

# HUNTING DINOSAURS IN CENTRAL ASIA

TEXT  
BY LUIS M. CHIAPPE  
PHOTOGRAPHS  
BY LUIS M. CHIAPPE, DISCOVERY /  
DINOSAURS DIGS / BLAKE EDGAR









*Nelle pagine precedenti, impronta di un sauropode nella grande pista dei dinosauri ad Aghia i-Pill, (la Valle della Santa degli Elefanti), in Turkmenistan. (Missione del C.S.R. Ligabue del 1993). Furono gli abitanti del luogo a darle questo nome convinti che quelle impronte fossero di elefante.*

*Previous pages, sauropod footprint in the great dinosaur trail at Aghia i-Pill, Turkmenistan. (Ligabue SRC Mission, 1993). Convinced that the footprints had actually been left by elephants, the local people gave this name (meaning "Valley of the Elephant Saint") to the location.*

*Sotto, questo cranio, appartenente al famoso Velociraptor, è uno dei molti preziosi fossili scoperti dalle Spedizioni Centrasiatriche degli anni Venti nelle rocce della Mongolia risalenti al Cretaceo Superiore.*

*Below, this skull, belonging to the celebrated Velociraptor, is one among a trove of fossils discovered in the Late Cretaceous rocks of Mongolia by the Central Asiatic Expeditions of the 1920s.*

*We managed to make out an enigmatic writing on a high doorway: "Here the world ends. But for us the world began here".*

*(Marco Polo in *The Travels of Marco Polo*, c. 1298, on his arrival in Xinjiang)*

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"Silk Road", for someone living in Los Angeles, Paris, or Rome, these romantic words evoke images of barren lands, wind-gusted caravans, and exotic peoples. They stir up the spirit of discovery that lives inside most of us, the thrill of exploring worlds beyond the familiar ones. More than 700 years ago, Venetian traveler Marco Polo must have felt the same when he so vividly expressed his arrival in Xinjiang - today's northwestern China. What Messer Polo did not know was that under the rocky terrain and seeping sands of the central Asian deserts, layers upon layers of ancient rocks have entombed an astonishing array of dinosaurs and other animals that lived by their side.

The earliest discoveries of dinosaurs in the deserts of central Asia are probably associated with the myth of the Griffin. This legendary creature with the body of a lion, the head and feet of an eagle, and a greed for gold, was believed in the inhabitants of Dsungaria, now the area

*Pagina accanto, intorno a questo scheletro di Sinosauropteryx, risalente a 125 milioni di anni fa, si è conservata una scura aureola di piume simili a filamenti.*

*Opposite, filament-like feathers are preserved as a dark halo around the skeleton of this 125 million-year-old Sinosauropteryx.*

where Xinjiang, Mongolia, and Kazakhstan converge, and other central Asian territories. With the onset of modern explorations, in the early 1920s, of the vast Mesozoic-aged deposits that outcrop throughout much of central Asia, plant-eating, dog-sized dinosaurs with parrot-beaked heads such as the 130 million-year-old *Psittacosaurus* and the 70 million-year-old *Protoceratops* were found in great numbers. These rather small dinosaurs are the early relatives of the large, horned dinosaurs of North America, such as the renowned *Triceratops*. Yet their general appearance bears a striking resemblance to the legendary Griffin. The first scientific expeditions to search for dinosaurs in the heart of Asia were those of the legendary American explorer, Roy Chapman Andrews of New York City's American Museum of Natural History. The Central Asiatic Expeditions, as these expeditions became known, started with a reconnaissance trip in 1919, followed by a number of large-scale expeditions between 1922 and 1930. With his base in Beijing (China) and supported by a caravan of camels to haul the supplies and a small fleet of motor vehicles to carry the crew, Andrews set off to collect specimens of the extinct and extant fauna of Central Asia, to conduct







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*Sotto e pagina accanto, scheletro di dromeosauride Sinornithosaurus. La presenza di penne in questo dinosauro del Cretaceo Inferiore, parente dell'aggressivo Velociraptor, indica che la pelle di molti dinosauri carnivori di piccole dimensioni era coperta da un piumaggio simile a quello degli uccelli.*

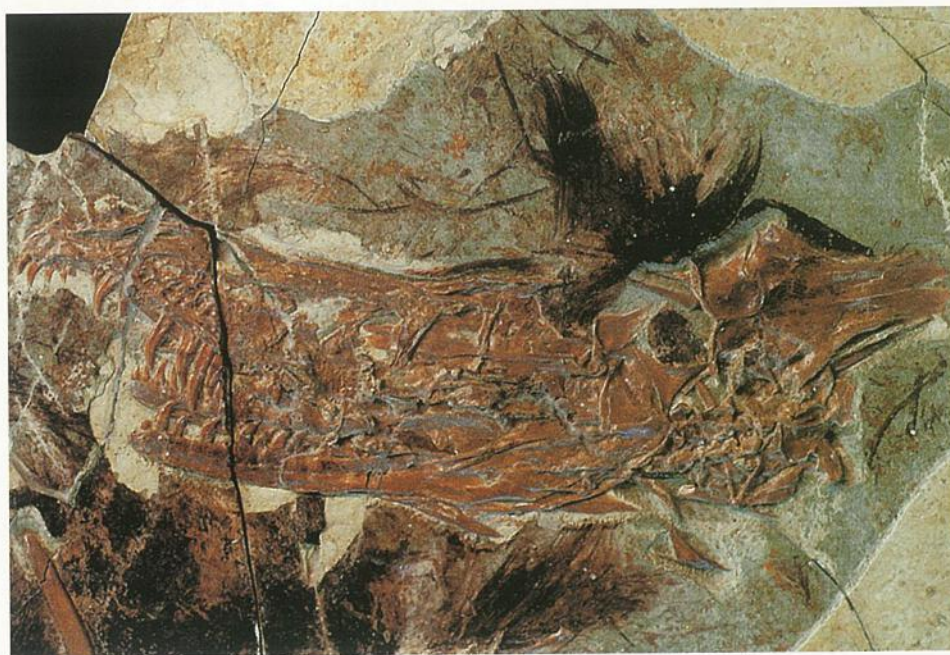
*Below and opposite, skeleton of the dromaeosaurid Sinornithosaurus. The presence of feathers in this Early Cretaceous relative of the vicious Velociraptor indicates that the skin of many small meat-eating dinosaurs was cloaked with a bird-like plumage.*

