



THE DINOSAUR PROJECT—AN INTERNATIONAL COOPERATIVE PROGRAM ON DINOSAURS

The dinosaurs of China are among the most exciting in the world. An appreciation of the anatomy of Chinese dinosaurs has become a central element in modern studies of dinosaurian evolution (Russell 1987), and the world's palaeontologists have paid a great deal of attention to China because of her abundant dinosaur resources. The Dinosaur Project, originally called the Canada-China Dinosaur Project (CCDP), was organized in 1985. In that year, the Ex Terra Foundation, Alberta, signed an agreement establishing the project with three core partners: The Tyrrell Museum of Palaeontology in Drumheller, The National Museum of Natural Sciences in Ottawa, and the Institute of Vertebrate Paleontology and Paleoanthropology (IVPP), Academia Sinica, in Beijing.

In May of 1986, a survey team made up of seven people was sent to the Jiangjunmiao region of the Junggar Basin, Xinjiang. Here many dinosaur fossils, including the articulated skeletons of a sauropod and a theropod, had been collected from Middle and Upper Jurassic strata by the 1984 field team of the IVPP. Because of the abundance of bone, the Jiangjunmiao region was agreed upon as the major field site of the CCDP for the summer of 1987.

During the balance of the 1986 field season, a team from the IVPP travelled to Canada to work in Dinosaur Provincial Park (Alberta) with the Tyrrell Museum of Palaeontology, and in the Canadian Arctic Islands with National Museum of Canada staff. A *Troodon* braincase discovered by Tang Zhilu has proven to be very significant in the debate on the origin of birds (Currie and Zhao, in preparation).

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The following is a summary of the scientific activities of participants in the Dinosaur Project during its first field season in China, between August and October of 1987. The most complete succession of dinosaur faunas in the world is known to occur in China. Field activities were focussed on poorly explored strata in the vicinity of Jiangjunmiao in the eastern part of the Junggar Basin, Xinjiang. A 6,000 km palaeontological survey through Nei Mongol was essential in preparation for the 1988 field season, during the course of which sediments of Middle Jurassic through Late Cretaceous age were examined. The fossil fauna they contain are well situated in space and in time to reveal faunal relationships between central Asia, North America and other regions of the world.

XINJIANG

The beginning of field operation was delayed due to problems with the transfer of funds, and consequently the purchase and delivery of equipment and supplies to the field



Fig. 1 Camp at Jiang junmiao, 1987



Fig. 2 Collecting dinosaur fossils at Jiangjunmiao locality

necessarily was made in great haste. The IVPP team arrived in the Jiangjunmiao area early in August, established the base camp (Fig. 1) and located potentially interesting bone occurrences throughout the region. Personnel from the Tyrrell Museum of Palaeontology, National Museum of Natural Sciences, Ex Terra, Shanghai Scientific and Educational Film

