R-STRATEGIST

Reproduction 1

These species evolve in unstable and unpredictable environments. They produce many offspring without much parental care.

E1

GROOMING

Individuals of primate colonies will remove dirt and parasites from areas of fur that are hard to reach. This also aids group cohesion; building up stable colonies that are more likely to persist through difficult conditions.

E1

K-STRATEGIST

Reproduction 3

These species produce few offspring and provide them with lots of parental care. They tend to evolve in stable environments where there are limited resources.

E1

OVIPAROUS

Reproduction 2

This form of internal fertilisation includes any species that lays eggs, such as most birds and reptiles.

E1

VIVIPAROUS

Reproduction 2

This form of internal fertilisation involves the embryo growing inside the mother and the mother giving birth to live young.

E1

VIVIPAROUS

Reproduction 2

The extra weight of a growing baby in the womb can make the mother more vulnerable to predation as she is less mobile.

E1

SEMELPAROUS

Reproduction 5

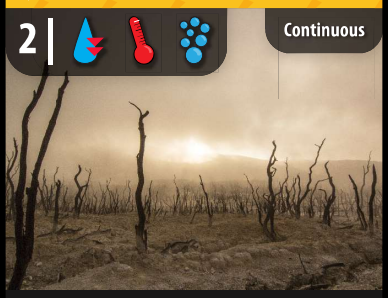
After this Species undergoes Reproduction, place this Trait in the discard pile.

Species with this life cycle tend to reproduce only once in their lifetime. They can have annual or overlapping cycles. Some cicadas coordinate hatching across 13 and 17 year periods.

E1

DROUGHT

2 | Continuous



This card affects your Community again on your next Nature Calls if fewer than half of your Species are Resilient when facing this Event card for the first time.

Each Vulnerable Species loses 2 Trait cards.

Draw 2 cards for each Resilient Species.

The effects of drought are severe across a range of ecosystems. It can cause: dried out bodies of water or wetlands; increased pollution of surface water; lowered soil quality; reduced biodiversity and drought-induced cavitation.

E1

FREEZE-THAW

1 |

Affects Plants only.

Each Vulnerable Species loses 1 Trait card.

Draw 2 cards for each Resilient Species.

As the xylem conduit freezes, gases become less soluble and tiny bubbles accumulate. As the conduit thaws, the bubbles can cause cavitation, resulting in an air-filled xylem where water cannot be transported as easily.

E1

Habitat Fragmentation

1

— Choose 1 of your Vulnerable Species. It goes Extinct.

+ Draw 1 card for each Resilient Species.

Large areas of habitat are isolated into a number of small patches with lower total area due to geological activity or human activity.

E1

Meteorite

2

Affects all players. To determine if your Community is affected draw a card and add it to your hand. If it is a Trait or Event card then you are affected. If it is an Interaction card then your Community is unaffected.

— Your opponent chooses 3 of your Vulnerable Species. Lose 2 Trait cards from each.

+ Draw 1 card for each Resilient Species.

Like the meteorite that wiped out the dinosaurs, an impact can launch large numbers of small particles into the atmosphere. This filters out some of the radiation from the sun causing a temperature drop and an unseasonal winter.

E1

Monsoon

1

— If more than half of your Species are Vulnerable, choose 1 Vulnerable Species to go extinct.

+ If half or more of your Species are Resilient draw two cards for every opponent.

Typical monsoon hazards include extreme heat, rounds of thunderstorms, flash floods, dust storms, drought and wildfires.

E1

Oil Spill

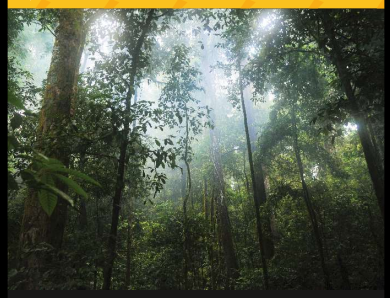
Also affects the opponent to your left.

— All of your Species lose 1 Trait card.

The Exxon Valdez oil spill of 1989 covered 1300 miles of coastline in millions of gallons of oil. It resulted in the short-term and long-term loss of multiple species including seabirds, sea otters, seals and orcas.

E1

Rainforest



+ Search the discard pile and take the first Plant Trait card you find. Place this in your Community as a new Species. If there are no Trait cards in the discard pile, search the deck for the first one you find, and then shuffle the deck.

The species diversity and richness found in a tropical rainforest surpasses that of every other biome; it is estimated that millions of different plant and animal species live only here and cannot be found anywhere else on the planet.

E1

Intraspecific Competition

Choose an opponent's Trait card and place it in the discard pile.

Indirect or scramble competition involves depletion of a shared resource, resulting in a reduced chance of survival or reproduction in weaker individuals.

E1

Interaction Inhibitor

Negate the activation and/or effect of an Interaction card and place it in the discard pile.

E1

Courtship

Can only be played on your turn. Go through the discard pile until you reach the first Animal Trait that has a 'Reproduction' Attribute and add it to your hand.

Courtship occurs between members of the same species as a way to prevent cross-breeding and increase the chance of reproductive success. One example is the extended phenotypes of bowerbirds.

E1

Brood Parasitism

Play when one or more opponent's Animal Species undergo Reproduction. You gain all benefits of Reproduction from the opponent's Species, and the opponent gains nothing.

This situation arises when the parasite species manipulates the host to raise its young. In this way the parent minimises costs to itself to raise young while providing for the growth of its offspring.

E1

Brood Parasitism

Play when one or more opponent's Animal Species undergo Reproduction. You gain all benefits of Reproduction from the opponent's Species, and the opponent gains nothing.

Cuckoos lay their eggs in the nests of other bird species such as the Eurasian reed warbler. The host parent then raises the parasite young, often at a cost to its own offspring as the cuckoo demands more food.

