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Dinosaurs: A Comparative Study of Eurocentric and Indigenous Perspectives

Marshall Mannella



Eurocentric and Indigenous Standpoints of Dinosaurs

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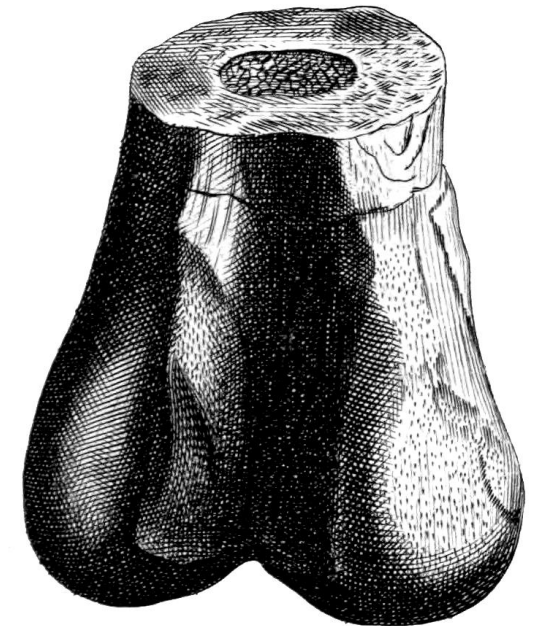
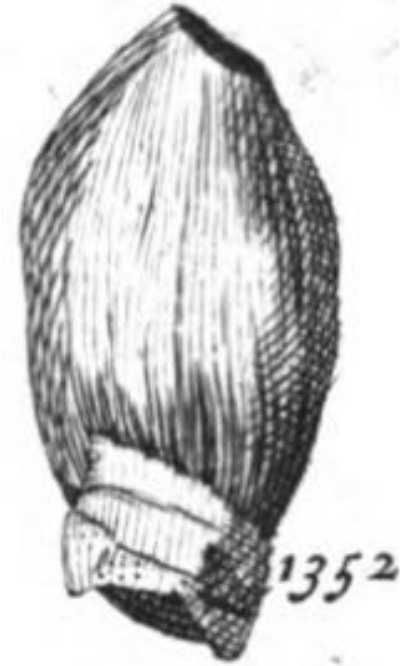
Guiding Questions

- What are some ideas held about dinosaurs in Eurocentric communities? In Indigenous groups?
- How does Western academia define dinosaurs?
- What roles has colonialism played in the field of palaeontology?



The Western Story – 1690s-1860s

- Earliest descriptions dating to 1699, Western palaeontology officially coined in 1822 by Henri Marie Ducrotay de Blainville
- Dinosauria (1833) – giant, spiky crocodile-like lizards
 - Earliest accepted members - *Megalosaurus sp.* (1824), *Iguanodon bernissartensis* (1825), and *Hylaeosaurus armatus* (1833)
 - Notably terrestrial, unlike the marine “Enaliosaurians”
- First public engagement with dinosaurs in the Crystal Palace Park’s Geological Court (debuted in 1854)
 - Updated and innovative depictions from prior decades
- *Archaeopteryx lithographica* – described in 1861 as a single feather by Hermann von Meyer, identified as a bird
 - Skeleton later described by Sir Richard Owen in 1863



The Western Story – 1870s-1950s

- Many more dinosaur taxa were described in this era, large sized supported ideas of unique but sluggish, swamp-dwelling reptiles
 - Popular genera from North America, including *Brontosaurus excelsus* (1879), *Triceratops horridus* (1889), and *Tyrannosaurus rex* (1905)
- The Bone Wars held during this time – hostility caught public interest in dinosaurs
 - Microcosm of palaeontology's extractive background
- Questions raised about their extinction, leading to the idea that dinosaurs were “evolutionary failures”
 - Avian affinities of dinosaurs with *Archaeopteryx* fell out of favour



Indigenous Ideas - Preface

- Indigenous people in North America are a plurality of groups with their respective cultures
 - Some groups reside(d) in fossil-rich lands, others did not
- Ideas about dinosaurs vary between different groups, should not be homogenized
 - Stories grossly overlooked by colonial arrivals
- Indigenous observations largely drawing from the work of Dr. Adrienne Mayor (1946-)
 - Research Scholar and historian at Stanford University
 - Writer of several books, including *Fossil Legends of the First Americans* (2005)



Indigenous Ideas – Yuchi Stories

- Sot'adax'i chata'a → Great Lizard
 - Perceived as a threat in legends
- Yuchi Medicine Men recount stories about giant lizards attacking people and fighting each other
 - Attributed with the “Lizard Dance” of their Green Corn Ceremonies
- Many large dinosaur species described from around Oklahoma, the current residence of the Yuri people
 - Ex. *Acrocanthosaurus atokensis* (1950), *Saurophaganax(?) maximus* (1995), *Sauroposeidon proteles* (2000)

Indigenous Ideas – Zuni Fetishes

- Fetishes are said to be petrified animals that assist the Zuni people
 - Appear naturally in the landscape as animal-shaped rocks
- Modern fetishes are stone carvings made by the Zuni Indigenous People
 - Sometimes made from fossils themselves (ex. *Belemnitella* sp.)
- Reports from Zuni elders about finding the “life-size forms of many beings that no longer live”
 - Role of the giant, hostile creatures that preyed on early humans in the Zuni myths
- Dinosaur carvings are recent manifestations of the connection between fossils and fetishes, but have no cultural significance

