Welcome to Pterosaurs: The Card Game!

Pterosaurs were flying reptiles that lived during the age of dinosaurs — and the first vertebrates to fly under their own power.

Pterosaurs: The Card Game uses images and information from the vast collections of the American Museum of Natural History in New York City, especially the 2014 special exhibition *Pterosaurs: Flight in the Age of Dinosaurs*. The game was co-designed with teenagers in the Museum's *#scienceFTW* program and with game designer Nick Fortugno, based on an existing biodiversity card game, Phylo (Phylogame.org).

Much about pterosaurs is still unknown, and scientific research is ongoing. While ***Pterosaurs: The Card Game*** is based on the latest findings, it also involves educated guesses. For example, we can't always know exactly what an animal ate about 66–220 million years ago.

Making Your Cards

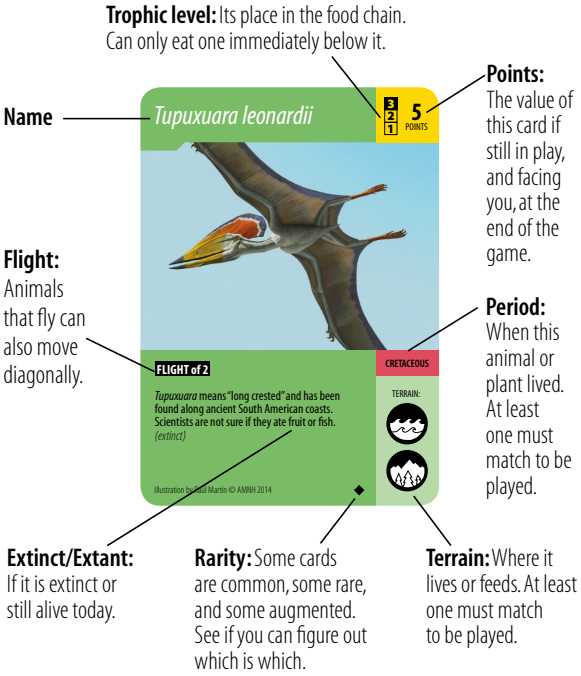
What You'll Need:

- printer
- regular paper
- light card stock (optional)
- scissors

What To Do:

1. Print the instructions (p.1-2 of PDF) on regular paper.
2. Print the cards (p.3-11) on light card stock or regular paper.
3. Optional: If you'd like, print the pattern (p.12) on the back of the cards.
4. Cut the cards using scissors. There are 51 cards in this deck.
5. Grab a friend and play!

Card Elements



Sample Layout After a Few Turns

How To Play

Number of Players: 2

Objective: Place and keep on the table as many plants and animals as you can by building up their food chains and disrupting your opponent's food chains. The person with the most points at the end of the game wins.

Setup: Place the two Home Cards in the center of the table, head-to-head. Every card played should face its owner. Shuffle the remaining cards, deal each player five cards, face down, and place the rest on the side as the Draw Pile, also face down. Youngest player begins the game.

Taking A Turn: To start your turn, take a card from the top of the Draw Pile. Then you must choose 3 of these 5 actions (you can use the same action more than once in a turn):

1. **Start a food chain:** Place a Trophic Level 1 card next to any card. (A trophic level is an organism's place on a food chain. 1 is lowest and 3 is highest.) The card must face you.
2. **Add to a food chain:** Place a Level 2 or 3 card in an empty space next to a card already in play (including your opponent's). You can only place a card next to a card that meets the following conditions:
   - It's one trophic level lower on the chain.
   - It shares at least one time period (e.g., Jurassic) and one terrain (e.g., ocean). Note: a card does not need to match ALL surrounding cards but must match at least ONE.
3. **Play an Event Card:** Event cards disrupt another player. Follow the instructions on the card. Note: Some cards can be played during an opponent's turn.
4. **Move a Card:** If an opponent has played a card that disrupts your card's food chain, you must reconnect it to another food chain. You can only move it one square into an open space, either horizontally or vertically. Animals that fly can also move diagonally. If the card cannot find food by the end of your next turn, you must remove it from the board.
5. **Discard a card:** Place a card from your hand face up on the Discard Pile (next to the Draw Pile) and take three cards from the top of the Draw Pile. These cards may be played on the turn in which they were drawn.