anthropological research, and recover geological data about this uncharted territory. Over the years, these expeditions produced an enormous wealth of fossils and turned the eyes of dinosaur paleontologists to the heart of Asia. In 1923, Andrews made his most famous discovery: a nearly complete dinosaur egg clutch - the first of its kind. Other significant discoveries included the first specimens of small meat-eating dinosaurs such as the sickle-clawed *Velociraptor*, the beaked dinosaur *Oviraptor*, and the lightly built *Saurornithoides*.

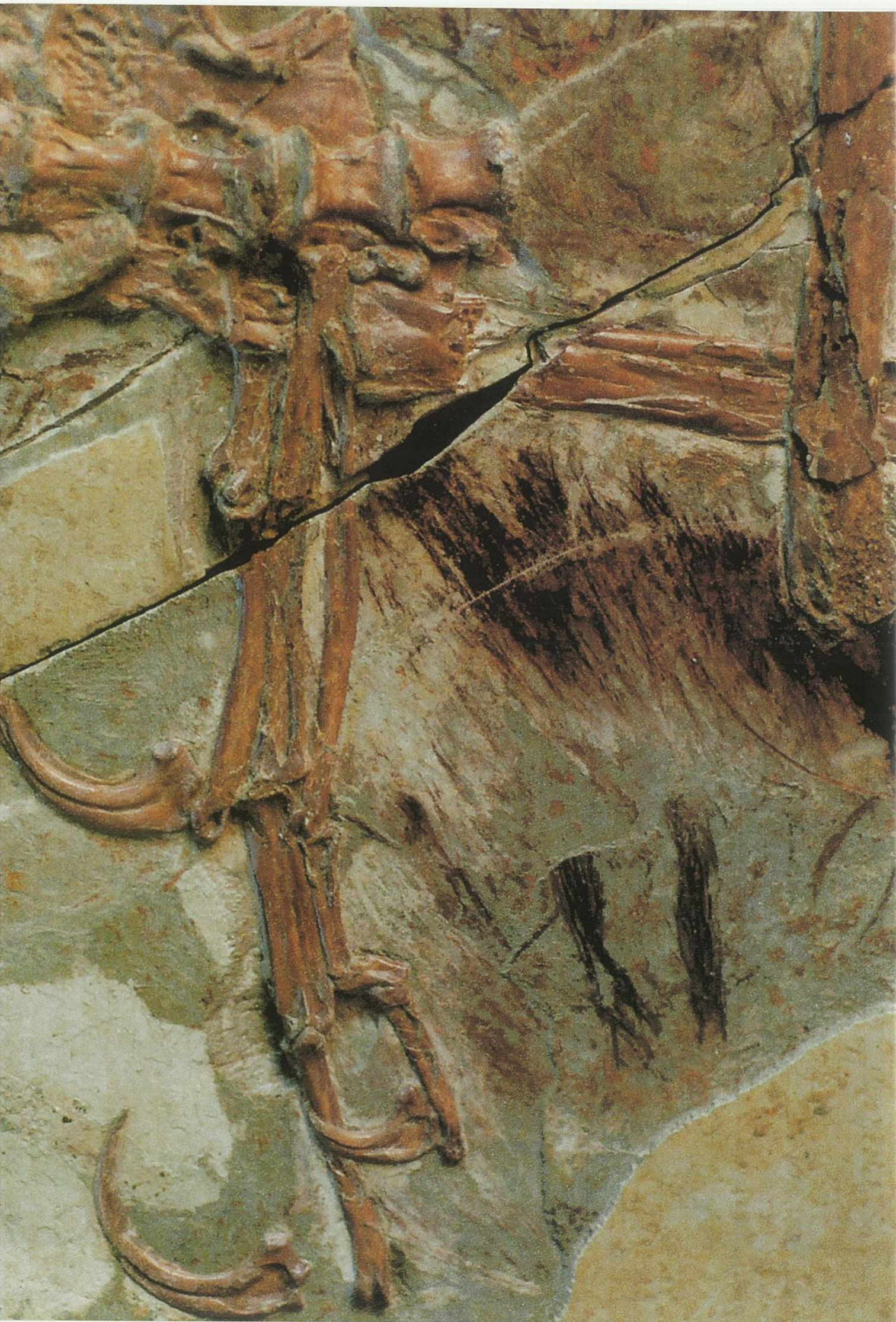
Political differences between Mongolia, at the time under the sphere of the Soviet Union, and the West put a stop to the Central Asiatic Expeditions. However, the trove of fossil riches unearthed by these expeditions did not pass unnoticed with Soviet paleontologists, who began entertaining the possibility of conducting similar expeditions. In the 1930s, plans for a large-scale expedition to the Gobi Desert were made in Moscow, but the outbreak of the Second World War put them to rest. After the war, between 1946 and 1949, Russian paleontologists from the Academy of Sciences of the USSR led a series of productive expeditions to southern Mongolia, discovering numerous other dinosaurs including the fearsome