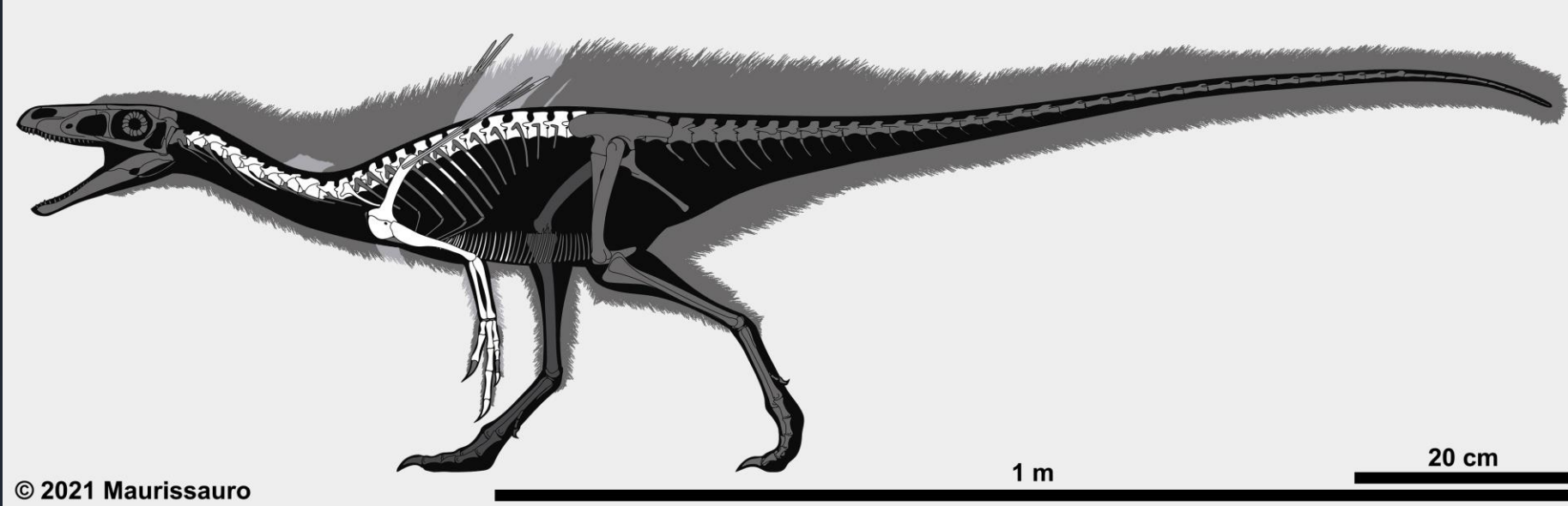


The Western Story – 1960s-Present



- John Ostrom’s landmark paper solidifying the dinosaurian nature of modern birds using the recently described *Deinonychus antirrhopus* (1969)
 - Idea that dinosaurs in the form of birds survived one of Earth’s most devastating extinction events
- Nature of non-avian dinosaur extinction revealed with asteroid impact traces
- Public awareness of dinosaurs as terrestrial and successful animals succinctly presented with *Jurassic Park* (1993)
- Ideas of dinosaurs continue to radically evolve as more fieldwork is performed and described
 - New discoveries consistently muddy the perception of exclusively “avian” traits that no other dinosaurs had
 - Ongoing efforts to de-colonize the field of Palaeontology





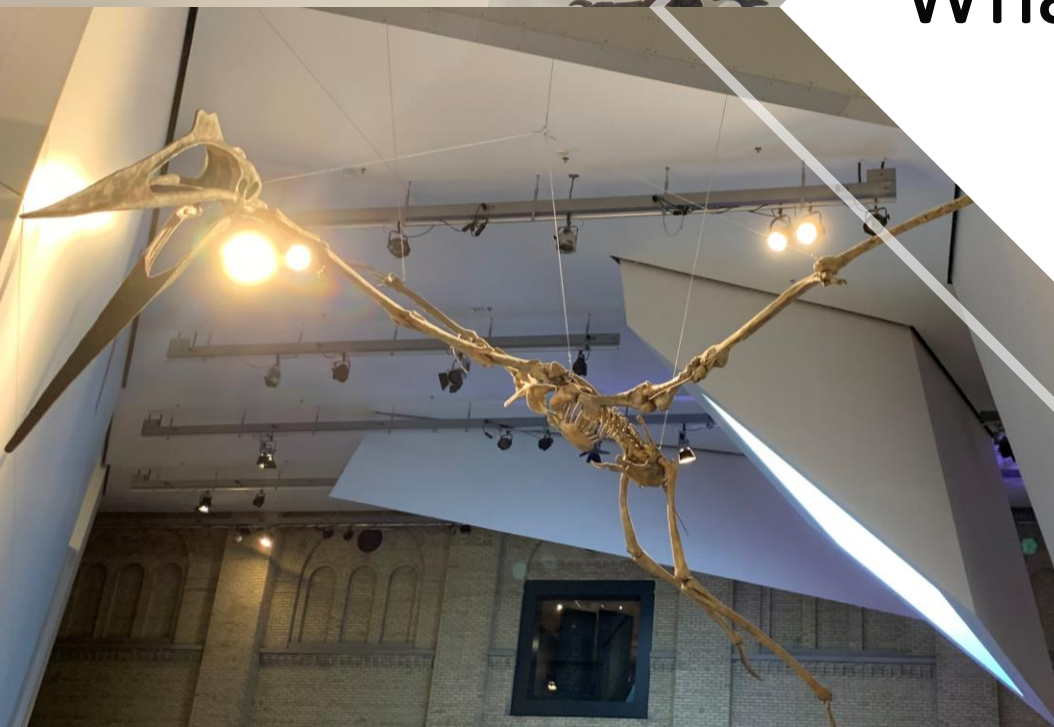
Palaeontology & Colonialism

- Deep, historic ties to colonialism in the field
- Countless fossils extracted on land owned by unwilling people and/or illegally
 - Indigenous people rarely get ownership of the fossils taken from their land
- Recent example: “*Ubirajara jubatus*” – specimen illegally taken from Brazil by German paleontologists
 - Brazilian law demands that at least 1 Brazilian scientist must be a participant in studies, no such worker was part of the excavation
 - Lead author, Dr. David Martil, expresses discriminatory remarks when discussing Brazilian law
 - Reparation works only now underway
- Importance of refusal in the field of palaeontology to protect against injustices to sovereignty



What is a Dinosaur?

There is only 1 dinosaur skeleton on this slide!



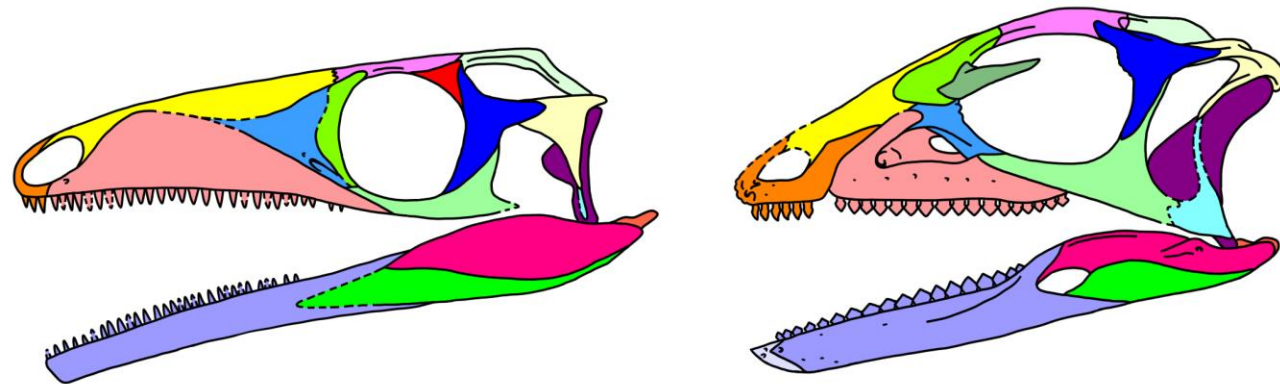
Identifying a Dinosaur

- Erect hindlimbs – ancestrally bipedal clade!
- No postfrontal bone
 - Trait also seen in some pseudosuchians (ex. *Effigia okeeffeae*)
- Notched humerus (elongate deltopectoral crest)
- “Advanced Mesotarsal” ankle – fused to the tibia
 - Trait also shared by Pterosauria and Aphanosauria