End game: The game ends when there are no cards left in the Draw Pile. Players count up the point value of every card facing them on the table. The player with the most points wins!

Acknowledgments

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- Thanks to all of the artists who worked to make their images available or provided them online under Creative Commons.
- Thanks to David Ng, Haley Fiege and the rest of the **Phylo** community. Special credit to Honorah O'Neill for principal development of the Phylo game rules. Thanks also to the Michael Smith Laboratories, UBC, whose financial support helped make this game possible. For free access to more Phylo cards and information, please visit http://phylogame.org

Jeholopterus ningchengensis

3 2 1 **4** POINTS

FLIGHT of 1

JURASSIC

TERRAIN:

Jeholopterus was named after a city near where it was found in Northeastern China. It lived in the forest, hunted insects, and is the only known species in its genus. *(extinct)*

Illustration by Raúl Martín © AMNH 2014

Pterodaustro guinazui

3 2 1 **4** POINTS

FLIGHT of 1

CRETACEOUS

TERRAIN:

This pterosaur's name comes from the Greek word "pteron" (wing) and the Latin word "auster" (south wind). It may have used its thousands of bristle-like teeth to strain crustaceans, plankton, and other small aquatic animals. *(extinct)*

Illustration by Raúl Martín © AMNH 2014

HOME CARD

American Museum of Natural History's Pterosaurs: The Card Game

Pteranodon longiceps

3 2 1 **5** POINTS

FLIGHT of 2

CRETACEOUS

TERRAIN:

Pteranodon is one of the most famous pterosaurs, having appeared in movies such as *King Kong*. Its name means "wing without tooth" and its fossils have been found in western Kansas. Scientists think it may have dived for fish. *(extinct)*

Illustration by Raúl Martín © AMNH 2014

Tupuxuara leonardii

3 2 1 **5** POINTS

FLIGHT of 2

CRETACEOUS

TERRAIN:

Tupuxuara means "long crested" and has been found along ancient South American coasts. Scientists are not sure if they ate fruit or fish. *(extinct)*

Illustration by Raúl Martín © AMNH 2014

HOME CARD

American Museum of Natural History's Pterosaurs: The Card Game

Dimorphodon macronyx

3 2 1 5 POINTS

JURASSIC

TERRAIN:

FLIGHT of 2

Dimorphodon macronyx was discovered near Lyme Regis, England, on what is now called the Jurassic Coast. *Dimorphodon* means "two-form tooth," which refers to its two distinct types of teeth. *Macronyx* refers to its large claws. *(extinct)*

Illustration by Raúl Martín © AMNH 2014

Tapejara wellnhoferi

3 2 1 4 POINTS

CRETACEOUS

TERRAIN:

FLIGHT of 1

Tapejara means "old being" and has been found in Northeast Brazil. The tip of its lower jaw is turned downward. It may have been a fruit eater, or skimmed the surface of the ocean for fish. *(extinct)*

Illustration by Raúl Martín © AMNH 2014

Pterodactylus antiquus

3 2 1 4 POINTS

JURASSIC

TERRAIN:

FLIGHT of 1

These were the first pterosaurs ever to be identified, found in 1784 by the German scientist Cosimo Alessandro Collini for the wonder cabinet he curated. *(extinct)*

Illustration by Raúl Martín © AMNH 2014

Quetzalcoatlus northropi

3 2 1 7 POINTS

CRETACEOUS

TERRAIN:

FLIGHT of 3

SPECIAL RESTRICTION: MUST BE PLAYED ADJACENT TO TWO DIFFERENT LEVEL 2 CARDS.