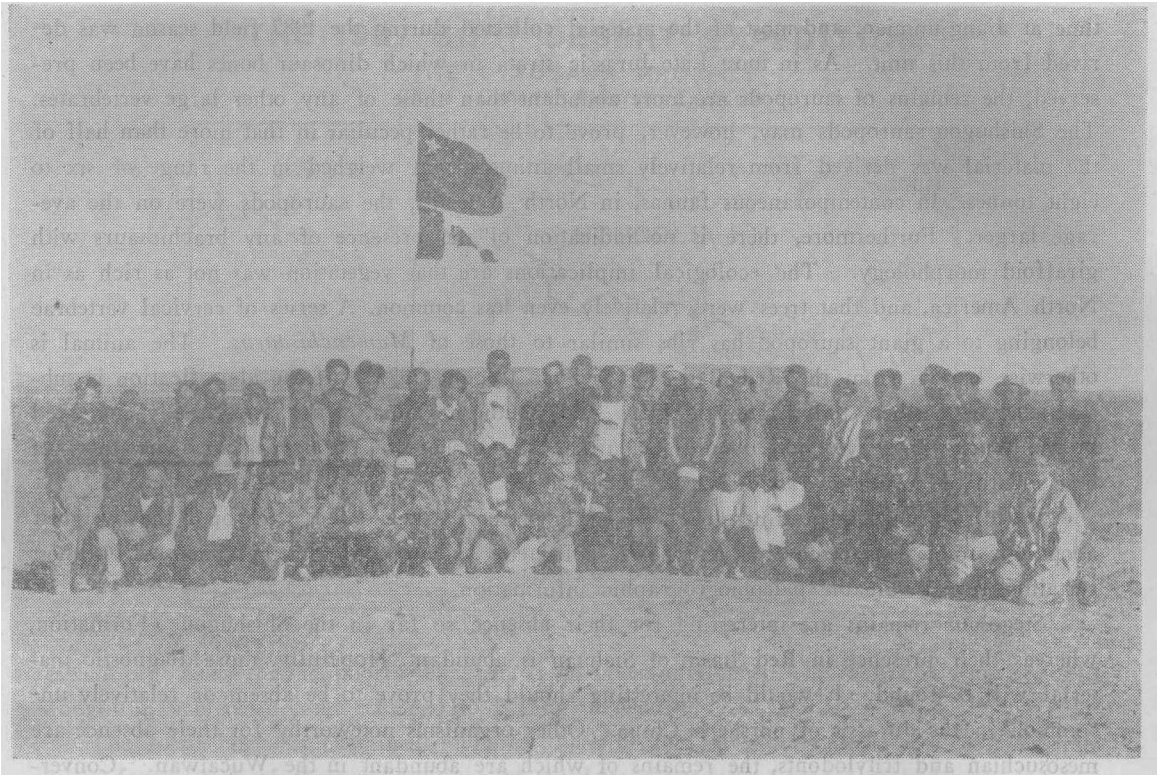


Fig. 3 Participants of the Dinosaur Project, 1987.

Studio and Great North Communications arrived at the base camp on August 24. Thereafter, the number of persons in camp (Fig. 3) varied between 30 and 50 until operations were halted at Jiangjunmiao by cold weather on October 10. Camp palaeontologists and palaeontological technicians invested a total of about 975 person-days in searching for and collecting fossils. Excavations were initiated during the latter part of August, and a total of eleven localities were sampled in stratigraphic units ranging from Middle Jurassic through Early Cretaceous age (Fig. 2).

A preliminary appraisal of the specimens collected from the Jiangjunmiao region can be given on the basis of field observation and preliminary preparation. The middle Jurassic Wucaiwan Formation was re-examined at the site of the 1984 IVPP excavations, but no additional large specimens were found. The theropod and sauropod skeletons collected previously are being studied by Dr. Zhao. A new but very fragmentary skeleton of a small theropod includes some characteristics that are typical of Late Cretaceous oviraptorosaurs. If substantiated by further study, this would constitute the earliest record for the group. Skeletal material of small turtles, mesosuchians and tritylodonts were collected, but no evidence was found of sharks, lungfish or the small sauropod *Bellusaurus* (Dong 1987), all of which have been identified in other Wucaiwan localities in the Klameli district 50 kilometers to the west. Two isolated sauropod teeth recovered in 1987 exhibit a primitive morphology. Differences between vertebrate faunas sampled at different Wucaiwan localities suggest the presence of more than one palaeohabitat. Middle Jurassic sediments in the Junggar Basin may thus show dinosaur that were undergoing fundamental evolutionary diversification.

The overlying late Jurassic Shishugou Formation was sampled extensively for the first

time at Jiangjunmiao, and most of the material collected during the 1987 field season was derived from this unit. As in most Late Jurassic strata in which dinosaur bones have been preserved, the remains of sauropods are more abundant than those of any other large vertebrates. The Shishugou sauropods may, however, prove to be rather peculiar in that more than half of the material was derived from relatively small animals that weighed in the range of six to eight tonnes. In contemporaneous faunas, in North America, the sauropods were on the average larger. Furthermore, there is no indication of the presence of any brachiosaurs with giraffoid morphology. The ecological implications are that vegetation was not as rich as in North America, and that trees were relatively even less common. A series of cervical vertebrae belonging to a giant sauropod has ribs similar to those of *Mamenchisaurus*. The animal is otherwise known from the Red Basin of Sichuan (Young 1972). If the identification is substantiated by further study, faunistic links with southern China, which are already suggested by the Wucaiwan tritylodonts, would be further strengthened. *Mamenchisaurus* has not yet been identified outside of east Asia.

With regard to other dinosaurs, a superbly preserved skeleton of a theropod that weighed about one tonne was discovered and partly collected. A study of this specimen will almost certainly reveal valuable paleobiogeographic information.