Protorosaurus speneri

Lesothosaurus diagnosticus



- | | | | | | | | |
|-------------|------------|-------------|-------------|-------------|---------------|-------------|------------|
| Orange | Premaxilla | Green | Palpebral | Light Green | Parietal | Blue | Dentary |
| Yellow | Nasal | Purple | Frontal | Yellow | Squamosal | Light Green | Angular |
| Pink | Maxilla | Light Green | Jugal | Cyan | Quadratojugal | Pink | Surangular |
| Blue | Lacrima | Red | Postfrontal | Purple | Quadrate | Orange | Articular |
| Light Green | Prefrontal | Blue | Postorbital | Light Blue | Predentary | | |



Plateosaurus

Dimorphodon



Sampling of Dinosaur Biodiversity

3 Main Dinosaur Groups

Ornithischia – “Bird-hipped”

- Misleading! - hip shape evolved convergently
- Unique bone – Predeontary
 - Early formation of a beak
 - Adaptations for herbivorous lifestyles
- 3 main branches
 - Marginocephalia (ex. *Triceratops horridus*, *Pachycephalosaurus wyomingensis*)
 - Ornithomimidae (ex. *Parasaurolophus walkeri*, *Iguanodon bernissartensis*)
 - Thyreophora (ex. *Stegosaurus stenops*, *Ankylosaurus magniventris*)



Sauropodomorpha - “Lizard-footed”

- Large nostrils and lightweight skulls
 - Leaf-shaped teeth for cutting foliage
- (Generally) long necks and tails
 - Expanded feeding envelope for browsing
 - Use of gastroliths for digestion
- 3 main branches
 - Plateosauridae (ex. *Plateosaurus trossingensis*, *Issi saaneq*)
 - Macronaria (ex. *Giraffatitan brancai*, *Dreadnoughtus schrani*)
 - Diplodocidea (ex. *Brontosaurus excelsus*, *Amargasaurus cazau*)



Theropoda - “Beast-footed”

- Only surviving dinosaur group - birds
- Ancestrally carnivorous
 - Herbivory evolved several times in the group
- All members are bipedal, upright posture
 - (Generally) hollow bones
- 3 main branches
 - Carnosauria (ex. *Allosaurus fragilis*, *Spinosaurus aegyptiacus*)
 - Ceratosauria (ex. *Carnotaurus sastrei*, *Ceratosaurus nasicornis*)
 - Coelurosauria (ex. *Tyrannosaurus rex*, *Velociraptor mongoliensis*)



Dinosaur Pelvises

- Varied greatly between groups of dinosaurs
 - Some had lizard-like pelvises, others had bird-like ones
- Pelvis shape doesn't (always) determine relatedness!
 - Maniraptoran theropods changed pelvis shape convergently multiple times
- 3 main bones, with labelling below



