

## The Evolution Game

*You are part of a population of medium, fleshy creatures on another world. Life is new here, and your species made it out on to land first. You're not very well adapted yet, moving around on little stubby limbs with round, fleshy end, unsupported by either a skeleton or exoskeleton. Your unspecialized, medium eyes with black-and-white vision, ideal for rooting about in the mud to pick up, squish, and eat worm-like creatures in your toothless jaw.*

*However, the world around you is filled with opportunity and potential disasters. Who knows what your species will finally end up as?*

### Directions:

In this game, we simulate evolution by randomly introducing characters into the population, and when there is a crisis, only the fit organisms survive. You begin by taking your 6x6 piece of graph paper, choose two characters you want your descendant to have, and roll the pair of dice you have twice. The dark dice tells you how many horizontal columns to count, and the light dice how many vertical columns to count.

You can have any combination of characters that are not "mutually exclusive pairs". If you roll one of these (say, "large eyes") but already have another ("reduced eyes"), the two cancel and you erase the old one (large reduced eyes are medium eyes, so erase the reduced square). The "mutually exclusive pairs" are the blue shaded squares on your character sheet. If you roll a square you already filled, you also erase that square (your descendant reverts to an ancestral form).

After the first round, and every four rolls afterwards, you or a classmate will pick a "crisis" card. This card will talk about some crisis your population faces, and have a list of beneficial and detrimental traits. Each beneficial trait cancels one detrimental trait your creature has, and a creature that is neutral has a 50% chance of survival.

To determine survival, roll a die, and on a 1,2 or 3 your creature dies; it lives on a 4, 5, or 6. If your creature dies, raise your hand and your teacher will give you a new piece of graph paper, and you copy one of your neighbor's creatures. After each round of crisis, you roll your dice four more times (reflecting evolution and diversification after the crisis). After six rounds, draw a picture of your creature (whether it survived or not) and talk for 30 seconds or so about how it survived (or why it didn't), and how it differed from its ancestors.

### Characters

|          |                |               |                                    |                                      |                |                   |
|----------|----------------|---------------|------------------------------------|--------------------------------------|----------------|-------------------|
| <b>6</b> | Large Eyes     | Endoskeleton  | Spade Claws                        | Mobile skull bones ("kinetic" skull) | Burrowing      | Leaf-shaped teeth |
| <b>5</b> | Reduced Eyes   | Exoskeleton   | Hooked Claws                       | Lungless / No swim bladder           | Climbing       | Grinding teeth    |
| <b>4</b> | Large Size     | External ears | Sharp Claws                        | Prehensile tail                      | Swimming       | Plate teeth       |
| <b>3</b> | Small Size     | Internal ears | Color vision                       | Movable digits with opposable thumb  | Racing         | Fur               |
| <b>2</b> | Reduced Tail   | Wings         | Whiskers / Feelers                 | Gills                                | Needle teeth   | Feathers          |
| <b>1</b> | Elongated Tail | Limbleness    | Directional Smell / Chemoreception | Fins / Tail sail                     | Serrated teeth | Scales            |
|          | <b>1</b>       | <b>2</b>      | <b>3</b>                           | <b>4</b>                             | <b>5</b>       | <b>6</b>          |

**Crisis: Predators attack!**

Some of your fellow creatures have evolved into vicious predators, hiding in the plains and attacking anything they can. Are you food or are you a survivor?

Good traits: large size, external ears, climbing, swimming, fur, scales, feathers

Bad traits: small size, elongated tail, reduced eyes, internal ears

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**Crisis: Deadly Winds**

A change in the gulf streams has led to an increase in warm water off the shores, which has resulted in an increase of powerful winds. Flying debris batter poor animals senseless, and protection is vital.

Good traits: large size, endoskeleton, exoskeleton, burrowing

Bad traits: small size, wings, climbing, large eyes

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**Crisis: Drought!**

The rains are many months late – it is closer to the next season’s rains than the ones that were supposed to have just passed. Carrion eaters are doing the best, while the water-bound and herbivores are doing worst, but everything is in danger of dehydration and overheating.