Named after both the Aztec air god Quetzalcoatl and the Northrop Corporation, this Texan pterosaur had a wingspan of roughly 33 feet (the size of a 2-person airplane) and a height of 16-18 feet! *(extinct)*

Illustration by Raúl Martín © AMNH 2014

Nyctosaurus gracilis

3 2 1 4 POINTS

CRETACEOUS

TERRAIN:

FLIGHT of 1

Nyctosaurus means "night lizard." It has been found in the Niobrara Formation of the mid-western United States. *Nyctosaurus* possessed an extraordinarily large antler-like crest, which is surprising given how small the pterosaur was. *(extinct)*

Illustration by Raúl Martín © AMNH 2014

Rhamphorhynchus muensteri

3 2 1 4 POINTS

JURASSIC

TERRAIN:

FLIGHT of 1

Rhamphorhynchus means "beak snout." This pterosaur has been found in Germany. It had a very long tail, and its long, needle-like teeth helped it catch fish over open water. *(extinct)*

Illustration by Raúl Martín © AMNH 2014

Ammonite

3 2 1 POINTS 3

CRETACEOUS

TERRAIN:

Despite their large shells that could grow up to seven feet across, these predatory, squid-like shellfish were capable of swimming. *(extinct)*

PTERO TIDBIT

Pterosaurs are close cousins of dinosaurs, but evolved on a separate branch of the reptile family tree.

Photo ©AMNH/M. Shanley

Dsungaripterus weii

3 2 1 POINTS 5

CRETACEOUS

TERRAIN:

FLIGHT of 2

Dsungaripterus was first found in China in the Junggar Basin. Its jaw was not designed to catch and eat fish, but rather to dig up clams along the beach and crush them with its large flat teeth. *(extinct)*

Illustration by Raúl Martín © AMNH 2014

Anhanguera blittersdorffi

3 2 1 POINTS 5

CRETACEOUS

TERRAIN:

FLIGHT of 2

Anhanguera means "Old Devil." The bumps on the tip of its bill may have helped it stabilize its head when snatching fish as they leapt out of the water! *(extinct)*

Illustration by Raúl Martín © AMNH 2014

Cockroach

3 2 1 POINTS 2

JURASSIC
CRETACEOUS

TERRAIN:

Cockroaches existed before pterosaurs and dinosaurs. The first fossils of modern cockroaches appeared in the Early Cretaceous period. *(extant)*

PTERO TIDBIT

When scientists find a small pterosaur they try to determine whether it was a juvenile or an adult member of a small species of pterosaur.

Illustration by Constantin Aston © AMNH

Ammonite

3 2 1 POINTS 3

CRETACEOUS

TERRAIN:

Despite their large shells that could grow up to seven feet across, these predatory, squid-like shellfish were capable of swimming. *(extinct)*

PTERO TIDBIT

Pterosaurs are close cousins of dinosaurs, but evolved on a separate branch of the reptile family tree.

Photo ©AMNH/M. Shanley

Scaphognathus

3 2 1 POINTS 4

CRETACEOUS

TERRAIN:

FLIGHT of 1

Scaphognathus means "fat snout" in Latin. It has been found in Germany and may have had a good sense of sight. *(extinct)*

Illustration by Raúl Martín © AMNH 2014

Lycoptera

3 2 1 POINTS 2

JURASSIC CRETACEOUS

TERRAIN:

Fossils of these small freshwater fish have been found in large groups, suggesting they congregated in sandbars. *(extinct)*

PTERO TIDBIT

Pterosaurs were the first animals after insects to evolve powered flight—not just leaping or gliding, but flapping their wings to generate lift.

Illustration © Ivy Rutsky (1996)

Dragonfly

3 2 1 POINTS 2

JURASSIC CRETACEOUS

TERRAIN:

FLIGHT of 1

Dragonflies are among the fastest and most ancient flying insects in the world! *(extant)*

PTERO TIDBIT

Pterosaurs were neither birds nor bats. They were flying reptiles that lived between ~220 and ~66 million years ago.

Illustration by Raúl Martín © AMNH 2014

Cockroach

3 2 1 POINTS 2

JURASSIC CRETACEOUS

TERRAIN:

Cockroaches existed before pterosaurs and dinosaurs. The first fossils of modern cockroaches appeared in the Early Cretaceous period. *(extant)*

PTERO TIDBIT

When scientists find a small pterosaur they try to determine whether it was a juvenile or an adult member of a small species of pterosaur.

Illustration by Constantin Aston © AMNH

Ischyodus

3 2 1 POINTS 2

JURASSIC

TERRAIN:

The long spine attached to the dorsal fin of the *Ischyodus* may have been venomous. *(extinct)*

PTERO TIDBIT

No one knows exactly what pterosaurs looked like. The pterosaur colors and patterns on these cards are inferred from animals living today that have similar lifestyles.