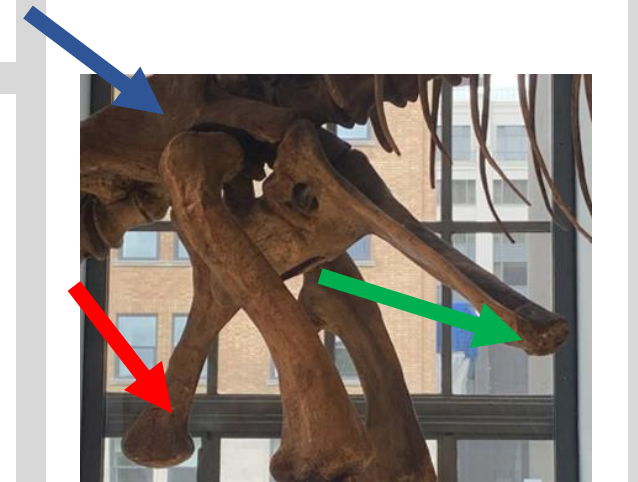
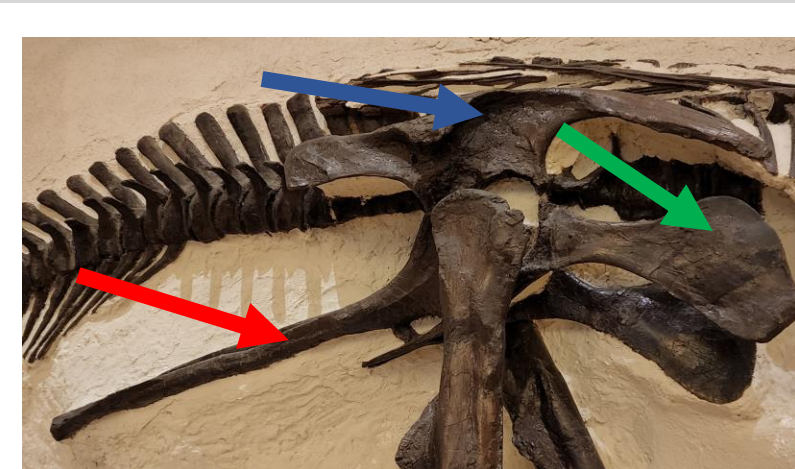
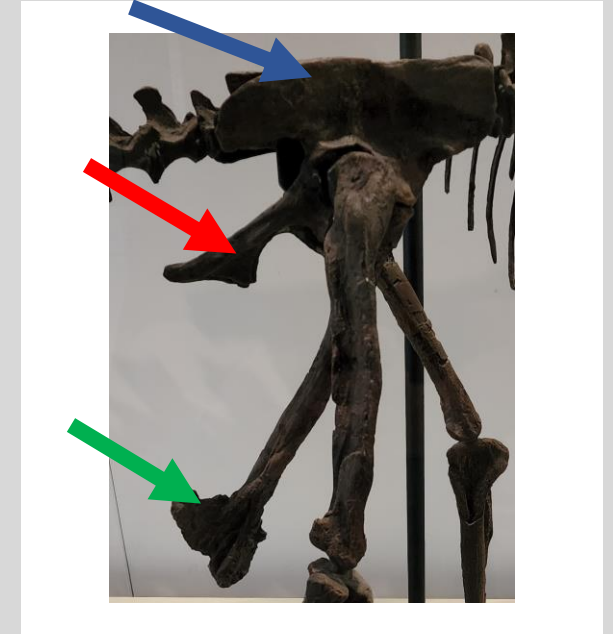
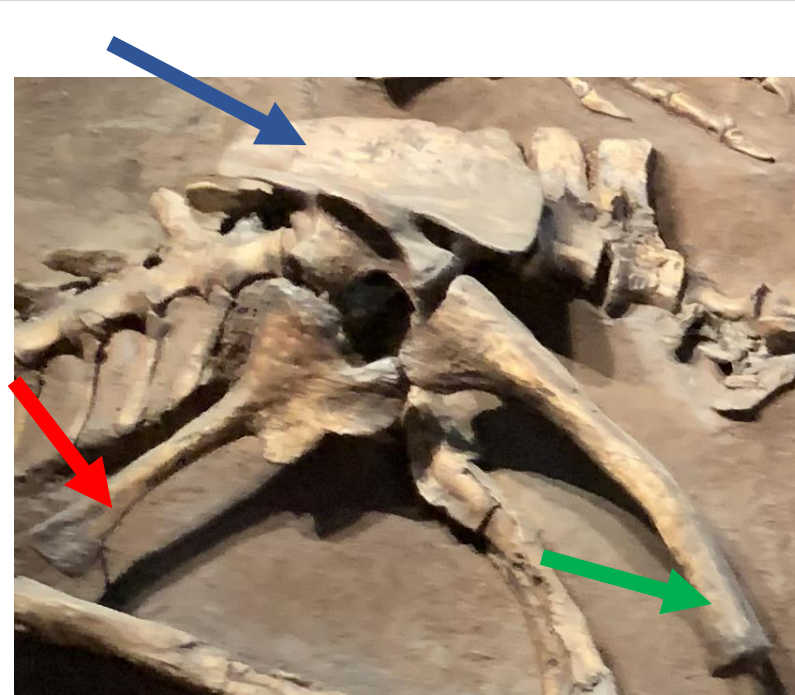
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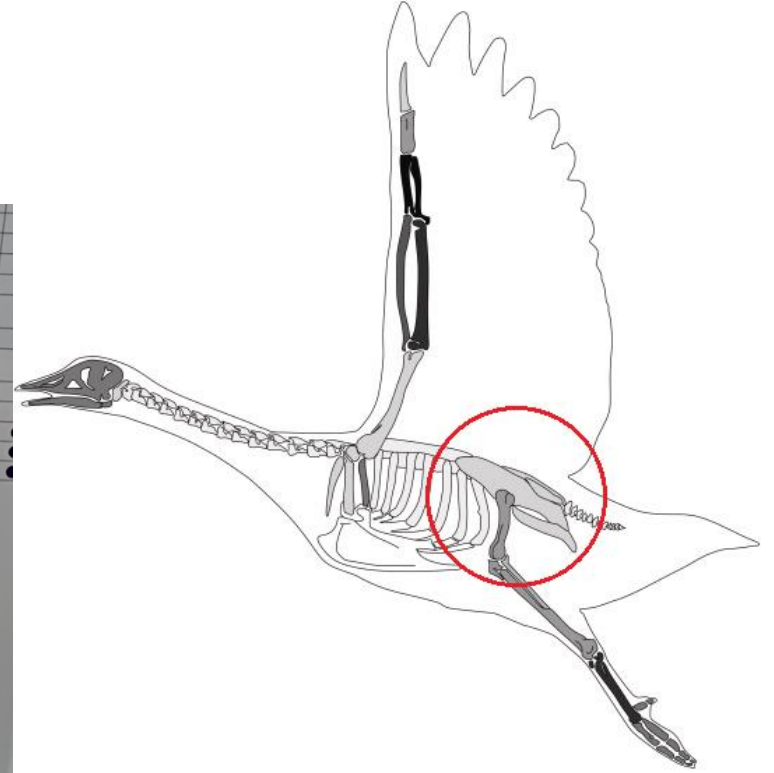
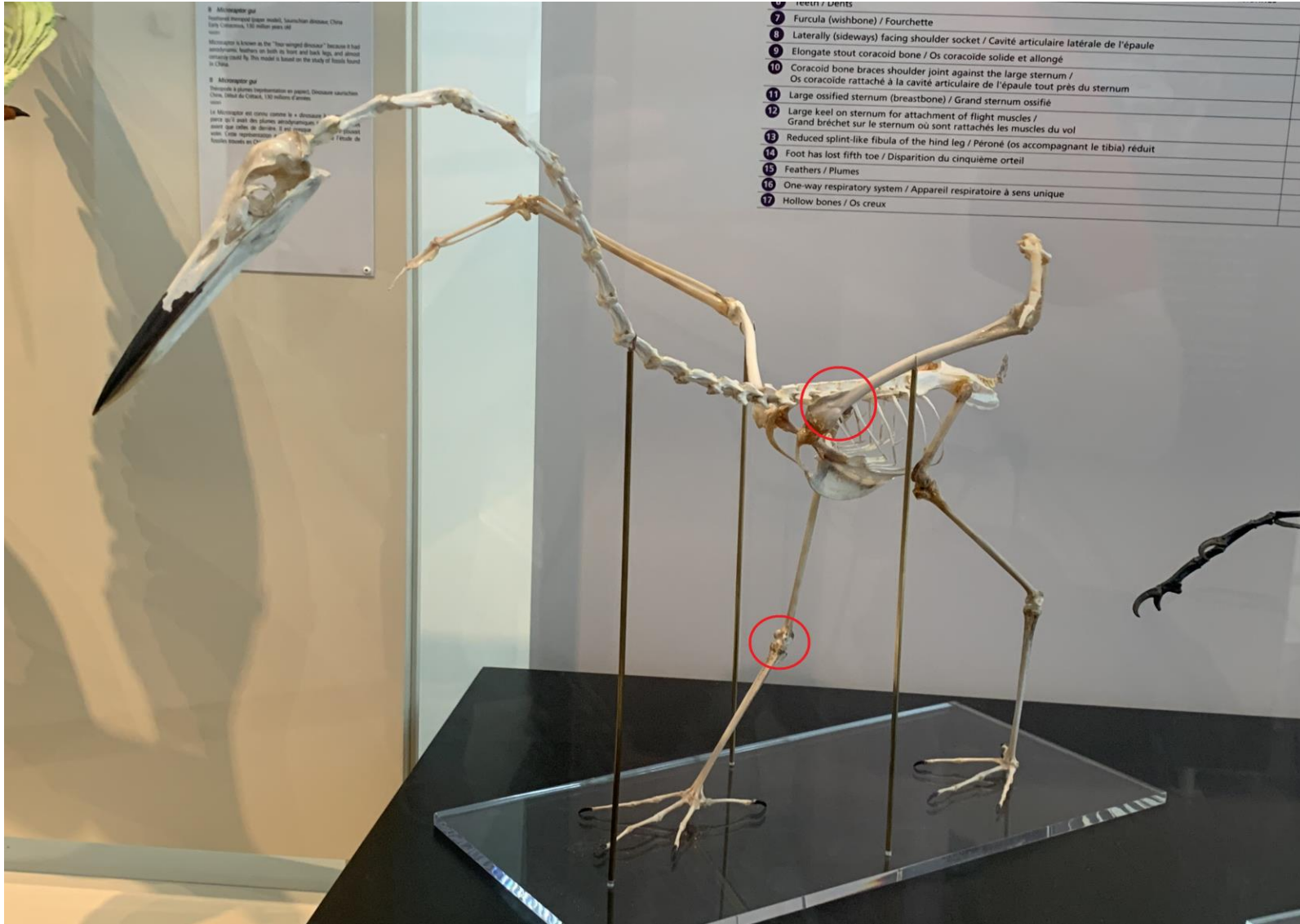
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Ilium



