



Non-fiction

Group 5

Us and the Fossils

Hong Kong International School, Chau, Christine – 16

Nestled in the hills of northeastern China is a remote village, Sihetun. Despite its unassuming rural farmhouses and vast fields of cornstalks, beneath the Earth were the remnants of the ancient reptiles that once walked on the same ground as us. Within the hillsides of this village, such was discovered by the farmer Li Yumin during the summer of 1996 when he found two halves of a rocky slab containing the marked fossils of a *Sinosauropteryx*. This was the world's first known feathered dinosaur, its curiously small size a clear contrast to the massive, reconstructed skeletons of T-rexes found in museums. It was the initial puzzle piece connecting the evolutionary relationship between dinosaurs and modern birds, unraveling an entirely unknown part of the ancient world for paleontologists. Li's encounter with the fossil of the *Sinosauropteryx* illustrated that its feathers were part of a broader evolutionary narrative, and it would go on to bridge the gap between these prehistoric reptiles and their avian descendants with its exceptionally preserved impressions of feathers and tissues. Eventually dubbed the "China dragon bird", this myth-like discovery was the start of a Renaissance within Chinese paleontology, eventually spreading past the dusty village.

What is just as prominent as the discovery of the *Sinosauropteryx*? Arguably, it could be the fact that the Yixian Formation of Liaoning preserves a world that has long been left behind by the hands of time. Its fine-grained sedimentary rocks captured fossils in surprising detail, making it a crucial discovery ground for more than 40 dinosaur species, including 24 other winged pterosaurs. The Yixian Formation is a storybook in terraform, beginning in the late Jurassic period, when these small, feathered dinosaurs gradually hollowed their bones and reshaped their forelimbs to reach the tantalizing possibility of flight over millions of years. It entombed the very period when birds as a species separated from dinosaurs, evolving into new, aerial creatures that entered the next chapter of the Cretaceous period—in place of the dinosaurs who were bound to the Earth, came the new lineage of early birds who could soar through the heavens.

With such a rich fossil record, China has emerged as a pivotal player in the field of paleontology, particularly through its remarkable discoveries of feathered dinosaurs that yielded some of the most significant findings in the study of dinosaur evolution (especially regarding the origins of avian flight). To mention one of the most notable examples, the *Microraptor zhaoianus* was a small, feathered theropod dinosaur that captivated scientists and the public alike when it was discovered in 2000. This dinosaur, measuring about 55 cm in length, is known for its unique anatomical features, including its four wings—two on its arms and two on its legs. The well-preserved fossils demonstrate that the *Microraptor* had long feathers on its limbs and tail, suggesting it was adapted for gliding or possibly powered flight. This challenges earlier notions that only small dinosaurs could achieve aerial capabilities and introduces the idea that larger species could have developed similar traits. Interestingly, the feather structures found in the *Microraptor* share many similarities with modern birds, indicating that the evolutionary lineage leading to avians was more complex than previously understood. This is also highlighted by the presence of features such as hollow bones and nesting behaviors, which are characteristic of modern birds as well.

Another significant discovery is the *Changyuraptor yangi*, which was found in 2014. This dinosaur is believed to be the largest known four-winged dinosaur, with a complete skeleton featuring long tail feathers measuring up to 30 cm. The discovery of the *Changyuraptor*, which lived approximately 125 million years ago, adds to the narrative that flight adaptations were not limited to small dinosaurs. Its structure and feather arrangement suggest that it may have used its long tail for enhanced control during flight, helping it to slow down for safe landings—a critical adaptation for aerial locomotion. The implications of these discoveries resonate deeply within the scientific community, and China's importance in the realm of paleontology is vividly illustrated by its treasure trove of these prehistoric, winged creatures, illuminating the evolutionary narrative of flight. As excavations persist to bring these ancient fossils back to life, China's role in paleontology is poised to flourish, offering more threads to weave into the massive web of our history on Earth.

However, China's newfound paleontological resources have attracted not only scientists but also opportunists looking to capitalize on the fossil trade. The commercialization of fossils has surged, driven by a long-standing tradition of collecting "dragon bone" for traditional medicines and a recent boom in museum construction. This

commercialization became increasingly detrimental to the work of researchers, as financial incentives led to unethical practices, including the forgery of fossils. Reports suggest that farmers, in search of profit, may lack the discerning eye needed to identify authentic specimens from forgeries, leading to the market being flooded with crude plaster among ancient bones. Amid this commercialized landscape, paleontologists face the challenge of balancing the thrill of new discoveries with the necessity of scientific integrity. The fissures created by the fossil trade not only jeopardize the authenticity of specimens but also endanger the future of Chinese paleontology. While the influx of fossils has propelled a new generation of paleontologists into the limelight, it has simultaneously raised questions about whether or not their discoveries align with the stories that the existing, authentic fossils write for us.