*Tarbosaurus* - a close relative of the North American *Tyrannosaurus rex* - and its foe, the large duck-billed *Saurolophus*, as well as remains of long-necked and armored dinosaurs. These expeditions were followed by a series of Polish-Mongolian Gobi expeditions in the 1960s, which discovered important new localities in southern Mongolia and also collected numerous new fossils of dinosaurs, including birds, as well as of the tiny mammals and lizards that shared with them the arid ecosystems of the central Asia, 70 million years ago. Some of this new dinosaur fauna included superb specimens of long-necked sauropods such as *Opisthocoeleicaudia* and *Nemegtosaurus*, dome-headed pachycephalosaurs like *Prenocephale* and *Homalocephale*, and the agile meat-eating ornithomimid *Gallimimus*. At about the

same time, Chinese paleontologists began to explore more thoroughly the rich Mesozoic beds of northern China. In the early 1960s, these scientists concentrated their efforts in the northwestern territory of Xinjiang - an enormous region that is home to the Muslim Uygurs. The barren deserts of this region produced significant remains of plant-eating stegosaurs and psittacosaur, colossal sauropods, and a variety of meat-eating dinosaurs. They also discovered the remains of the medium-sized pterodactyl *Dsungaripterus*, a flying reptile sporting a robust and upturned beak, which in turn came to characterize the 130 million-year-old fauna of western Central Asia. This initial exploration of Xinjiang was followed by successful Sino-Canadian expeditions in the 1980s and more recently by my own expeditions. Today, Xinjiang stands as one









*Lo Shuvuuia, un alvarezsauride grande quanto un tacchino esistente sulla terra 75 milioni di anni fa, era un corridore molto rapido che utilizzava i suoi corti, ma possenti arti anteriori probabilmente per spezzare piante alla ricerca di insetti.*

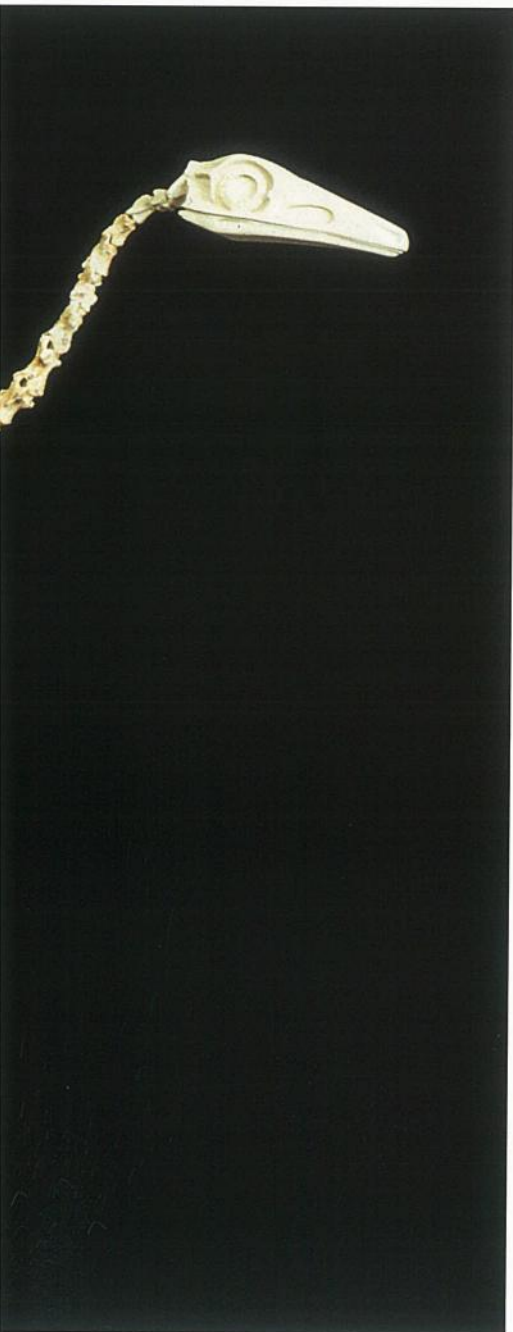
*The Shuvuuia, a 75 million-year-old turkey-sized alvarezsaurid was a fast runner that may have used its short but powerful forelimbs to break apart plants in search of insects.*

of the most potentially productive areas for the study of central Asian dinosaurs. Meanwhile, in the Gobi Desert, Russian interest in the rich dinosaur beds of this region led to intermittent expeditions during the 1970s and 1980s. Nonetheless, the most recent chapter in the exploration of the dinosaur beds of central Asia came after the collapse of the Soviet Union, when teams of American, Canadian,

Japanese, and Franco-Italian paleontologists began to organize large-scale expeditions to the steppes and deserts of Mongolia and Xinjiang. I had the privilege of participating in this decade of expeditions, first as a member of the early 1990s expeditions of the American Museum of Natural History - which, followed the footsteps of the Central Asiatic Expeditions and their renowned



leader, Roy Chapman Andrews - and then directing my own expeditions to Xinjiang and Mongolia. These expeditions and others conducted by other teams (Ligabue Study and Research Centre Franco-Italian Expedition, Mongolia 1991) have produced hundreds of important dinosaur specimens. Some of these finds include superb specimens of the meat-eating dromaeosaurids (*Velociraptor* and its kin)



and oviraptorids (*Oviraptor*, *Citipati*, *Khan* and their relatives) - some even sitting on top of their egg clutches - along with skeletons of more primitive meat-eating dinosaurs (tyrannosaurids and ornithomimids), abundant remains of plant-eating protoceratopsids together with spectacular fossils of their babies, and many other herbivorous dinosaurs.