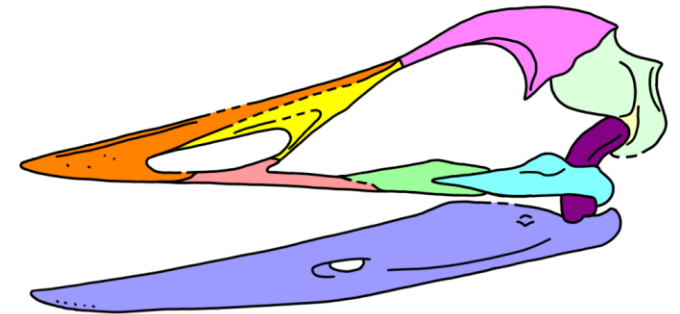
Do Birds have these Features?



Yuornis junchangi

L-08-7-3

5 cm



- Premaxilla
- Frontal
- Quadratojugal
- Nasal
- Parietal
- Quadrate
- Maxilla
- Squamosal
- Mandible
- Jugal

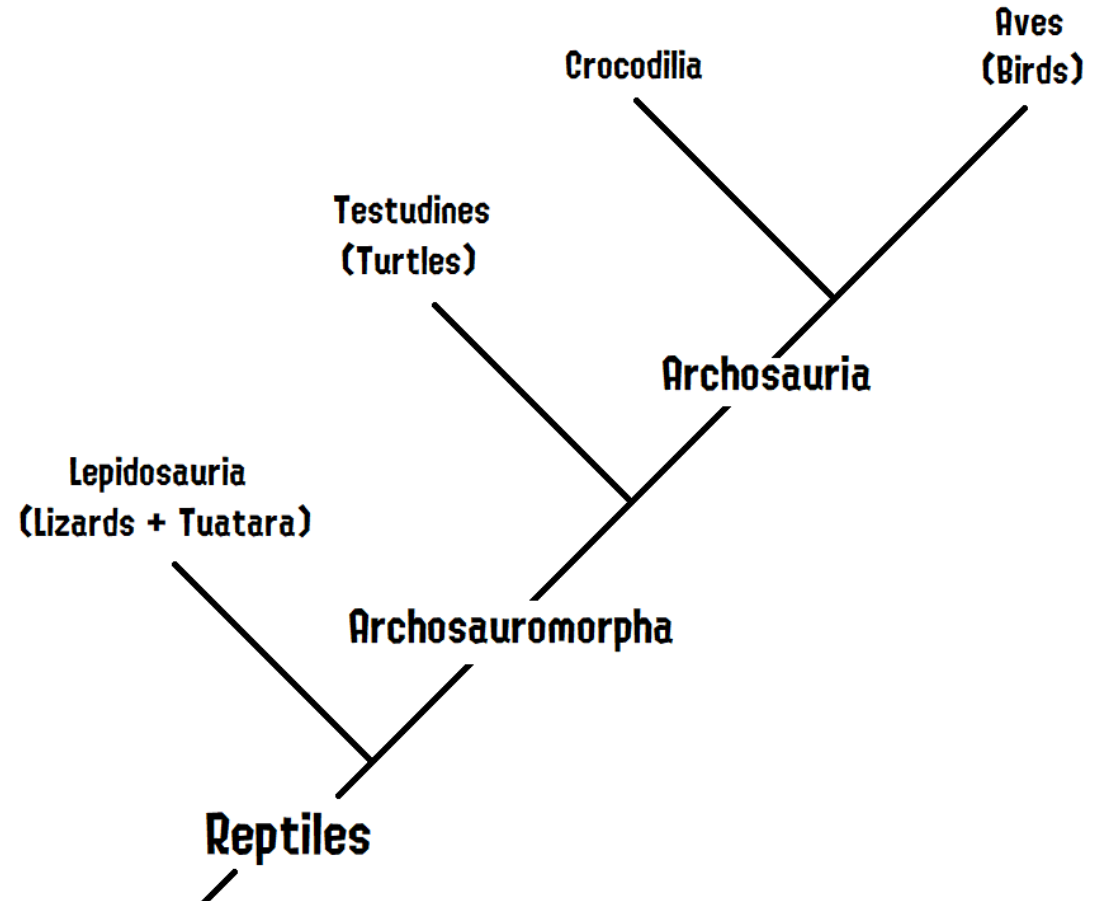
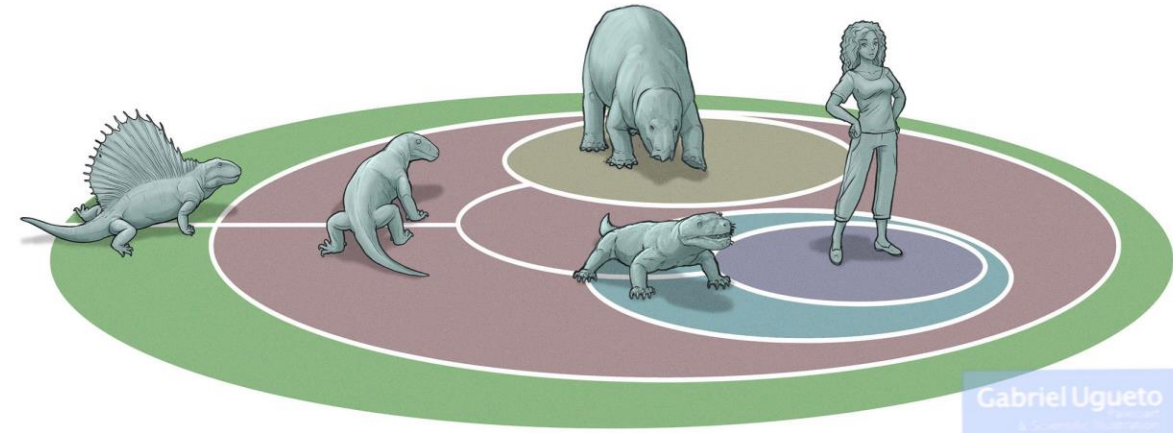
Indigenous Ideas – Theropods & The Thunderbird