Despite these setbacks, China is still rapidly emerging as a hub for fossil-hunting and paleontological research, illustrated by even more recent discoveries that highlight its rich heritage. In Nanchang, Jiangxi, the discovery of a new species of dinosaur in 2021, the *Gandititan cavocaudatus*, or the *Titanosaur*, has opened exciting avenues for research. Found at a construction site, these fossils, which date back approximately 90 million years, include around 40% of the dinosaur's skeleton. This finding suggests the existence of a previously unknown group of titanosaurs in eastern Asia, indicating a potential link between Asian and South American dinosaur populations during the mid-Cretaceous period. As these discoveries accumulate—ranging from feathered dinosaurs to ancient fossils—Chinese paleontology contributes significantly to a global narrative about evolution. This shared pursuit of knowledge fosters international collaboration, inviting people from around the world to explore the interconnectedness of life through the lens of paleontology. In doing so, we are not only enhancing its scientific standing but also reinforcing a universal truth: all living beings are linked through a shared history. With each new fossil unearthed, we are reminded that, despite geographical and cultural differences, we are all part of a larger story of existence.

The very existence of the *Sinosauropteryx* in China, along with countless other fossil findings everywhere else is not just a significant advancement for paleontology; it serves as a timeless story of how we are connected across time and space. What else has remained constant throughout the billions of years that have gone by on Earth? What is better proof of there being a universal *us* than the fact that all living things born on here Earth— from legendary, prehistoric dinosaurs to delicate, airborne birds— will remain here together, long enough for their descendants to find and know and love, even after millennia?

Fossil (Fuels): All the Rage in the Holocene

International Christian School, Lau, Sophie Grace – 16

What was it like after the meteor? Picture the earth, still and serene. Time itself suspended in shock of an era-ending celestial collision. There is not a single ripple on the surface of this static iridium lake. Gradually, a hazy sheet of soot and debris settles on the freshly shaken ground. From somewhere far in the distance travel the echoes of mighty tidal waves colliding with a stoic shore. All around, pillars of fire spring up, feeding on plant litter and amassed atmospheric gas. Once warm rays of sunlight now suffocate in the clutching grip of ash, and once lush plants begin to shrivel. The whole green planet has been transformed into a crimson dreamscape.

For a while, life on earth persisted more or less unchanged, save for a slight red hue. Yet as Father Time marched on, Mother Nature began to suffer. The seasons grew shorter, the cold became frigid, and the hot became sweltering. Life on earth turned from leafy paradise into desert terror. The gentle caress of sunlight never returned, causing plants to suffer without a source of light producing energy. The repercussions of this sent a ripple effect up the food chain, until every bearer of life on the planet felt that living was nothing more than a mere forcing of excruciating beats out of a heart stripped of the will to live. From the large, yet gentle *datousaurus* to the small and ferocious *sinornithosaurus*, the contagion effects of the meteor ran painfully deep. In one cruel trick of the universe, an entire species was eradicated.

Every flightless dinosaur met death. All others over 25 kilograms also fell. Yet their legacy was carried through to all future eras of natural history. In 1996, Li Yumin, Chinese fossil hunter, uncovered the first identified remains of *Sinosauropteryx* in the Liaoning province of Northeast China. The carnivore spanned approximately 1.1 meters and lived in the Early Cretaceous age. For the first time in history, scientists were able to make attempts to identify color patterns on a dinosaur by studying pigments preserved in the fossil. From this, it was hypothesized that *Sinosauropteryx* was brick-red with alternating shades on its tail. And it then took little time for paleontologists to realize that *Sinosauropteryx* was the key in unlocking the link between modern birds and winged dinosaurs. Since then, scientists have discovered many other dinosaurs entombed in the soil under China. Amidst the chaos and frenzy of construction in Gaxian province, unsuspecting workers uncovered the fossilized remains of *Gandititan cavocaudatus*. Possessing a history of approximately 90 million years, the remains were undiscovered until 2021, when they were found in a miraculously preserved state with about 40% of the whole dinosaur skeleton present. It was estimated that the sauropod (long necks, long tails, four thick legs) was on the smaller end, at 14 meters long. In 2024, scientists in the Fujian province found another unidentified fossil of an unknown bird-dinosaur, now known as *Fujianvenator prodigiosus*. The skeleton was assumed to belong to a creature that lived in the Jurassic Age and had a combination of traits belonging to running dinosaurs and present-day wading birds (herons, storks, ibises, etc). The same year, *Dinocephalosaurus orientalis*, a water dweller with an abnormally long neck, was discovered in Guizhou amidst limestone deposits.