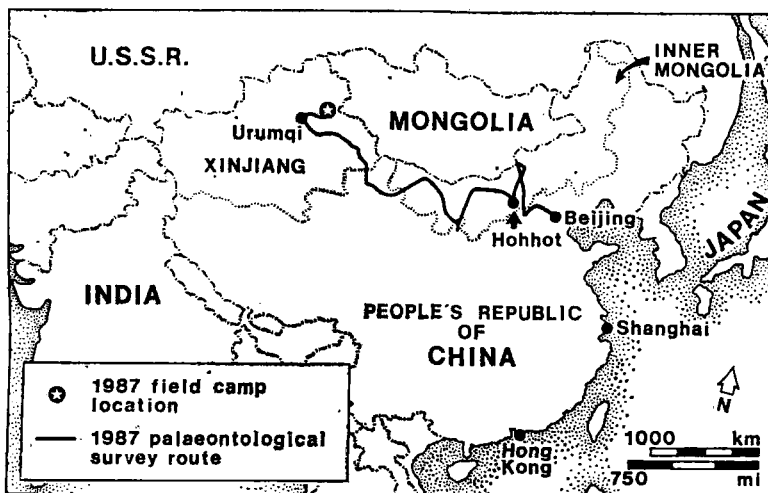
Stegosaur remains are interesting for their absence so far in the Shishugou Formation, whereas their presence in Red Basin of Sichuan is abundant. Hopefully, more diagnostic material will be found. It would be interesting should they prove to be absent or relatively uncommon in the Jurassic of northern China. Other organisms noteworthy for their absence are mesosuchian and tritylodonts, the remains of which are abundant in the Wucaiwan. Conversely, turtle specimens comprise about one half of all the articulated remains of vertebrates in late Jurassic terrestrial sediments. According to Dr. Brinkman (personal communication, 1987), the Shishugou turtle *Xinjiangchelys* is congeneric with the form identified in the Wucaiwan. Perhaps the two formations do not differ greatly in age.

Strata of the early Cretaceous Tugulu Group were also quarried in the region of Jiangjunmiao, as well as to the northwest of Wucaiwan Station in the Klameli District. According to Drs. Brinkman and Dong, vertebrate remains found in these lacustrine sediments in the southern Junggar Basin are limited to those of an amphibian (?), three different varieties of turtles, a crocodile, at least one variety of sauropod and a pterosaur (*Dzungaripterus*). Titanosaur remains have been recovered from one locality (Pingfengshan) in the Tugulu Group. In any case, the presence of the small bipedal ceratopsoid *Psittacosaurus*, which was known to occur over a region extending from the Shandong Peninsula over 3,000 km into the Soviet Union in the northwest, has not yet been recorded in the northeastern Junggar Basin.

NEI MONGOL

A 6000 kilometer trek followed the Silk Route and across the Gobi Desert to Inner Mongolia in preparation for the expedition of 1988. On September 27 the excursion team, comprising eight persons with three vehicles, departed from the main camp at Jiangjunmiao. At the request of the Chinese Academy of Science, local communities most hospitably welcomed the group as it proceeded along its route across Xinjiang, Gansu and Nei Mongol toward the east. The many localities that were visited (Fig. 4) were all of Cretaceous age, and most were dated from the middle portion of the period during a time of great evolutionary change in ter-

THE 1987 GOBI DESERT EXPEDITION
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restrial organisms that is poorly documented on other continents. The excursion team left Nei Mongol in a blizzard, and returned to Beijing on October 20.

The fossil horizons examined included those of the Early Cretaceous *Psittacosaurus*-pterosaur fauna, and of three subdivisions of the Late Cretaceous titanosaur-hadrosaur fauna (from oldest to youngest ?Saynshandian, Baynshirian and Barungoyotian). Sediments of the youngest subdivision of late Cretaceous time (Nemegetian) were not identified. Strata belonging to the *Psittacosaurus*-pterosaur level were visited in the region of Chabusum, where a small collection of fossil fishes (lycoptera) was made in lacustrine sediments, and dinosaur footprints were briefly studied in lakeshore facies. An unusually great variety of footprints were identified, suggesting the presence of a diverse dinosaurian assemblage. One was made by a large floating ornithopod pushing through the water on its toes.

The Qagan Nur locality is of unusual significance in that it is apparently in sediments younger than those of the *Psittacosaurus*-pterosaur fauna, but has yielded sauropod and stegosaur taxa that are unrecorded in Late Cretaceous strata in the region. It may represent a time corresponding to the Saynshandian interval in The People's Republic of Mongolia, The Qagan Nur strata may also be comparable in age to those that have produced the *Probactrosaurus* assemblage of Alashan region. Material of the carnivorous dinosaur *Alectrosaurus* was collected long ago at Iren Dabasu (Erlien) and has also been identified in Baynshirian assemblages in Mongolia.

The Bayinmanduhu strata, producing *Protoceratops* and small theropods, are exposed about 150 kilometers, north of Linhe city, and probably are equivalent to Djadochta strata in Mongolia. Other localities were visited east of Ejin Qi, north of Bayantu and southeast of Bayantu which are of uncertain age but are worthy of further study.

In 1988, the expedition will be undertaken in both areas of Junggar and Nei Mongol. The aim of The Dinosaur Project will further our understanding of the similarities and the differences between the dinosaurian faunas of Asia and North America, and will lead to a much better understanding of the evolution and distribution of dinosaurs.

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