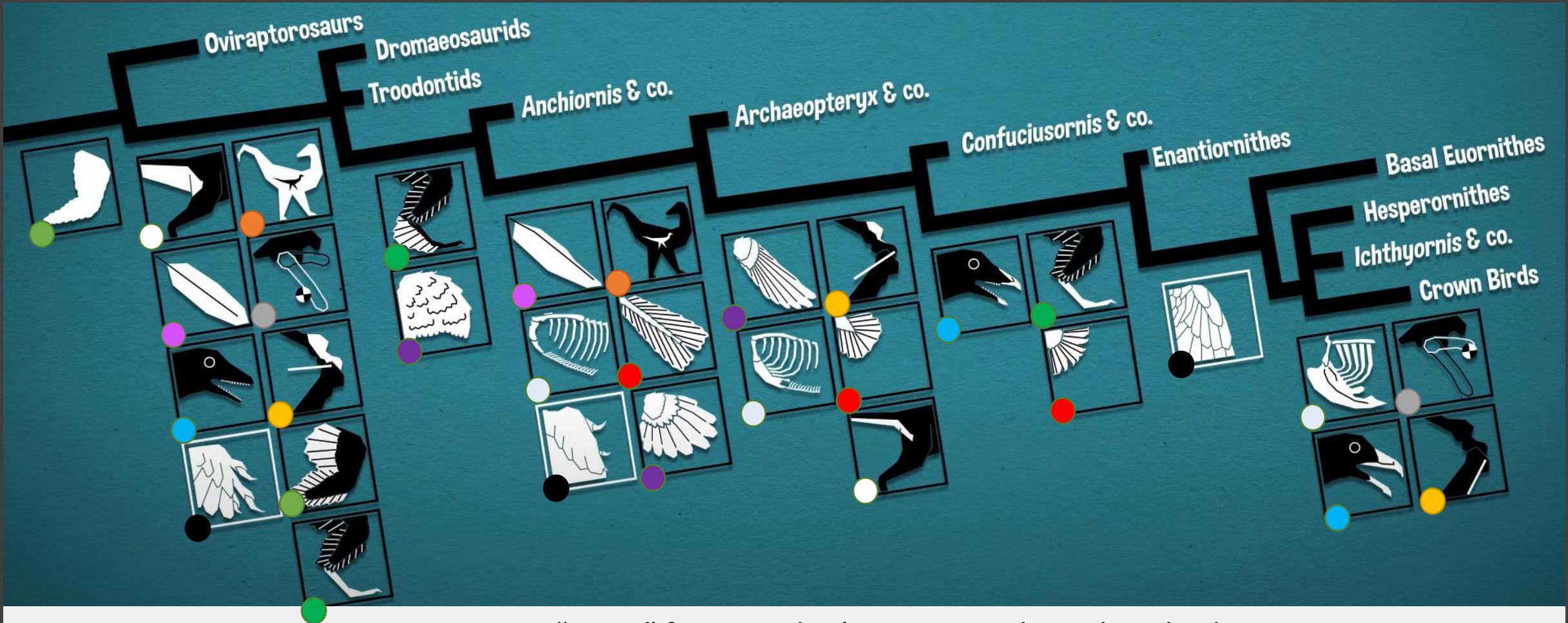


- The Thunderbird is an important part of culture for the Navajo Indigenous people
- Several bones and footprints found for theropod dinosaurs in this area
 - Includes tyrannosaurids – large dinosaurs with two clawed fingers per arm
- Trackway in Noenave, Arizona – called “Place with Bird Tracks” by the Navajo people
- Thunderbirds are often depicted as avians with 2 claws, matching both footprints and fossil remains
 - Implications for the Navajo people observing the avian qualities of local fossils(?)
- Thunderstorms washing away sediment can reveal fossils, creating the connection

Birds as Dinosaurs – Genetic Support

- Birds must be reptiles for the group to be functional
- Taxa cannot leave a clade from which they descend



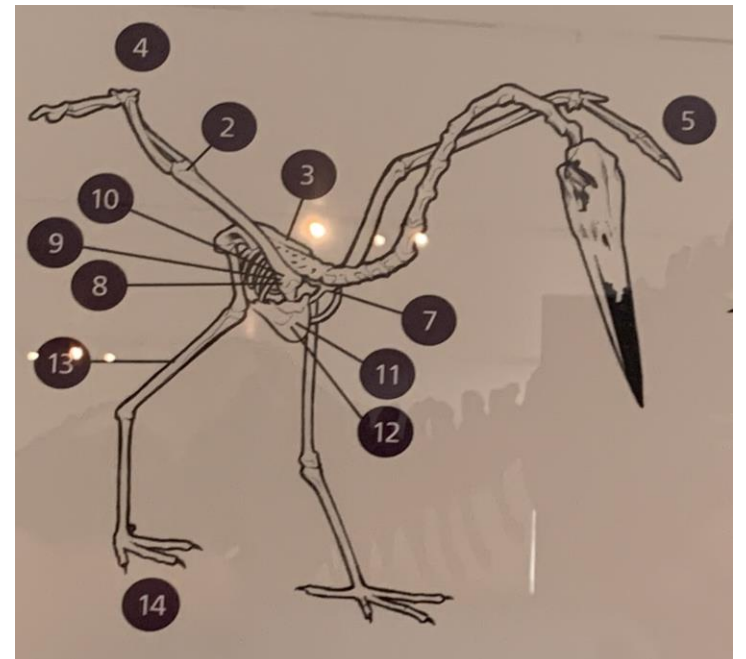
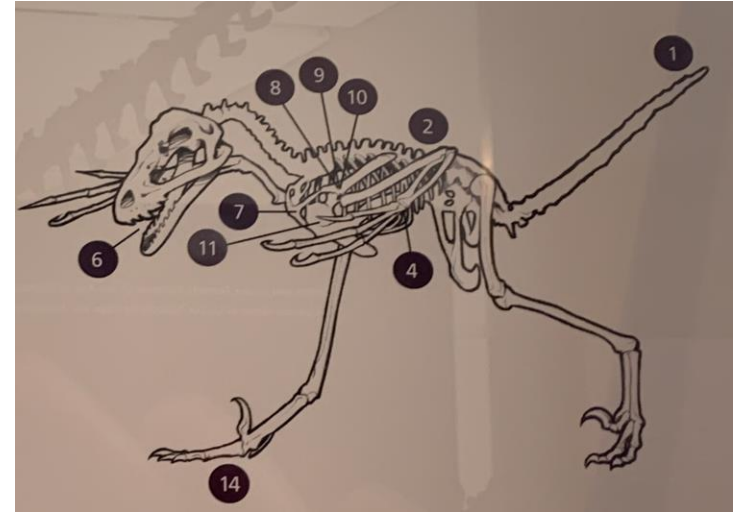