The identification of smudged fingerprints left by these prehistoric titans have left the human population enraptured in beauty and mystery. We find delight in studying these relics of the past and marvel at the might and the majesty of these kings of the Jurassic age. But this wonder is often short-lived. We reach the end of the article or the documentary and those complex scientific names promptly exit the other ear. Too often do we overlook the magnitude of these beasts, not on the scale of human existence, but on the scope of the universe. As a child, I found amusement in growing dinosaurs out of little plastic tablets, peeling back the thin cardboard to reveal a 3 by 4 grid of condensed foam raptors and T-Rexes. I would observe with wonder as those half-inch sponges transformed into miniature pterodactyls and bronctosauri that were foreign to me outside the silver screen. However, as with most children's toys, interest was quickly lost and those colorful reptilian mounds made their way to their final destination via garbage truck. My fascination was piqued in the delight of having a new toy. But my joy crumbled the second I could not gain anything more for myself. Looking back, I pity those dinosaurs for their descent from being the kings of the Earth to cheap icons used to fuel rampant capitalism.

Yet I, like many others, missed the opportunity for introspection. Do we not, in multiple aspects, closely resemble clade Dinosauria? Having ascended to the top of the food chain with egos bolstered with addictive illusions of invincibility, we have carelessly thrown away our duty of stewarding the earth. We trade our morality away with reckless abandon to be the richest in our cities and to possess the most destructive technology. We believe that if, somehow, we can build a neo—tower of Babel, that we might have a chance at pinning down immortality. But as we destroy our planet, mining relentlessly for precious metals and ever decreasing oil supplies, we cease to remind ourselves that our planet can one day destroy us. For the dinosaurs, it took a meteorite strike. But at the rate that we speed through life, our very existence on this planet has become the biggest threat to our survival. The dinosaurs ruled the earth for 165 million years, and the modern man has only roamed it for 200,000. The human race is a mere speck in the face of eternity, and life of the individual is comparably microscopic. So when we unearth unknown dinosaurs, we must consider that these could be fossilized reflections of our future. How would we change if a glimpse into a crystal ball revealed an alien species excavating the remains of *Homo sapiens*, Asian female, 5 foot 3, omnivore?

The decision has fallen to us: will we speculate about the future as we scrutinize the past, or will we ‘educate’ ourselves while shrouded in ignorance? Will we delay action and study fossils until the fossil fuels make the air too thick to breathe? Until the smog is so turbid that our screams are completely dampened behind a tear—inducing curtain of toxic gas? We are the poison that is killing us. The seas perpetually toss our plastic footprints back at us as we massacre the rainforests that heal the air we need to survive. And still, we could not care less. Must we bear the shame of being fluent in both ignorance *and* imprudence? What most do not know about the extinction of the dinosaurs is that prior to the asteroid crash, the earth was already undergoing a period of climate change. Volcanic activity in modern south Asia caused a dramatic influx of gas into the atmosphere which drastically altered the global climate. This lit the flame at the end of the rope which eventually exploded in the plummeting numbers of vegetation. Of course, the dinosaurs could not have done anything to backtrack or revise the hand they had been dealt. But now history is repeating. Except now the gasses being pumped into the atmosphere are completely controllable. Now, they are being pumped out of industrial buildings that we created and depend upon for everyday life. And still, the gasses being pumped into the atmosphere are what will end the species. Now, the ones causing climate are *us*. Now, the decline of the species will not come as a result of an unforeseen meteor strike, but as the predictable result of human error and greed.

I could go on. But we must not neglect to remember the once most prominent creatures that spanned three ages of the universe. We must not allow the next dominating species to ooh and ahh over their remains and forget the consequences they died to remind us of. So we must start peeling off the duct tape and plastic wrap that has bound our planet for so long, and begin to appreciate that the same earth which was once home to the rulers of the Mesozoic Era is now home to us.