All dinosaurs evolved from an ancestral form that was probably a small, bipedal predator, whose forelimbs were shorter than its hindlimbs, and which likely lived at the very beginning of the Mesozoic, nearly 240 million years ago. Yet dinosaurs are not found in the fossil record until some 10 million years later. These 230 million-year-old dinosaurs of the late Triassic already show the features characteristic of the main groups. This suggests that the ancestral dinosaur rapidly evolved into the earliest members of the two major groups of dinosaurs: the bird-hipped ornithischians and the lizard-hipped saurischians. These earliest forms were also bipedal. Ornithischians soon became specialized plant-eaters. These dinosaurs are characterized by having pubic bones pointing towards the rear of the animal. It is not clear what purpose this specialization served but perhaps it provided extra support to the gut, which

had to be large in order to process the amount of food that was required to nourish dinosaurs feeding on plants. The saurischians followed a rather different path. Although some of them, such as the prosauropods and its much bigger sauropod relatives, also became herbivorous, an important group of saurischians, the theropods, retained the meat-eating habits of the ancestral dinosaur. Regardless of their feeding habits, all saurischians are characterized by having a hand capable of grasping. This attribute probably helped the theropods to catch their prey and the plant-eating prosauropods to grasp tree branches. The colossal sauropods evolved towards quadrupedalism and their hands became highly reduced and specialized to support their enormous weight.

For the last 200 million years, and for most of the history of dinosaurs, central Asia has not been covered by sea. In the Triassic Period (from 245 to 208 million years ago), all continents were merged into a single and enormous landmass - Pangea. The Panthallassic Ocean, a gigantic ocean occupying an entire hemisphere, washed the shores of this supercontinent. The climate was warm and dry; deserts and arid regions were abundant. The last 30 million years of the Triassic saw the







*Pagina accanto, il Saichania dalla pesante corazza è uno dei molti ankilosauri che vivevano nel deserto del Gobi 75 milioni di anni fa.*

*Opposite, the heavily armoured Saichania is one of several ankylosaurs that inhabited the Gobi Desert, 75 million years ago.*

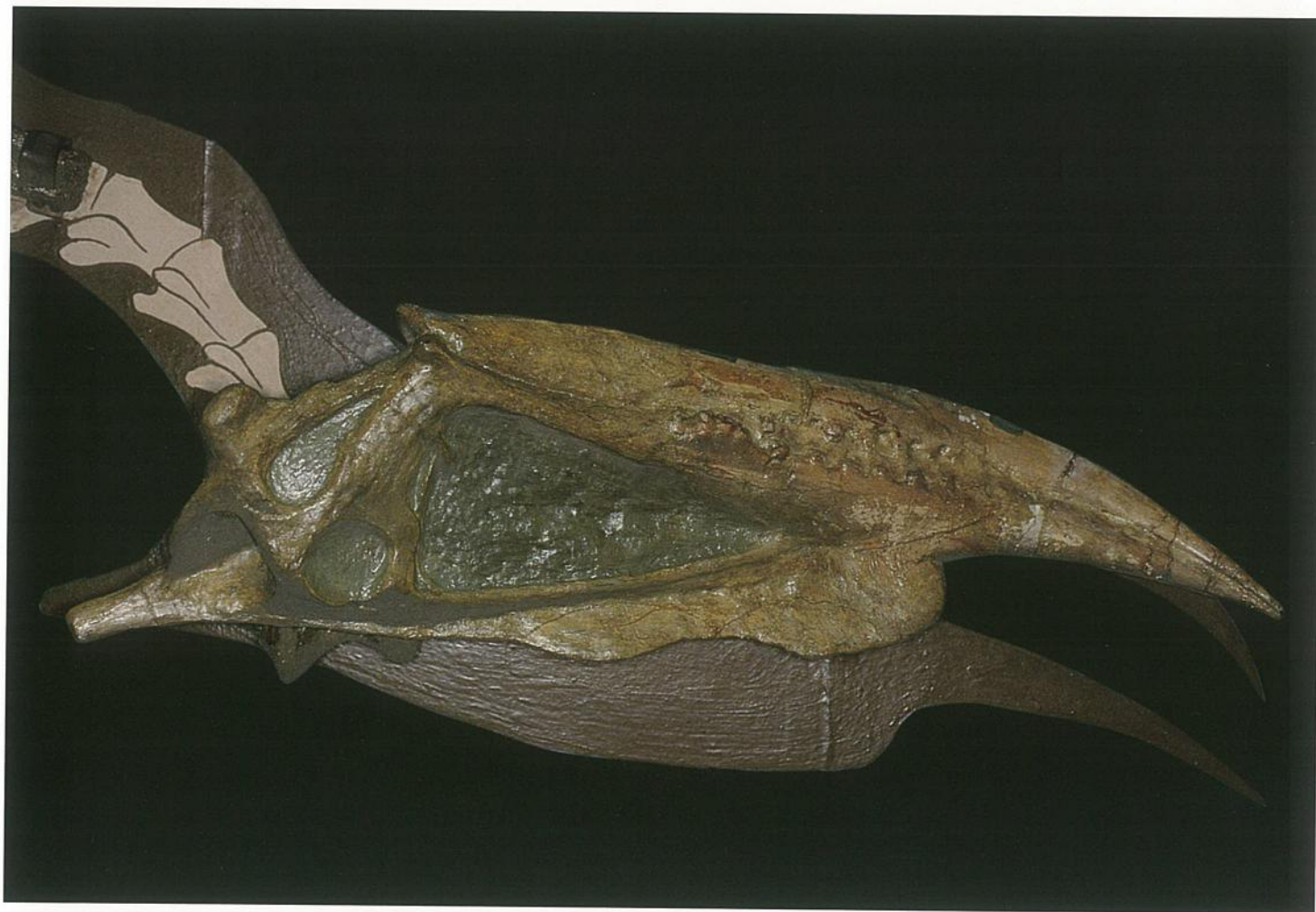
emergence of dinosaurs, which progressively came to dominate the scene in all terrestrial ecosystems. Nonetheless, this period is very poorly represented in the rock record of central Asia - no remains of Triassic dinosaurs are known from this territory.