“Transition” From Non-Avian to Avian

- “Avian” features don’t appear exclusively in birds
 - Traits of birds seen multiple times in non-avian dinosaurs
 - “Non-Avian” features can secondarily re-appear in birds
- Details are fuzzy – both figuratively and literally
 - Feathers may be basal to dinosaurs or even archosaurs as a whole(?)

Traits of Birds

- Core unique traits:
 - Center of mass at the knees, pushed forward from balancing at the hips (helped by pushing the pubis back)
 - Ligaments generating shoulder balance (transition seen with *Archaeopteryx*)
 - Torso and pectoral girdle built up (adaptation for powered flight, transition seen with *Archaeopteryx*), no gastralia (loss not unique to birds)
 - Beak without teeth (loss of teeth not unique to birds)
 - Fingers form the tip of a wing (hoatzin as an extant exception, ancestral re-emergence)
- All features derived from traits seen in non-avian dinosaurs (maniraptorans in particular)
- “Avian” appearances are old, ~165 million years (Late Jurassic!)
 - *Archaeopteryx* is ~150.8 million years old



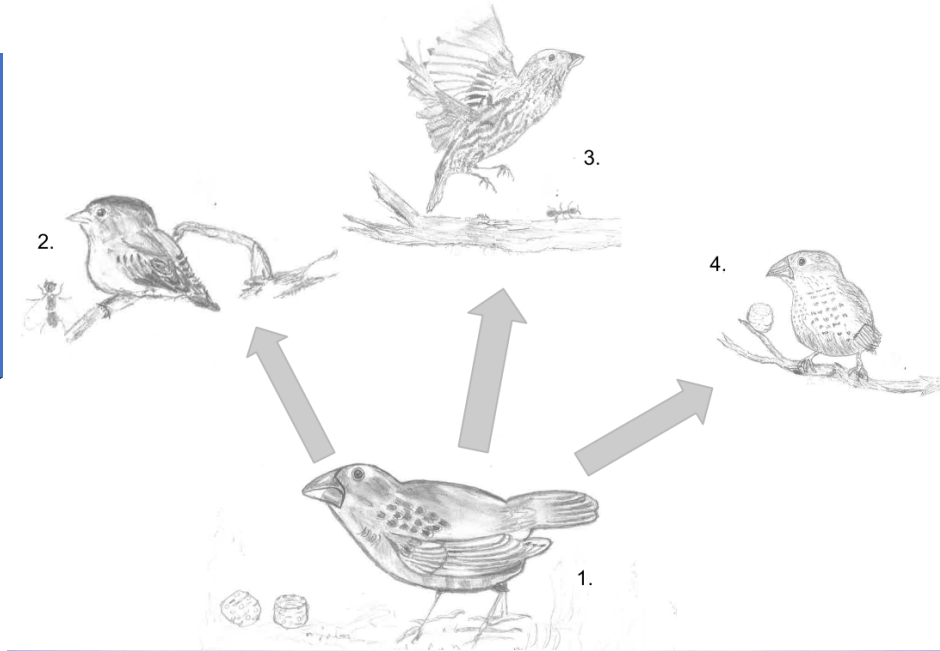


Indigenous Ideas – Marella the Emu Man

- Creator Being and Lawgiver from Australian Aboriginal Dreaming (Goolarabooloo people in particular)
 - Dreaming – a concept used to explore one’s ancestry, unfixed in time
- Sang the world into being, song left behind as 3-toed footprints stretch from Broome to James Price Point (Walmadany)
 - Feather traces also left in the ground
 - Marella himself is imaged into the night sky
- *Australovenator wintonensis* (2009) is a tyrannosauroid from Australia
 - Largest known theropod from the country, possible originator of Marella’s tracks

Dinosaur Evolution & Extinction

- The Theory of Evolution sets to explain the related phenomenon of natural selection and genetic inheritance
 - Traits acquired by random genetic mutations can be detrimental, neutral, or beneficial to a species – latter of which is most likely to be carried in a lineage and leads to specialisation
 - Biodiversity is achieved through this process, dinosaurs are a microcosm of such variety
 - Popular extant example – Galapagos finches
- Extinction originates from a variety of causes (ex. climate changes, non-Earth interferences, spike in natural disasters)
 - Generalist species are most likely to persist through extinctions, specialised species more likely to be victims of extinction
 - The Cretaceous-Paleogene (K-Pg) extinction event (caused via asteroid impact) killed most lineages of dinosaur, birds are the only surviving group and survived by originally being generalists



Indigenous Ideas - Unkche Ghila



- Lakota Sioux legends of “[a] huge animal whom no human being has ever seen alive”
 - Identified by James LaPointe in 1976 as a dinosaur
- Many large and unfamiliar animals summoned to a race to help bring order to the world
 - Contestants sinking under their own weight and killed by “fire and rocks” – ideas about mass extinctions?
 - Potential parallels to evolution by natural selection
- Lakota Sioux people are located in South Dakota, one of several states that hold the Hell Creek Formation
 - Notable large dinosaurs include *Triceratops horridus* (1889), *Edmontosaurus annectens* (1892), and *Tyrannosaurus rex* (1905)

BIRD'S EYE VIEW OF THE BLACK HILLS
TO ILLUSTRATE THE GEOLOGICAL STRUCTURE.

Lakota Story – The Great Race (Excerpts)

“Far back in the first sunrise of time... all the animals of the earth gathered here in the Black Hills for a big race... The words Unkche Ghila in Lakota describe certain huge animals who once were numerous here, but are now extinct. These animals, oddly shaped and huge in size, roamed the land in great numbers. Then for some unknown reason, they disappeared.