Illustration © Ivy Rutsky (1996)

Water Strider

3 2 1 POINTS 3

JURASSIC

TERRAIN:

The water strider's long and slender legs, with several thousand hairs, enable them to walk on water. *(extant)*

PTERO TIDBIT

Pterosaurs left no descendants—only fossils.

Photo ©AMNH/M. Shanley

Dragonfly

3 2 1 POINTS 2

JURASSIC CRETACEOUS

TERRAIN:

FLIGHT of 1

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PTERO TIDBIT

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Illustration by Raúl Martín © AMNH 2014

Waterscorpion

3 2 1 POINTS 3

JURASSIC

TERRAIN:

Waterscorpions are insects, but are not closely related to true scorpions. *(extant)*

PTERO TIDBIT

The earliest known pterosaurs were roughly the size of a seagull.

Photo © Scott Morrison

Waterscorpion

3 2 1 POINTS 2

JURASSIC

TERRAIN:

Waterscorpions are insects, but are not closely related to true scorpions. *(extant)*

PTERO TIDBIT

Pterosaurs were closely related to dinosaurs but had streamlined bodies, narrow jaws, and long forelimbs—adaptations for life in the air.

Photo © Scott Morrison

Obaichthys

3 2 1 POINTS 3

CRETACEOUS

TERRAIN:

Obaichthys is a primitive garfish, whose fossils have been found in Brazil. *(extinct)*

PTERO TIDBIT

More than 150 species of pterosaurs have been discovered in excavations around the globe.

Illustration © Ivy Rutsky (1996)

Nymphaeales (Water Lily)

3 2 1 POINT 1

CRETACEOUS

TERRAIN:

Water lily fossils have been found from as early as the Cretaceous period. *(extant)*

PTERO TIDBIT

Pterosaurs may have traveled in flocks or gathered at the same spots to feed.

Photo by Sixtybolts (CC-BY-SA-2.0)

Waterscorpion

3 2 1 POINTS 3

JURASSIC

TERRAIN:

Waterscorpions are insects, but are not closely related to true scorpions. *(extant)*

PTERO TIDBIT

In 1809, French zoologist Georges Cuvier was the first to identify a pterosaur. Cuvier called it a flying reptile, and he named it ptero-dactyle, meaning "wing finger."

Photo © Scott Morrison

Aspidorhynchus

3 2 1 POINTS 2

JURASSIC CRETACEOUS

TERRAIN:

Aspidorhynchus was a speedy, two-foot-long fish, with tooth-lined, elongated jaws. *(extinct)*

PTERO TIDBIT

Pterosaurs were the first vertebrates (animals with backbones) to have powered flight.

Illustration © Ivy Rutsky (1996)

Nymphaeales (Water Lily)

3 2 1 POINT

CRETACEOUS

TERRAIN:

Water lily fossils have been found from as early as the Cretaceous period. *(extant)*

PTERO TIDBIT

Pterosaurs may have traveled in flocks or gathered at the same spots to feed.

Photo by Sixtybolts (CC-BY-SA-2.0)

Aeger elegans

3 2 1 POINT

JURASSIC

TERRAIN:

Aeger elegans is a species of shrimp that was found in the Solnhofen limestone of Germany. *(extinct)*

PTERO TIDBIT

Pterosaurs all had the same basic body plan, but species varied dramatically.

Photo by Masur (CC-BY-SA-2.0)

Gingko

3 2 1 POINT

CRETACEOUS

TERRAIN:

The fan-shaped leaves of this ancient ginkgo tree, now extinct, are similar to modern ginkgo leaves. *(extant)*

PTERO TIDBIT

When pterosaurs walked, they tucked in their wings. The fourth finger was connected to the hand by a roller joint, so the wings could fold like umbrella spokes.

Photo by Kevmin (CC BY-SA 3.0)

Clam

3 2 1 POINT

CRETACEOUS

TERRAIN:

The organs of clams are surrounded by watery blood that contains nutrients and oxygen. *(extant)*

PTERO TIDBIT

Pterosaurs began life on the ground, hatching from eggs.