Throughout the Jurassic Period (from 208 to 146 million years ago), the climate remained much warmer than today.

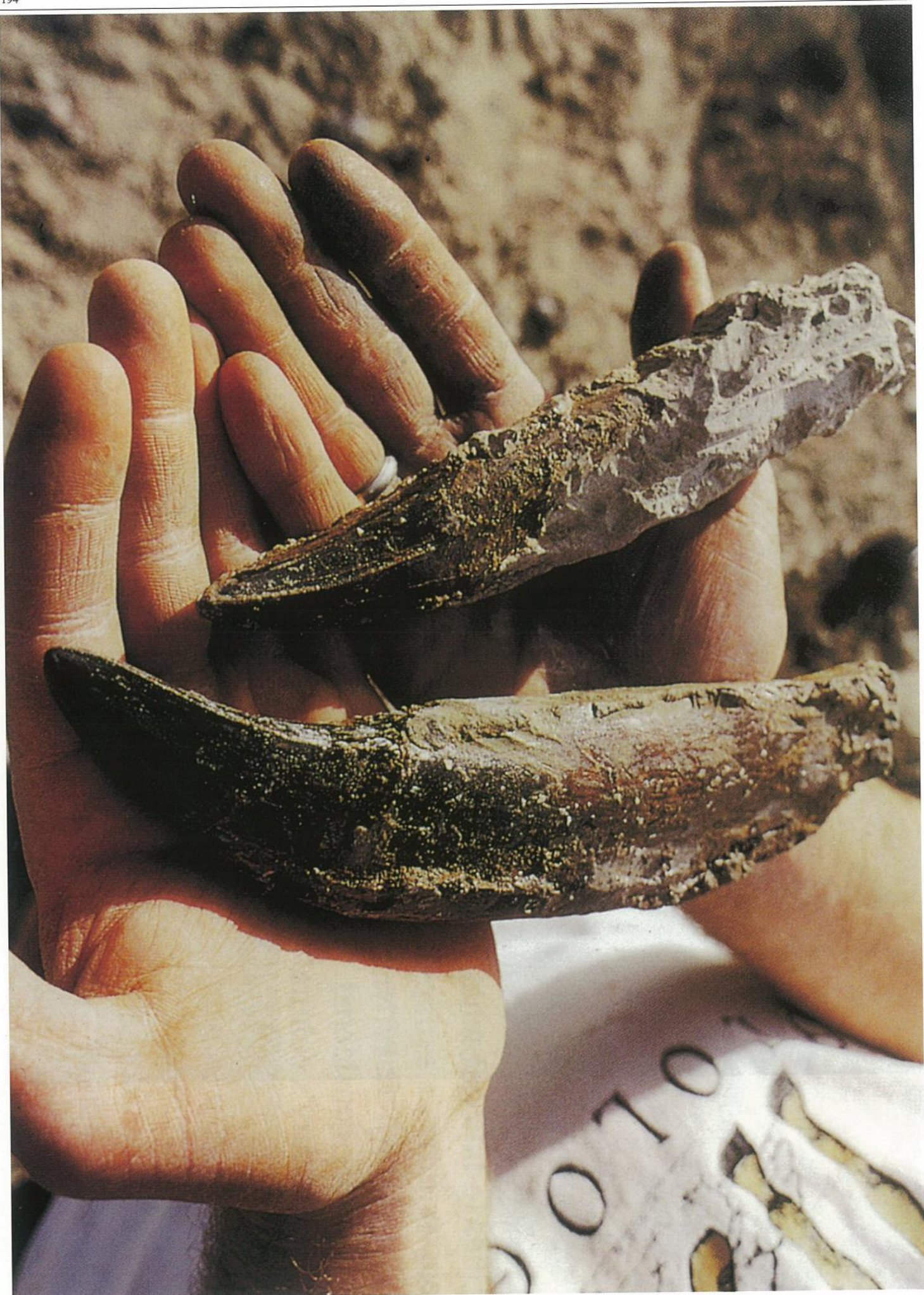
Shallow seas teeming with life flooded large portions of continents. In this blue world, Asia was largely underwater. Nonetheless, the emerged areas of central Asia hosted a variety of dinosaurs and other landliving animals. These are primarily known from the rich beds of Xinjiang, which have produced exquisite remains of the small sauropod *Bellusaurus* and the meat-eating *Monolophosaurus*

*Sotto, il pterodattilo Dsungaripterus prosperò negli aridi ambienti dello Xinjiang durante il Cretaceo Inferiore. Questo antico rettile volante raggiungeva un'apertura alare di oltre due metri.*

*Below, the pterodactyl Dsungaripterus thrived in the arid Early Cretaceous environments of Xinjiang. This ancient flying reptile reached wingspans of over two metres.*









*Pagina accanto, enormi denti come quelli raffigurati in questa immagine erano inseriti profondamente nelle possenti mandibole di grandi dinosauri carnivori quali il Tyrannosaurus e il Tarbosaurus, suo cugino dell'Asia Centrale.*