...In the midst of a world filled with predatory animals, in which man killed animals for food, and animals killed man, the idea came to man that there must be a way to bring order to such a chaotic world. He pondered long and deeply upon the matter. Then one day he sent out a call to all the animals of the world to meet with him. A powwow was held. It was a memorable event because, in order to bring peace and order to the world, it was agreed that a race of immense magnitude was to be the solution. The race was to decide many things. It would result in sorting and separating the animals into their proper species by the smell of their bodies. It was to be a grand, epic feat of the ages.

There were strict rules established, to insure a fair and orderly event. Every animal would have a chance, whether small or clumsy, weak or strong. Death was to be the penalty for any infraction of the rules in this race of the ages.... Since all sorts of animals appeared from every corner of the earth to take part in the race, heralders, in a common language, kept the newcomers informed of the rules. One rule established that once the race began, there was to be no stopping. All the racers must keep running, while the sun rose and set, one hundred times around the course. There were many guideposts, and the racers must run on the outer side of the markers. Stopping for food or water was at the runner's own peril....

...The race of the ages had begun; it was a test of endurance and sheer stamina. Before the sun had set that first day, there were already groans of agony. The squeals and wailing of the weaker animals filled the air. They were trampled and crushed under the heavy hooves of the giant animals. The damp earth lost its moisture under the constant beating of hooves. Pulverized dust rose skyward, choking and obliterating the flying hordes of birds above, as they circled with the animal racers down below. High above, a bird would screech and then fall to the ground, a victim of weariness, or of some accident in the air.

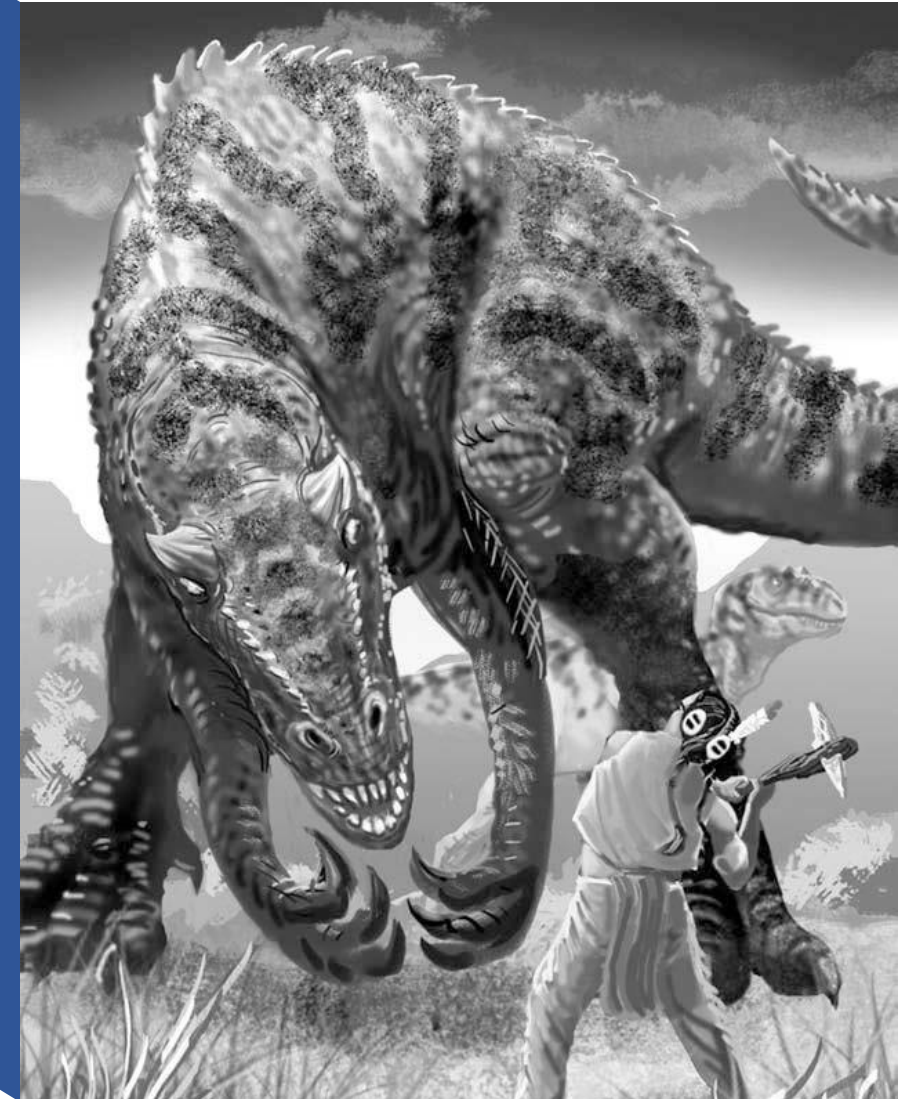
...As the endless stream of racing animals moved madly on, lo and behold! The path of the racers sank crazily under their combined weight. Within the circle of racing animals a bulge appeared, strangely rising out of the ground. At first it was only a small mound. But suddenly, the earth quivered and groaned like a huge animal in pain. The mound rose faster and faster, and higher and higher. Then, with a thunderous roar, it burst open. Flames and dense smoke rose skyward, carrying fire and debris. Rock and ashes pelted the racers.

The animal racers lay dead in their tracks, covered with smoldering ashes and lava. The epic race of the ages ended in a Wakipa (a curse inflicted by the Great Spirit)... After the air had cleared and there was calm once more, within the rim of the circle of dead animals there was seen a pile of broken rocks standing majestically high in the air.

Since the fabulous race of the ages was visited by a great holocaust, an act of displeasure by the gods, the winners were never fully determined... [T]he Unkche Ghila, a huge animal whom no human being in modern times has ever seen alive, was leading the ground animals.... The huge bones of the Unkche Ghila, which, once upon a time, roamed these prairie lands, can be found in the badlands to the east and south of the Black Hills.”

Conclusions

- Interpretations of dinosaurs vary between cultures, both colonial and Indigenous
 - Dinosaurs have been found virtually everywhere on Earth, as have the people who discovered their remains
 - Affinities with birds observed in multiple Indigenous groups, even before the settler connection
- Their diversity (including birds) and widespread presence serves to make them more familiar to us
 - Indigenous connections to dinosaurs serve both to observe their understandings of the world and to value the sovereignty of their land
- Dinosaurs were (and still are) real animals, they should be seen as such rather than as “monsters”
 - Dinosaurs are for everyone from all walks of life to enjoy, not just for the benefit of exclusive groups
 - Responsibility to faithfully portray dinosaurs in respects to their origin and our knowledge database





Thank You!