Good traits: small size, serrated teeth, sharp claws, external ears, scales, directional smell

Bad traits: large size, fur, feathers, leaf-shaped teeth, grinding teeth, lungless

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**Crisis: Cornucopia of the Sea**

With solar, lunar, and planetary cycles all properly aligned, there is four months of incredible bounty at the beach, particularly of crustaceans. With so many creatures there, even the small and medium herbivores can contentedly graze in peace off shallow sea grasses. Large predators, however, have few ways to stalk their prey.

Good traits: plate teeth, gills, swimming, fins, needle teeth

Bad traits: sharp claws, serrated teeth, hooked claws, large size, reduced tail

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### Crisis: **Attack on the Plants**

A new type of insect has arrived: one that thrives off the leaves of plants, killing trees and shrubs, but is too round and bulbous for many creatures to get it into their mouths, and feasting on tree-tops and living underground. How do you deal with this?

Good traits: kinetic skull, wings, limbless, climbing

Bad traits: leaf-shaped teeth, grinding teeth, large size, serrated teeth

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### Crisis: **Rise of the Night**

As the day gets progressively more full, more and more animals switch to a nighttime mode of living. Can you keep up?

Good traits: large eyes, directional smell, external ears, whiskers

Bad traits: reduced eyes, internal ears, racing, color vision

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### Crisis: **Fruits and Flowers**

Plants have developed a novel new way to spread their seeds: fruits and flowers. However, a lot of them don't like pesky animals eating them, so many are toxic. That tasty berry snack might be your last!

Good traits: color vision, hooked claws, climbing, wings, prehensile tail

Bad traits: spade claws, sharp claws, burrowing, reduced eyes, large size

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### Crisis: **Insects a-plenty**

Insects figured out something novel: going underground is really, really useful. This has led to an explosion of insects, which have been feasting on plant roots, causing overland devastation, and what trees are left to become dry and brittle – prone to collapse.

Good traits: burrowing, limbless, lungless, spade claws, needle teeth, (burrowing + scales), reduced eyes

Bad traits: (burrowing + fur), (burrowing + feathers), leaf-shaped teeth, grinding teeth, (burrowing + external ears), hooked claws, climbing

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Crisis: **Bitter Cold**

An unusually harsh winter has been going on for too long. Food is hard to find, and many animals are freezing to death.

Good traits: fur, feathers, large size

Bad traits: small size, needle teeth, external ears

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Crisis: **Egg Thieves**

A new animal has popped up – and its stealing the eggs of other animals at such an overwhelming rate that many species are starting to go extinct. Can you defend your clutch?

Good traits: whiskers, claws (any)

Bad traits: reduced eyes, internal ears, limbless

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Crisis: **Desertification**

As the continents drift closer together, it creates a dead spot in the center of the new supercontinent that doesn't allow wind – or, more importantly, rain – to visit. As a result, this new supercontinent has a huge, inland desert, with sweltering highs, freezing lows, and little water. The disruption of currents has led to the huge overfreezing of the polar caps, dropping sea levels everywhere.

Good traits: scales, fur, feathers, directional smell, burrowing

Bad traits: large size, lungless, gills, swimming, climbing

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Crisis: **Abundance of Oxygen**

A huge, very isolated island has become so overpopulated with plant life that it has had significant effects on the oxygen content of the atmosphere. Suddenly, a tipping point was passed, and it became more efficient to absorb oxygen through your skin. However, nothing is without a price, and electrical storms in this high-O<sub>2</sub> atmosphere leads to rampant fires.

Good traits: lungless, exoskeleton, racer, burrowing

Bad traits: climbing, small size, reduced eyes

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Crisis: **Scattering of Seed-Pods**

In yet another stage of their own little war, plants have come up with a novel invention: the seed-pod. These nutrient-packed parcels are hard to open, but worth the effort.

