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

Trophic level: Its place in the food chain. Can only eat one immediately below it.

Points: The value of this card if still in play, and facing you, at the end of the game.

Period: When this animal or plant lived. At least one must match to be played.

Terrain: Where it lives or feeds. At least one must match to be played.

Extinct/Extant: If it is extinct or still alive today.

Rarity: Some cards are common, some rare, and some augmented. See if you can figure out which is which.

Flight: Animals that fly can also move diagonally.

Sample Layout After a Few Turns

Draw Pile

Discard Pile
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!

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• Thanks to David Ng, Haley Fierge and the rest of the Phyllo community. Special credit to Honora O’Neill for principal development of the Phyllo game rules. Thanks also to the Michael Smith Laboratories, UBC, whose financial support helped make this game possible. For free access to more Phyllo cards and information, please visit http://phylogame.org
**Jeholopterus ningchengensis**

**FLIGHT of 1**

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 Raul Martín © AMNH 2014

**Pterodaustro guinazui**

**FLIGHT of 1**

This pterosaur’s name comes from the Greek word “pterous” (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 Raul Martín © AMNH 2014

**Pteranodon longiceps**

**FLIGHT of 2**

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 Raul Martín © AMNH 2014

**Tupuxuara leonardi**

**FLIGHT of 2**

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 Raul Martín © AMNH 2014
**Pterodactylus antiquus**

*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*)

**Tapejara wellhoferi**

*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*)

**Dimorphodon macronyx**

*Flight of 2*

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

**Rhamphorhynchus muensteri**

*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*)

**Nyctosaurus gracilis**

*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*)

**Quetzalcoatlus northropi**

*Flight of 3*

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

**3 POINTS**

**CRETACEOUS**

**FLIGHT of 2**

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

**TERRAIN:**

*PTERO TIDBIT*

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

Illustration by Paul Martin © AMNH 2014

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Dzungaripterus weii

**5 POINTS**

**CRETACEOUS**

**FLIGHT of 2**

Dzungaripterus 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.

**TERRAIN:**

*Illustration by Paul Martin © AMNH 2014*

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Anhanguera blittersdorffii

**5 POINTS**

**CRETACEOUS**

**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.

**TERRAIN:**

*Illustration by Paul Martin © AMNH 2014*

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Cockroach

**2 POINTS**

**JURASSIC**

**CRETACEOUS**

**TERRAIN:**

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

*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 Accinelli © AMNH

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Ammonite

**3 POINTS**

**CRETACEOUS**

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**TERRAIN:**

*PTERO TIDBIT*

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Photo ©AMNH/VA Shantry

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Scaphognathus

**4 POINTS**

**CRETACEOUS**

**FLIGHT of 1**

Scaphognathus means “fat snout” in Latin. It has been found in Germany and may have had a good sense of sight.

**TERRAIN:**

*Illustration by Paul Martin © AMNH 2014*
Gingko

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

PTEROSAURS

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

Photo by Kevien (CC-BY-SA 3.0)

Aeger elegans

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

PTEROSAURS

PTEROSAURS

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

Photo by Maxur (CC-BY-SA 3.0)

Nymphaeales (Water Lily)

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

PTEROSAURS

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

Photo by SajjiB0lo (CC-BY-SA 3.0)

Clam

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

PTEROSAURS

Pterosaurs began life on the ground, hatching from eggs.

Illustration by Raul Martinez © AMNH 2014

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

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Photo by Maxur (CC-BY-SA 3.0)
Paleomattea

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

CRETACEOUS

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

Photo © AMNH

Brachyphyllum

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

CRETACEOUS

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

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

CRETACEOUS

PTERO TIDBIT
Pterosaurs began life on the ground, hatching from eggs.

Illustration by Rob Martin © AMNH 2014

Gnetales

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

CRETACEOUS

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

Illustration by Ivy Ribicky, AMNH

Beurlenia

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

CRETACEOUS

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

Photo © AMNH

Brachyphyllum

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

CRETACEOUS

PTERO TIDBIT
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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

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**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

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**EVENT: I Don’t Think So**

**HA HA HA**

**NO.**

**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

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**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

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**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).

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.

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.