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Creative Writing
Non-Fiction
Group 5

The Relationship Between Geography and Dinosaur Migration

Jiaxing British Columbia Offshore School, Luo, Yuanyuan Amy –

Do you know the birds are actually a kind of dinosaur? Dinosaurs, a various group of reptiles. Tracking to the earliest time they appeared, it was the Triassic period, from 243 and 233.23 million years ago. However, in the Late Cretaceous, dinosaur ultimately disappeared and the gradually became the fossils, which are found by people today. The paleontologists discover that the fossils record the movement and migration of the dinosaurs, which allows them to have more information to explore the geographic change at that era. The discovery of new dinosaur fossils helps scientists to explore the geography in the era of dinosaurs, and the dinosaur migration shown in fossils the change or evolution of plants, the climate and the landform.

Dinosaurs played an important role in plant evolution, and when they moved into one place, they not only affected the distribution of plants, but also may have contributed to the development of plant diversity because of their diet. For example, those large herbivorous dinosaurs, including species like stegosaurs and sauropods, played an important role in shaping the plant life of their era through their preference of the diet of cycads and conifers. These massive creatures exerted a form of natural selection on the vegetation, and their favorite plants were those capable of rapid growth and reproduction, such as angiosperms or flowering plants, which got a floral revolution in the landscape during the Late Cretaceous. Furthermore, the dinosaurs had a profound impact on the diversity of plants. By targeting specific plant species for consumption, they changed the ecological balance within plant communities. This disturbance created opportunity for other variety of plant species to establish them and flourish. Therefore, they could enhance the overall biodiversity in the ecosystem. Additionally, dinosaurs served as agents of seed dispersal, a critical process for plant reproduction and distribution. As they consumed plant and travelled to another land, they transported seeds away from their parent plants, facilitating the spread of plant species across vast distance. This seed dispersion was essential for the expansion and colonization of new habitats by various plants, contributing to the rich type of prehistoric flora.

The migration of dinosaurs was closely related to changes in the local climate. Sea levels, seasonal temperature alters, and changes in rainfall patterns all likely influenced dinosaur migration, which impacted their habitat, food sources, and ecosystem stability. Climate change, a critical factor in the prehistorical world, significantly influenced the migratory habits and overall survival of dinosaurs. Seasonal temperature fluctuations, which could turn the region intolerantly hot or cold, and likely triggered dinosaur migrations to regions with more moderate temperature. This environmental shift would have had profound implications for their possibility of successful reproduction and ability of surviving in these new habitats, as they had to adapt to varying thermal conditions. Moreover, alternations in rainfall patterns played an essential role in shaping the landscape of dinosaur era. Changes in precipitation levels directly impacted vegetation growth, which influenced the ability of food for the herbivorous dinosaurs. In period of drought, a death of plant could have compelled these plant-eaters to venture towards greener grassland, initiating a ripple effect of migration. Predatory dinosaurs, dependent on their herbivorous prey for sustenance, would have followed this movement, establishing a chain of migration. These climate factors not only dictated the geographical distribution of dinosaurs, but also potentially influenced the evolution of various dinosaur traits, such as thermal tolerance and seeking strategies, as they navigated the challenge posed by a dynamic climate. The interaction between climate, habitat, and dinosaur behavior paints a complex picture of life in age of dinosaurs, where survival was intricately associated with ability to adapt to an ever-changing environment. For example, during the changing seasons, hadrosaurids, a type of duck-billed dinosaur in North America, could have embarked on annual journeys spanning hundreds of miles to search for more abundant food sources and suitable nesting area, which reflected migrations in response to seasonal shifts.

Dinosaurs migration may also triggered by the landform change. Geographic changes, such as the formation of mountains, the diversion of rivers or the expansion of lakes, would have altered the distribution of dinosaur habitats. These changes helped dinosaurs to find the information of new habitats, and likely triggered migration. At the same time, they changed the route of migration due to the changes in landform. The rising and falling sea level is a significant factor that impacts the dinosaur migration. The sea level was related to the dinosaur habitats, particularly those coastal-dwelling species. When sea level rose and coastal areas were flooded, dinosaurs were forced to move to

inland. Also, with the rising sea level, the local climate became wetter, which affected the type and distribution of the vegetation. In order to seek the food resource, the dinosaurs changed their habitats and started to move. In comparison, the falling of the sea level created more exposed new land for dinosaurs to exploration, and the isolated areas connected to the main land. However, the dry weather brought by this phenomenon may reduce the vegetation growth, which led dinosaurs to migrate to follow the food sources.

In conclusion, the geographic changes associated with dinosaur migration deeply. The latest discovered dinosaur fossils have provided scientists with valuable clues to the geography of the dinosaur era. The dinosaur fossils record the migration patterns of dinosaurs, so that scientists are able to reveal how the dinosaurs and geography connected to each other in the past and discover the myth of geographic change in the age of dinosaurs.