*Opposite, enormous teeth like these were deeply inserted in the powerful jaws of large meat-eating dinosaurs like Tyrannosaurus and its Central Asian cousin, Tarbosaurus.*

from middle Jurassic rocks as well as slightly younger skeletons of the large theropod *Sinraptor* and the colossal, long-necked sauropod *Mamenchisaurus*. Smaller theropods are also known from these 150 million-year-old rocks; these are particularly important since they show evolutionary connections to birds. All these Jurassic dinosaurs lived in an environment spotted by forests, as evidenced by large petrified trees that are found in similar rock layers. During this period, the large supercontinent of Pangea began to break up, probably intensifying the already ongoing evolutionary diversification of dinosaurs. Towards the end of the Jurassic, this supercontinent was fragmented into two large continental masses, Gondwana in the south and Laurasia in the north, completely separated by an equatorial sea - the Tethys. The period that followed the Jurassic, the Cretaceous (from 146 to 65 million years ago), represents the time when most continents acquired their basic modern features and to which the origin of most lineages of organisms living today can be traced. Yet Asia was not to achieve its familiar configuration during this period. Even towards the end of the Mesozoic, South China and Southeast Asia were still large islands navigating north on a vast

*Sotto, ricostruzione dell'ornitomimide Gallimimus. Era una presenza frequente nelle faune di dinosauri che vivevano nell'Asia Centrale durante il Cretaceo Inferiore. Sebbene dal punto di vista evolutivo gli ornitomimidi si collocano fra i dinosauri carnivori, questi animali dalla corporatura leggera si nutrivano anche di piante.*

*Below, reconstruction of an ornithomimid Gallimimus. It was a common presence among the Late Cretaceous dinosaur faunas of Central Asia. Even though ornithomimids are evolutionarily nested within meat-eating dinosaurs, these lightly built animals also ate plants.*

tropical ocean and the Himalayas and the Tibetan Plateau did not exist - their formation would begin millions of years later with the collision of India against the core of the Asian continent. During the Cretaceous period temperatures remained warm but the climate became more arid than in the Jurassic. In the early part of this period, large lakes dominated the central Asian landscape. The climate was still humid, although more in the east than in the west. Along the shores of these early Cretaceous lakes there were forests of conifers and ancient relatives of the monkey-puzzle (*Araucaria*), with ferns and small flowering plants forming the undergrowth. Various dinosaurs inhabited these environments. The parrot-headed *Psittacosaurus* along with other plant-eaters such as iguanodontids, stegosaurs, and sauropods have been recorded in the 130 million-year-old rocks of Xinjiang and other central Asian territories. Naturally, ferocious predators also roamed this scene and the air was crossed by crested pterodactyls such as *Dsungaripterus* and its relative *Noriopterus*. Spectacular discoveries from early Cretaceous rocks formed in the bottom of lakes that existed in what is today northeastern China have recently documented an array of small theropod





Sotto, antenato degli ubiqui dinosauri a becco d'anatra del Cretaceo Superiore, il *Probactrosaurus* presente nella Cina settentrionale durante il Cretaceo Inferiore, ha delle grandi narici e il muso sdentato tipici dei suoi più giovani parenti a becco d'anatra.

Below, a forerunner of the ubiquitous Late Cretaceous duck-billed dinosaurs, *Probactrosaurus* from the Early Cretaceous of northern China shows the large nostrils and toothless snout typical of its younger, duck-billed relatives.

dinosaurs covered with feathers. These fossils provide the most persuasive evidence of an evolutionary connection between dinosaurs and birds so far. Later in the Cretaceous, topographic shifts led to environmental changes decreasing the size and distribution of these lakes. These changes also led to a reduction in the range of the forests and to a landscape more similar to a savanna dotted with groves of trees, and in time to the development of field dunes and conditions not much different from those found in the region today. These semi-arid environments, however, still hosted a wide diversity of dinosaurs. The late Cretaceous rocks of the Gobi Desert and other central Asian territories have provided more dinosaur skeletons than any other part of the world. Although large dinosaurs such as the meat-eating *Tarbosaurus*, the duck-

billed *Saurolophus*, the armored ankylosaur *Saichania*, and the long-necked *Nemegtosaurus* probably dominated the scene, the fossil record of this part of the world shows a remarkable abundance of medium to small dinosaurs. Among these is a menagerie of small theropods such as the dromaeosaurids, troodontids, oviraptorids, ornithomimids, and alvarezsaurids together with small ornithischians such as the frilled protoceratopsids and the dome-headed pachycephalosaurs. Furthermore, not only are the skeletons of these dinosaurs known but in many instances, eggs and their babies have also been found. This ancient Pandora's box that Roy Chapman Andrews first opened more than eighty years ago, has provided the most vivid image of what dinosaurs looked like, and how they grew and behaved.

Indeed, the paleontological research conducted in central Asia has furnished critical clues for the study of the evolution of dinosaurs. Paramount among these studies are the documentation of an enormous diversity that lived in this part of the world, the reproductive and behavioral inferences provided by the numerous eggs and babies, and most recently, the realization that some



