS!  
WE'RE EVOLVING  
INTO CHICKENS!

WHAT IS A SPECIES? GENERALLY SPEAKING, A SPECIES CONSISTS OF ORGANISMS THAT CAN MATE WITH EACH OTHER... BUT THE DEFINITION IS SOMEWHAT FUZZY, BECAUSE SOME ORGANISMS CAN MATE ACROSS SPECIES, AND WHEN YOU START TALKING ABOUT ORGANISMS LIKE BACTERIA, OTHER CRITERIA MUST BE FOUND.



SORRY... BUT YOU KNOW WHAT THEY SAY ABOUT "BIRDS OF A FEATHER..."

NO PROBLEM.

EXACTLY HOW SPECIATION OCCURS IS NOT WELL UNDERSTOOD. MOST BIOLOGISTS BELIEVE IN

# allopatric

("OTHER PLACE") SPECIATION: A SMALL POPULATION BECOMES GEOGRAPHICALLY ISOLATED IN SOME WAY. BREEDING ONLY AMONG THEMSELVES, ITS MEMBERS EVOLVE AWAY FROM THE ANCESTRAL TYPE. HUMANS AND CHIMPANZEES DIVERGED, IT IS BELIEVED, BECAUSE THE ANCESTRAL SPECIES WAS DIVIDED BY AFRICA'S GREAT RIFT VALLEY.



'ALLO, PATRICK!

# Sympatric

("SAME PLACE") SPECIATION CAN INVOLVE SEASONAL OR HABITAT ISOLATION—POTENTIAL MATES AREN'T IN THE SAME PLACE AT THE SAME TIME—OR BEHAVIORAL ISOLATION, FOR EXAMPLE, WHEN A COURTSHIP RITUAL DEVELOPS THAT APPEALS TO SOME BUT NOT TO ALL.

IN ONE WAY OR ANOTHER, THE WORLD IS



NOBODY KNOWS EXACTLY HOW MANY!

WITHIN A SPECIES, A POPULATION IS ARE ACTUALLY AVAILABLE TO EACH OTHER IF SPREAD ACROSS THE GLOBE, WHILE A POPU TOGETHER.\*



WE CAN'T GO ON MEETING LIKE THIS!

\*EXCEPTIONS, AS ALWAYS, EXIST!

# Sympatric

("SAME PLACE") SPECIATION CAN INVOLVE **SEASONAL OR HABITAT ISOLATION**—POTENTIAL MATES AREN'T IN THE SAME PLACE AT THE SAME TIME—OR **BEHAVIORAL ISOLATION**, FOR EXAMPLE, WHEN A COURTSHIP RITUAL DEVELOPS THAT APPEALS TO SOME BUT NOT TO ALL.



IN ONE WAY OR ANOTHER, THE WORLD IS DIVIDED INTO MILLIONS OF SPECIES.



WITHIN A SPECIES, A **POPULATION** IS A GROUP OF INDIVIDUALS THAT ARE ACTUALLY AVAILABLE TO EACH OTHER FOR MATING. A SPECIES MAY BE SPREAD ACROSS THE GLOBE, WHILE A POPULATION TENDS TO CLUSTER TOGETHER.\*



\*EXCEPTIONS, AS ALWAYS, EXIST!

GOOD NEWS!  
WE'RE EVOLVING  
INTO CHICKENS!



MAKING, A SPECIES CONSISTS OF ORGANISMS BUT THE DEFINITION IS SOMEWHAT FUZZY, ACROSS SPECIES, AND WHEN YOU START CRITERIA, OTHER CRITERIA MUST BE FOUND.



'ALLO,  
PATRICK!