Mysterious Discovery

Jiaxing British Columbia Offshore School, Song, Haoyang Sean –

Through the long history of Earth, the dinosaur era has hidden mystery and darkness, the discovery of dinosaur fossils in china has also had a huge impact and contribution to the world. China has some richest dinosaur fossils resources in the world, especially in Liaoning province, where has many important dinosaur fossils. These discoveries not only rewrote the history of dinosaur evolution, but also attracted widespread attention worldwide. In china the discovery of dinosaur fossils not only has significant in history, but also has important impact in the fields of economy and culture. Firstly, the dinosaur fossil history and it effects in the world. Secondly, dinosaur effects on economic development, particularly in the tourism industry. And, effect of Chinese dinosaur fossils on cultural development.

The discovery of dinosaur fossils in china is crucial for our understanding of biodiversity, during the dinosaur era. Its history started billion years ago, but today, it still makes people want to explore it, has provided a wealth in information on species diversity, evolutionary links, and ecological roles. In these types of information, this also has significantly contributed to the fields of paleontology and our comprehension of life's history in the world. For example, "the discovery of feathered dinosaur fossils for the first time, Chinese Loong ornithosaurus was discovered in Liaoning province in 1995." (Morgan Gutierrez), "and the discovery and research of the Dashanpu dinosaur fossil group in Zigong, Sichuan in the 1970s filled the gap in the world's mid Jurassic dinosaur fossil scarcity and sparked an new wave of dinosaur research in China, Zigong is still considered to be the place in the world where the largest number of Jurassic dinosaur fossil species have been discovered and the best preserved" this discovery shocked the international paleontology community, because it was the first time that human found a definite feathered dinosaur fossil. It is also a significance for understanding the evolutionary, relationship between dinosaur and modern birds, over turning our original understanding of dinosaur, it provides that feathers are not exclusive feathered of birds, but have already appeared in dinosaurs. Of course, the examples and the discovery not only develop in the scientific implications, but also have a positive impact on education and public interest in science. They have attracted people interested in paleontology and science development. The history discovery and effects of world both are important, it has decisive elements in the development of world archaeology, also provides some process of dinosaur evolution that people can understand and apply more comfortable and deeper in their life.

Nor is this all, the diversity of dinosaur fossils has had a positive impact on Chinese economy. Fossil sites become tourism attractions, many domestic and foreign tourists to promoting the development of local tourism industry. In addition, the dinosaur fossil exhibitions related to employment opportunities for the local people, the development of tourism not only bring benefits and economic income to the GDP to the local area and citizens but also promotes the growth of related with hotels, catering and transportation services. Like, "the biggest dinosaur fossils free open hall within the domestic that is in Jiangsu, which as the core ad Saul of china dinosaur part, it provides many technology facilities to play and enjoy, they can use 3D movies to enjoy the combining of art cultural about dinosaur evolution." (GabbyLi) it also attracts the attention of international paleontologists, brought economic benefits to the local area. It impacts the discovery of dinosaur fossil has many different types influence and positive road for looking forward, provides many chance to the public and growth the economic in the world, by creating employment opportunities and promoting the development of related industrial, made many contributions to the diversified development of the social economy.

Of course, as a earliest country to discovery the fossil of dinosaur, it must had a profound cultural impact, but that not only enhance national pride and confident but also become important tools for science popularization and education. The discovery of dinosaur fossil make many culture elements increase, the most crucial points are about science knowledge transmit, to let more and more young people realize the china is a powerful country and

scientific achievements. The dinosaur fossils in the museums and exhibitions have attracted many large audiences, especially young people, inspiring their interest in dinosaur. For example, “the Zigong dinosaur museum was built on site at the world-renowned Dashanpu dinosaur fossil site, and the houses tens of thousands of fossil specimens from nearly 300 individual dinosaur and other vertebrates.” (Neal) through spread, the discovery of dinosaur fossil, helps to enhance public science skills and promote the knowledge or proud of china increase, museums are not only important bases for popular science education, but also have developed a series of public education activity brands and promotes multiple activities, playing an important role in improving the local cultural education level. Our Chinese pride can be gradually built up through these great discoveries of dinosaurs, so that we can learn more extensive knowledge in class or daily life.