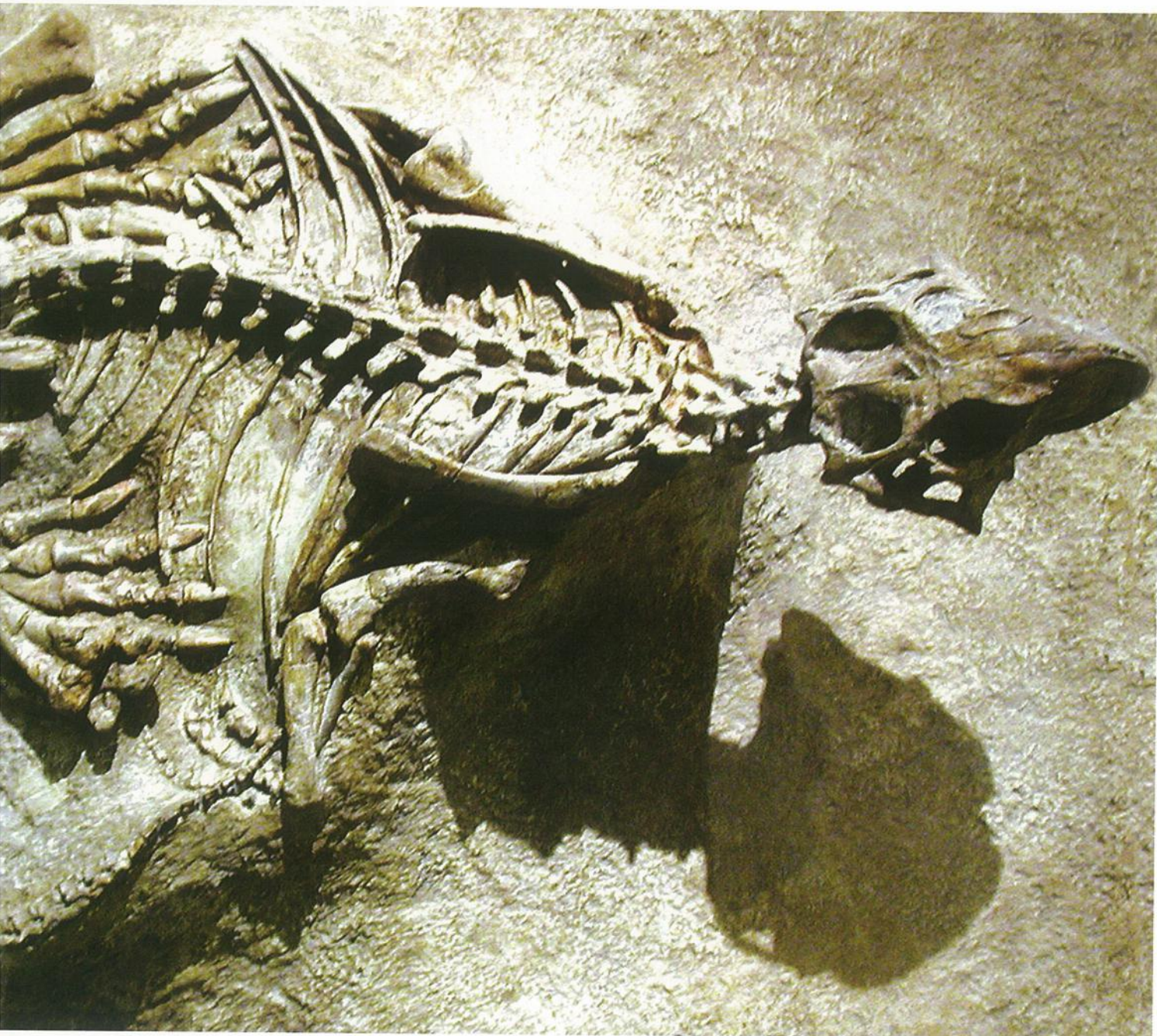


*Sotto, con un cranio che ricorda quello del pappagallo, lo Psittacosaurus, grande quanto un leone, può aver ispirato il mito del Grifone.*

*Below, with a skull reminiscent of a parrot's, the lion-sized Psittacosaurus may have inspired the myth of the Griffin.*

theropods were feathered. The arid conditions that have prevailed since the end of the Mesozoic in central Asia helped to preserve this clear view of such an ancient past. On the one hand, these conditions prevented the formation of thick soils and the consequent ground covering, thus leaving the ancient rocks and the fossils they contain easily available for discovery. On the other hand,

these conditions encouraged erosion through water, wind, and drastic changes in temperature. Finally, the absence of glaciations during the Ice Age left nearly intact the ancient Mesozoic deposits. Conducting field work in central Asia is not easy. General supplies are difficult to find. Roads are generally rare and the frantic behavior of some of the drivers often turns them into death strips.





Da secoli la medicina cinese tradizionale utilizza fossili detti "ossa di drago" per curare un'ampia gamma di malattie.