Illustration by Raúl Martín © AMNH 2014

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Photo by Kevmin (CC BY-SA 3.0)

Paleomattea

3 2 1 POINT

CRETACEOUS

TERRAIN:

The name of this shellfish means "ancient delicacy," and is derived from the Latin word *deliciosa* which means delicious. *(extinct)*

PTERO TIDBIT

A wide variety of pterosaurs lived during the Cretaceous period, including the largest known pterosaurs.

Photo © AMNH

Brachyphyllum

3 2 1 POINT

JURASSIC CRETACEOUS

TERRAIN:

These coniferous trees lived all over the globe during the Jurassic and Cretaceous periods. *(extinct)*

PTERO TIDBIT

In the Jurassic period a new group of pterosaurs emerged. They had shorter tails, longer hands and neck bones, and bony crests on top of their heads.

Photo © AMNH

Clam

3 2 1 POINT

CRETACEOUS

TERRAIN:

The organs of clams are surrounded by watery blood that contains nutrients and oxygen. *(extant)*

PTERO TIDBIT

Pterosaurs began life on the ground, hatching from eggs.

Illustration by Raúl Martín © AMNH 2014

Gnetales

3 2 1 POINT

CRETACEOUS

TERRAIN:

Gnetales are an evolutionary step between cone-bearing conifers and modern flowering plants, displaying BOTH cones and flowers. *(extant)*

PTERO TIDBIT

Baby pterosaurs were very independent. With long wings and toothy jaws, they could probably live on their own right after hatching, even able to find their own food.

Illustration by Ivy Rutsky ©AMNH

Beurlenia

3 2 1 POINT

CRETACEOUS

TERRAIN:

This extinct shrimp is named after the German paleontologist Karl Beurlen (1901-1985), who studied fossils in Brazil. *(extinct)*

PTERO TIDBIT

The earliest pterosaurs were relatively small and robust, with long tails, short necks and jaws lined with teeth.

Photo © AMNH

Brachyphyllum

3 2 1 POINT

JURASSIC CRETACEOUS

TERRAIN:

These coniferous trees lived all over the globe during the Jurassic and Cretaceous periods. *(extinct)*

PTERO TIDBIT

In the Jurassic period a new group of pterosaurs emerged. They had shorter tails, longer hands and neck bones, and bony crests on top of their heads.

Photo © AMNH

EVENT : Meteorite Crash

A meteorite has crashed, disrupting the entire ecosystem!

PLAY on any level 1 or 2 card.

EFFECT Destroy the selected card and each card lower than it on its food chain. Discard this card.

Photo © AMNH

EVENT : Theropod Attack

In Morocco, scientists found the tracks of a theropod (a type of carnivorous dinosaur) among those of pterosaurs. Did dinosaurs pose a threat to pterosaurs? Evidence is scarce, but some fossils suggest they did.

PLAY on one pterosaur to remove it from the game and leave this card in its place.

Photo © AMNH

EVENT : I Don't Think So

PLAY this card on your opponent's turn when they use an event card against you.

EFFECT Stop the effect of their event card and discard this card.

Image © AMNH

EVENT : Climate Change

The climate has shifted.

PLAY on any level 1 or 2 card.

EFFECT Leave this event card on the table and permanently change the terrain of the card underneath to land, sea or ocean. (Remove at end of game so opponent can collect the points underneath.)

Photo © AMNH

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Photo © AMNH

EVENT : I Don't Think So

PLAY this card on your opponent's turn when they use an event card against you.

EFFECT Stop the effect of their event card and discard this card.

Image © AMNH

EVENT : Volcano

A volcano has erupted, wiping out larger reptiles in this land or water area.

PLAY on any level 1 or 2 card.

EFFECT Destroy the selected card, discard this one, and freeze movement for all adjacent cards for one round (only horizontal and vertical).

Photo © AMNH

EVENT : Dead Pterosaur

Pterosaurs aren't immune to this fact of life: death!

PLAY on any pterosaur card and leave it there.

EFFECT The pterosaur group lives on but has been reduced in number, with a point value reduced by 2.

Photo © AMNH

EVENT : Migration

The season has changed. Time to move!

PLAY on any level 3.

EFFECT Turn any level 3 card around and take control of it. Then discard this card.

Photo © AMNH