In conclusion, the discovery of dinosaur fossils can make many great effects in the world, such as history, which is always mention people should not forget, it memories many valuable things, the financial development in the local area, it also represents a power of a country to use recourses, and the cultural pride also is significant, it also shows Chinese heart is an unit and red blood always flow in our daily life, these discoveries not only enrich our understanding of the paleontological world, but also give economic development and scientific popularization, demonstrating China’s role in the field of dinosaur fossil finding place.

Feathered Dinosaur Fossils

Jiaxing British Columbia Offshore School, Wang, Yixuan –

The first apparently feathered dinosaur, *Sinosauropteryx*, was discovered in China in the 1990s. The discovery of feathered dinosaur fossils is considered as a revolutionary breakthrough in the world of paleontology, which greatly highlights the function of feathers, as well as the similarities in behavior and habitat between modern birds and dinosaurs, advancing our understanding of dinosaur to bird evolution.

Feathers in dinosaurs are compulsory for several purposes, such as conserving body heat, displaying and flying. These functions are vital for dinosaur's survival and evolution. Initially, they may have provided insulation, helping dinosaurs maintain a stable body temperature in harsh environmental conditions, especially in colder regions. Moreover, the appearance of brightly colored or patterned feathers in some dinosaur species can be used for them to show off or to attract mates. Over time, feathers gradually evolved to possess more complicated structures to adapt the requirement of flight. This progress from simple to complex feather structures is evident, with early feathered dinosaurs including *Sinosauropteryx* while later species like *Confuciusornis* showcasing more advanced feather structures. This evolution of feathers not only transformed dinosaurs' behaviors but also paved the way for the appearance of modern birds, leaving a far-reaching impact on history.

In addition to the function and evolution of feathers, the findings of feathered dinosaur fossils are of significance because it gives us insight into the reasons behind the rich diversity of modern birds. They provide a new perspective on species evolution in a variety of ways. Some people even contend that these feathered dinosaurs can be considered the first birds. This has prompted us to look again at the defining characteristics of birds, not just their feathers, but also different aspects, including behavior and habitat. For behaviors, there are some similarities when it comes to nesting. Some fossilized nests of feathered dinosaurs reveal that they may have exhibited early ways similar to modern birds incubating eggs and protecting their young. In terms of habitat, the emergence of feathered dinosaurs living in different environments suggests that they have begun to choose the most appropriate place for them to survive, just as modern birds have specific habits and preferences for wetlands or mountains. Consequently, the discoveries regarding feathered dinosaurs establish a connection between dinosaurs and modern birds.

Furthermore, the discovery of feathered dinosaurs in China has promoted further research and exploration in the field of paleontology as well. Scientists are currently more motivated to find more evidence to further illuminate and explain theories of evolution from dinosaurs to birds, with more sophisticated studies of dinosaur fossils from around the world as researchers search for similar or related feather specimens. The discovery has also encouraged interdisciplinary research, combining paleontology with fields such as genetics and advancement biology. By studying the genetic basis of feather development in modern birds and comparing it to what we know about dinosaur structures, we can gain a deeper understanding of how feathers developed and evolved. For example, a study shows that by studying the cellular structure of dinosaur scales, researchers have made significant progress in understanding the evolution of feathers. This particular study focused on a dinosaur species, *psittacosaurus*, also compared with modern bird feathers. This interdisciplinary approach, which combines paleontology with genetics and biology, offers new perspectives on the development and evolution of feathers.

In conclusion, the discovery of feathered dinosaur fossils in China not only redefines how we think about dinosaurs, but also connects them to modern birds in ways we could barely have imagined before. The implications of these discoveries extend far beyond paleontology to the field of science and even affect our broader understanding of the adaptability and diversity of life.

Climate Change and the Extinction of Dinosaurs

Jiaxing British Columbia Offshore School, Wu, Zixi Jessy –

Dinosaur is one of the most mysterious creatures in the animal kingdom. Because its dominance over the earth hundreds of years ago in the prehistoric period, the entire species came to extinction suddenly and dramatically in the Cretaceous period eventually. Scientists and paleontologists have been embarking on the investigation of the causes of this great extinction of dinosaurs for a multitude of years. Among numerous theories that produced by the experts, the Asteroid Theory is the most common explanation of the perish of dinosaurs. It claims that 66 million years ago, an asteroid hit the Earth's surface, causing a huge earthquake and other disasters like tsunamis, resulting in dust and debris that formed dust cloud in the atmosphere. Thus the photosynthesis system of plant had been disturbed and the food chain had been also destroyed. Nevertheless, it is debated that whether dinosaurs were in decline or not before the strong impact of the asteroid. The Climate Change Theory is also an credible reason for the dinosaurs' demise. But it was always ignored by the public compared with the Theory of Asteroid. Nowadays, humans are facing nearly the same challenging situation with the dinosaurs in terms of the dramatic climate change with a global trend. By exploring the influence of climate change on the extinction of dinosaurs in prehistoric period, the principles of solving the global environmental crisis are revealed.