E1

Migration

Can only be played on your turn. Choose an opponent's Animal Species and move it to your Community.

When populations of whooping cranes were reintroduced into the wild in the USA they needed to be taught how to migrate. Filial imprinting was used to train them to fly across the country in the appropriate season.

E1

Reproduction

Can only be played on your turn. Choose either your Plants or Animals. Any Species of that type that has a Trait containing a 'Reproduction' Attribute undergoes Reproduction:
Draw cards equal to the sum of the numbers next to any 'Reproduction' Attributes on these chosen Species.

For asexual reproduction an individual inherits all its genes from one parent. Budding is a form of asexual reproduction, where a bud is formed by mitosis, it breaks off and develops into a new genetically identical organism.

E1

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Fragmentation is a type of asexual reproduction, it occurs when an individual is split into pieces, each piece forms a new clone of the original organism. Damage from predation can result in fragmentation.

E1

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One type of asexual reproduction is parthenogenesis. An egg is formed by mitosis or meiosis, in some examples, and may produce a diploid or haploid organism.

E1

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For sexual reproduction the individual inherits its genetic material from 2 parents. The gametes are formed by meiosis, they fuse (fertilization) forming a zygote. The zygote then forms an embryo via mitosis.

E1

Reproduction

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One disadvantage of sexual reproduction is that it is costly to produce gametes and to find a mate. Also, only females can sexually produce new offspring, so population growth rate is slower in species that sexually reproduce than those that reproduce asexually.

E1

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Sexual reproduction creates a genetically unique individual which can be advantageous. It can also combine rare beneficial mutations in one individual, allowing species to adapt faster than those that reproduce asexually.

E1

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One benefit of sexual reproduction is that it can purge harmful mutations from populations quicker than asexual reproduction. Additionally, it can produce individuals who are better protected from parasitism (Red Queen Hypothesis).

E1

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Many species can both sexually and asexually reproduce. An example of this is Daphnia: these crustaceans asexually reproduce in the spring when there are plenty of resources available but reproduce sexually later in the year when resources are limited.

E1

Tracheids

The xylem conduit is made up of unicellular tracheids. These narrow cells are good at resisting bubble formation and cavitation.

E1

Tracheids

Tracheids are dead, lignified cells in the xylem that communicate with each other via pits. These pits allow water to be redirected into another tracheid cell when one tracheid is blocked.

E1

Parallel Conduits in Xylem

This structural arrangement minimises the detrimental effect of a conduit lost to cavitation as the plant's overall transport capacity is not significantly reduced.

E1

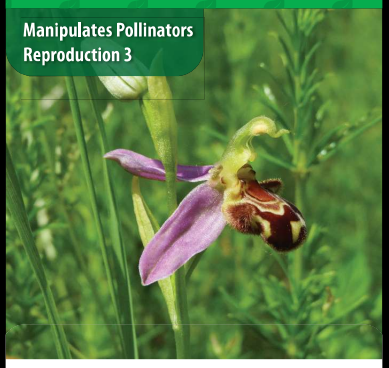
Parallel Conduits in Xylem

This consists of the elongated tracheid cells and short, wide vessel elements that make up the xylem. The vessel elements form channels via perforation plates situated at the end of each cell.

E1

Pollinator Mimics

Manipulates Pollinators
Reproduction 3



Bee Orchid flowers resemble the pigmentation of certain bee species. This encourages sexually active bee individuals to visit these flowers in search of a mate, thus carrying pollen between plants.

E1

Volatile Scents

Manipulates Pollinators
Reproduction 2

Antirrhinum flowers produce methyl benzoate to attract a specific pollinator. The scent concentration peaks when the pollen is fully mature, while variations occur so it is most pungent when bees are active.

E1

Multiple Rewards

Manipulates Pollinators
Reproduction 3

Invest 1.

Scarab beetles receive both food and warmth through the thermogenic spadix of Philodendron solimoesense. This is costly to the plant but ensures pollination promoting outbreeding and fertilisation.

E1

Wind Pollination

Reproduction 3

Lightweight pollen can increase the chances of fertilising unrelated individuals by being carried long distances. Many deciduous plants maximise their use of the wind by releasing pollen before their foliage returns.

E1

Dichogamy

Reproduction 3

Anthers and stigma mature sequentially. This promotes outbreeding as a plant cannot self-fertilise: when it releases pollen it is not receptive. Found in Geranium columbinum.

E1

Self Incompatibility

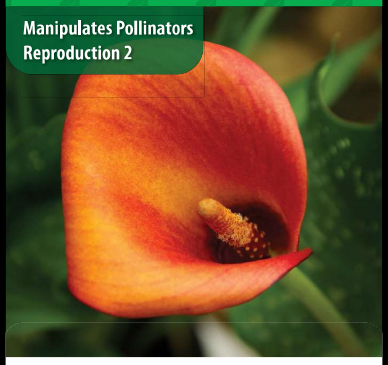
Reproduction 2

Pollen is unable to fertilise ovules from the same flower. The expression of linked genes creates a molecular label on the pollen. Fertilisation is terminated if this is recognised by the carpel secreted enzyme.

E1

Deceit by Resource Mimicry

Manipulates Pollinators
Reproduction 2



If this Species undergoes Reproduction, the Species with the most Traits in the Community to your left loses 2 Traits (if it is a tie, choose which Species is affected).

The dead horse arum lily releases four of the key volatile chemicals released by decaying meat. The Calliphoridae blowfly is thus attracted to the plant and then trapped overnight and becomes covered in pollen.

E1

Short Xylem

Plants with short xylem vessels use their root pressure to redissolve any bubbles that occur, allowing water to be easily transported back up the xylem.

E1