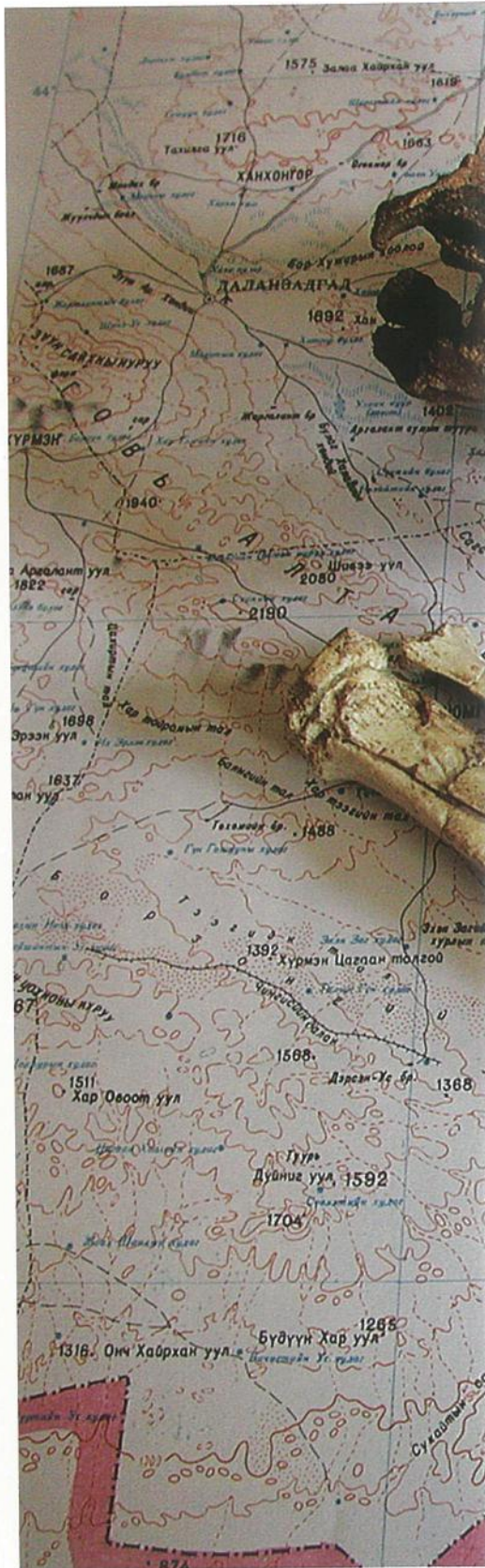
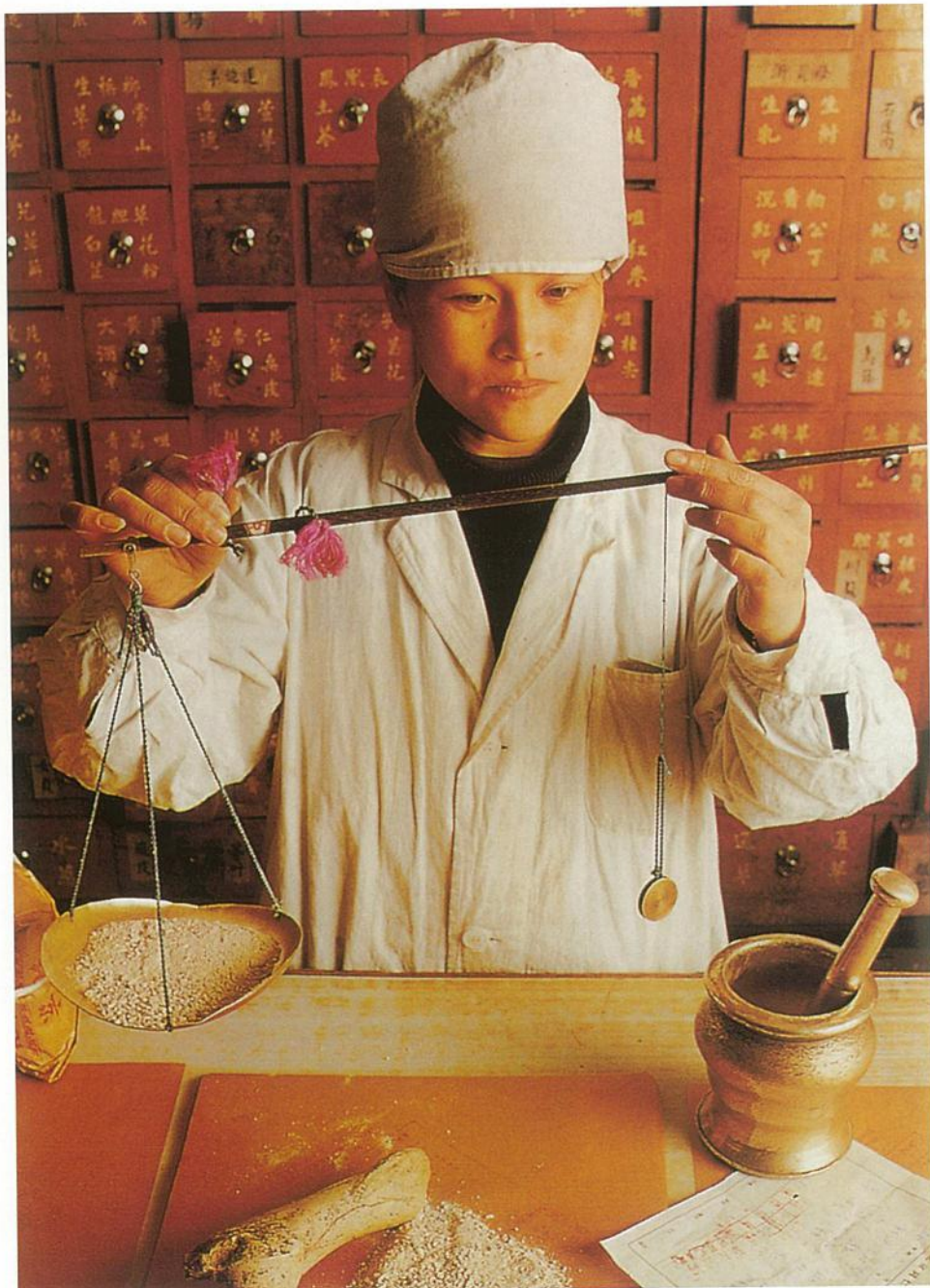
For centuries traditional Chinese medicine has used "dragon bone" fossils to cure a wide range of illnesses.

Furthermore, four-wheel drive vehicles, nearly essential for field exploration, are not always available. Add to this the language, a nearly complete lack of telephones or other means of communication, and the weather, creating some of the harshest conditions on earth, and you will get a good picture of what field work in central Asia entails. Yet the treasures buried in these remote locales are

such that modern explorers endure all that is necessary to advance our knowledge of a fascinating chapter in the history of life.

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*Cranio e artigli di Velociraptor. Sebbene avesse dimensioni molto più piccole di quelle attribuitegli nel film "Jurassic Park", i suoi denti aguzzi e i suoi artigli a falce lo rendevano un vero e proprio killer.*

*Velociraptor skull and claws. Although much smaller than depicted in Jurassic Park, the Velociraptor's sharp teeth and sickle-shaped claw made it a well-suited killer.*