The variation of the global climate in the Cretaceous period influence the extinction of the dinosaurs. This is due to the fact that dinosaurs were already in decline 50 million years before they were wiped out by the asteroid strike. "Even though they were wiped out ultimately by the impact of the asteroid, they were actually already on their way out around 50 million years before the asteroid hit," according to a leader of research, Dr Manabu Sakamoto explained. New researches reveals that the rapid volcanic eruptions, not warming temperatures, were the primary cause of the Triassic-Jurassic extinction event 201.6 million years ago. Dinosaurs emerged from the late Triassic to the end of the Cretaceous Period of the Mesozoic era, a period when Earth's climate was warm and wet with no significant seasonal changes. Besides, temperatures during the dinosaurs era were about 10-15 degrees Celsius higher than they are today, and the warmer temperatures allowed animals to use less energy to maintain their body temperature, leaving more energy for growth and reproduce. Thus initially, dinosaurs thrived in the planet's consistently humid, tropical climate. However, in the late Mesozoic Era that corresponds with the extinction of the dinosaurs, evidences show that the planet slowly became cooler. A lava flows in India noted that a giant, gaseous volcanic plume might have initiated global climate change that threatened the survival of dinosaurs, lower temperatures caused ice to form over the North and South poles and the oceans to became colder. The sudden cooling, often called "volcanic winter", was devastating to many species that were unable to adapt quickly enough to the changing environment. There are terms called ectothermy and endothermy, describes whether most of and animal's heat is absorbed from the environment or generated by internal processes. Because the dinosaurs were cold-blooded animals, meaning they obtained body heat from the sun and the air they could not have been able to survive in significantly colder climates. Yet some species of cold-blood animals, such as crocodiles, did manage to survive. These evidence above support an environmentally driven decline of dinosaurs well before the asteroid impact.

History is always astonishingly similar. In ancient times, dinosaurs were wiped out by the huge cooling. Now our earth is also in a serious situation, where the climate in a global range is highly fluctuated and intensive. Generally, the global precipitation is decreasing, the temperature level is only increasing from year to year, the glaciers in the Northern and Southern Poles are melting rapidly and massively, and the carbon dioxide levels in the atmosphere are rising, too. These various series of abnormal climate phenomenon represent that our earth is facing a potential crisis that everyone should pay attention to. A tendency is emerged that what the dinosaurs in Cretaceous Period had experienced has an extremely similar tendency with what today's humans are suffering from. For example,

the climate of the past is reminiscent of Southern Sweden today. Modern day sweater temperatures in Southern Sweden vary between summer and winter, by 14 degree, from an average of 3 degrees in winter to 17 degrees in summer. This fluctuated is not far from what the researchers conclude about the late Cretaceous Period, when temperatures fluctuated on average by 12 degrees, from 15 degrees in winter to 27 degrees in summer. “Our summer are likely to be even hotter and drier than predicted thus far,” according to Nicolas Thibault, a researcher who stresses that he is no longer able to assess the exact temperature change. Moreover, researches demonstrate that the global warming is increasing the amount of water vapor in the atmosphere, resulting in an increase in the frequency and intensity of extreme weather events such as heat waves and droughts. This extreme heat has a direct impact on human health. For instance, extreme heat or cold snaps can increase the risk of infections from influence viruses to dengue fever, and the fertility will be affected. Globally, people over 65 years of age and infants under 1 year of age are at significantly increased risk of heat exposure, especially in 2019, when heat-related premature deaths among people over 65 years of age reached a record high of 345,000. This shows that global warming has posed a serious threat to the health and life safety of certain population. We are facing the same condition with the dinosaurs that live millions of years ago in the same planet with us. By saying this, I mean that the climate change both put the safety of life on the earth in great danger. Although dinosaurs are known as the kind of creature that are far more giant and powerful than humans, they fail to survive under the inevitable threaten from the nature. Nevertheless, the traits that humans are different from the dinosaurs in prehistoric period is that, humans own intelligence and consciousness. The in time awareness of the crisis of humans common homeland—the earth, benefits humans by alarming people taking proper actions to protect environment before the it be destroyed totally.