Good traits: movable digits, spade claws, climbing, grinding teeth

Bad traits: large size, exoskeleton, needle teeth

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Crisis: **Great Plains-Herds**

A recent explosion of plant life—grasses, sparse but large trees, and shrubs – has been a massive boon to local life. Everywhere, the abundance of food has let things become big, and left the smaller animals to become morsels of the larger.

Good traits: large size, endoskeleton, serrated teeth, leaf-shaped teeth, grinding teeth, racer

Bad traits: small size, climbing, burrowing, exoskeleton, limbless, internal ears, reduced eyes

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Crisis: **Rise of the Forests**

In the ever-present struggle for more light, plants have reached higher and higher into the sky, and a new ecosystem has sprung up: forests, with tall trees encasing their seeds in juicy fruit or in hard seed-pods, and with giant root systems all going to the rivers, leaving them as small streams. This new place has left many opportunities for life, particularly the small, nimble, and smart.

Good traits: small size, climbing, movable digits w/ opposable thumb, hooked claws, prehensile tail

Bad traits: large size, racing, reduced tail, swimming, plate teeth

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Crisis: **Tough Stalks**

In the struggle to adapt or die, plants have developed a novel coping mechanism: grow to be really, really hard. The resulting thin, tough plants soon grew to dominate the area, with little able to eat them. Starve or feast?

Good traits: grinding teeth, movable digits w/ opposable thumb

Bad traits: climbing, spade claws

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### Crisis: **Seagoing Munchies**

High sea levels have covered much of what was land with shallow seas. Underwater, there is a vast variety of resources waiting to be tapped, with all kinds of novel life forms spread out across the ocean. Only the meanest swimmers will make it to the top. Can you tap the vast resources?

Good traits: swimming, gills, needle teeth, fins/tail sail

Bad traits: No swim bladder, reduced tail, external ears, leaf-shaped teeth

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### Crisis: **Shoals of Food**

As a defense, many of the oceans inhabitants have evolved a novel new behavior: swimming in shoals. The vast numbers of fish confuse predators, with their quick motions and strange edges making it hard to single out a meal. The result has also pushed these fish into deeper waters, collapsing many shallow water and beach ecosystems relying on them.

Good traits: large eyes, needle teeth, serrated teeth, swimming, internal ears

Bad traits: leaf-shaped teeth, grinding teeth, plate teeth, reduced tail

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### Crisis: **Yummy Plankton**

Responsible for the oxygen in the atmosphere, plankton is everywhere, but surprisingly little eats them. Its an untapped bounty, ready to give an evolutionary leg-up to the innovative creature who can use them.

Good traits: swimming, kinetic skull, large size

Bad traits: small size, plate teeth, exoskeleton

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### Crisis: **Global Warming**

A change in solar activity, planetary tilt, and greenhouse gas concentrations are causing an increase in temperatures everywhere. Melting floating ice sheets destroy underwater currents, overland ice sheets raise sea levels, and the increased heat desertifies the inland continents. The resulting decrease in oceanic and land diversity and food supplies prompts mass extinctions.

Good traits: wings, directional smell, scales, large eyes, burrowing

Bad traits: fur, reduced eyes, spade claws, climbing, grinding teeth

Crisis: **Ice Age**

A low solar output cycle caused the north to start to freeze up, which reflected light, which caused more freezing, and in a runaway effect your planet found itself in an ice age. Can you deal with the frigid cold?

Good traits: fur, feathers, large size, burrowing

Bad traits: small size, external ears, scales, elongated tail

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Crisis: **Flood**

Huge storms, eroded riverbeds, and a collapsed natural dam have all combined to result in one thing: flood! When the storms leave, the flooded ground stays ... can you adapt?

Good traits: swimming, wings, climbing, fins

Bad traits: burrowing, racing, spade claws, lungless