Obviously, people have been deeply affected by global warming and are aware of the seriousness of the problem. Both the media and governments are promoting measures to improve global climate change. The climate change is just one of the sign that the nature send to people. And the fantastic fossils of dinosaurs are also the nature and history left to humans. The paleontologists and researchers contribute together to make the history speak, warning people what they miss to focus. Learn from the history and taking its value.

The Meanings of Discovery and Research in China

Jiaxing British Columbia Offshore School, Yao, Yi Yolanda –

China has been a treasure trove of dinosaur fossils since ancient times, and the discovery and research of them in China hold great significance for global paleontology studies, filling gaps in dinosaur evolutionary history, revealing the impact of ancient geographical environment on dinosaur survival and the like. In short, the discovery and research of dinosaur fossils in China have not only enriched the public's understanding of dinosaur diversity but also prompted the development of paleontology and related disciplines. From Liaoning province in the northeast to Yunnan province in the southern, from Shandong province along the coast to Xinjiang province inland, these fossils are like shining stars scattered across China's vast land, telling people the mysterious stories of ancient times.

First off, the discovery and research of dinosaur fossils in China have filled many blanks in the global history of dinosaur evolution. The discovery and research of China plays a crucial role in pushing the dinosaur evolution to improve. For instance, the fossil of "Microraptor" found in Liaoning province in recent years is small, feathered dinosaur whose discovery revealed an important stage in the evolution of dinosaur into birds. Through meticulous research, scientists found that the bone structure and feather characteristics of Microraptor are astonishingly similar to the birds, proving the kinship between dinosaurs and birds. The discovery not only broke the traditional paleontology concepts but also promoted research on the origin and evolution of birds, giving us a deeper understanding of the origin and evolution of life. Another example is in Pu'an Township, Yunchang County, Chongqing City, where scientists were thrilled to discover a magnificent dinosaur fossil site. This fossil site is renowned worldwide for its vast temporal span of distribution, widespread fossil coverage, and rich diversity of species. These fossils span the lengthy geological period from the late Early Jurassic, encompassing various dinosaur subclasses such as sauropods, theropods, ornithomimids, and stegosaurs, providing invaluable physical evidence for studying dinosaur evolution. Particularly noteworthy is the "dinosaur fossil wall" here, which measures 150 meters in length and is believed to be the largest Jurassic dinosaur fossil wall in the world. It not only showcases the intricate structure and detailed characteristics of dinosaur bones but may also contain the remains of multiple dinosaur individuals, offering unprecedented perspectives for studying dinosaur morphology, structure, and evolution. The discovery not only fills the gap in the spatiotemporal distribution of dinosaurs from the late Early Jurassic to the Middle Jurassic worldwide, providing crucial clues for scientists to uncover the mysteries of dinosaur evolution, but also provides the public with a vivid window to intuitively understand Earth's history and the evolution of life, becoming a popular destination for tourists and dinosaur enthusiasts. The discovery of the Yunchang Pu'an dinosaur fossil site is undoubtedly a major breakthrough in the fields of geology and paleontology, allowing us to glimpse the grandeur and mystery of the ancient dinosaur world. In summary, the discovery and research of dinosaur fossils in China contributes a lot for the global history of dinosaur evolution.

Secondly, the discovery and research of dinosaur fossils in China have also uncovered changes in ancient geographical environments. The fossils of "Omeisaurus" found in Sichuan Province is breathtaking. It is one of the largest herbivorous sauropod dinosaurs discovered so far, with a length of 10 to 20 meters, a height of around 4 to 7 meters, and a weight of about 10 to 15 tons. Through research on rock types of the strata where the Omeisaurus fossil was found, scientists inferred changes in the ancient geographical environment of the area at different times. During the Mesozoic era, when Omeisaurus lived, the Earth underwent multiple tectonic movements and climate change, leaving obvious traces in the geographical record. By studying these traces, people can understand the laws of tectonic movements, climate change trends, and ecosystem evolution at that time. These changes meant that dinosaurs needed to constantly adapt to new environments seeking new food sources and safe breeding grounds. The

discovery of the Omeisaurus fossil in China has provided a deeper understanding of the ancient geographical environment and climate conditions in southwestern China during the Mesozoic era.

In conclusion, the discovery and research of the dinosaur fossils in China plays a significant role in developing the global dinosaurs' research. It also made the public realize the importance to comprehend and learn the knowledge of the dinosaur fossils which are just like the national treasure in China. The discovery and research of them in China hold great significance for global paleontology studies, filling gaps in dinosaur evolutionary history, revealing the impact of ancient geographical environment on dinosaur survival and the like.