

The Lower-Upper Cretaceous and Cretaceous-Tertiary boundaries in China

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The Cretaceous rocks of China are represented by both marine and nonmarine facies. Correlation of the marine sequences is based in particular in ammonites, foraminifera, rudists and palynomorphs, and that of the nonmarine sequences on reptiles (including dinosaur eggs), fish, bivalves, ostracodes, conchostracans, insects, plants, charophytes and palynomorphs.

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Two different facies of Cretaceous are developed in China: marine and nonmarine. Marine deposits outcrop in a few bordering areas. Nonmarine deposits include (1) lacustrine-fluvial strata, locally coal-bearing, oil-bearing or with interbeds of evaporites and widespread in most inland basins, and (2) lacustrine-fluvial sediments with pyroclastic and volcanic rocks, exposed in eastern and southern coastal regions belonging to the Circum-Pacific Belt (Hao et al. 1982a; 1982b) (fig. 1).

Marine Cretaceous

The marine Cretaceous in China is distributed in the western part of the Talimu Basin, along the Kala-Kunlun and the Kunlun Mountains as well as in Tibet and Taiwan. In a few other regions, foraminifers, marine bivalves and fishes have been found from marine intercalations in the nonmarine Cretaceous (Hao et al. 1982a).

The Lower-Upper Cretaceous Boundary

In Gangba area of southern Tibet, the Lower Cretaceous is stratigraphically subdivided as the Dongshan Formation and its overlying Chaqeilai Formation (Hao et al. 1982a, Wan 1984). The

former contains Valanginian ammonites, *Neohoplloceras*, *Pterolytoceras* (Zhao 1976) and Foraminifera, *Lenticulina frankei* Marie, while the latter yields foraminifers and ammonites of Albian age, such as *Ticinella roberti* (Gandolfi), *Hedbergella trocoidea* (Gandolfi), *Dipoloceras cristatum* (Delug), *D. subdelarui* Spath and *Oxytropidoceras roissyanum* (d'Orbigny). The Chaqeilai Formation is overlain by the Lenqinre Formation containing Early and Middle Cenomanian foraminifers, *Rotalipora appeninica* (Renz), *R. greenhornensis* and *R. cushmani* (Morrow) in association with Cenomanian ammonites, *Acanthoceras* sp. and *Calycoceras newboldi* (Kossmat) (Wan 1984, Zhao 1976, He Yan et al. 1976), so that the Lower-Upper Cretaceous boundary is marked by the contact of the Chaqeilai and the Lenqinre Formations (table 1).

Along the western border of the Talimu Basin in the south of Xinjiang Autonomous Region, the Upper Cretaceous Yingjisha Group is divided into four formations. In the lowermost one, the Kukebai Formation and the overlying Wuyitak Formation, the foraminiferal *Migros-Ammobaculites* fauna of Cenomanian-Turonian age and the Turonian ammonites, *Placentoceras placenta* Peckay and *Thomasites koulabicus* (Kler) in association with the rudist *Durania* sp. have been found. Therefore the Lower-Upper Cretaceous boundary lies between the base of the Kukebai Formation and the Kezilesu Formation beneath

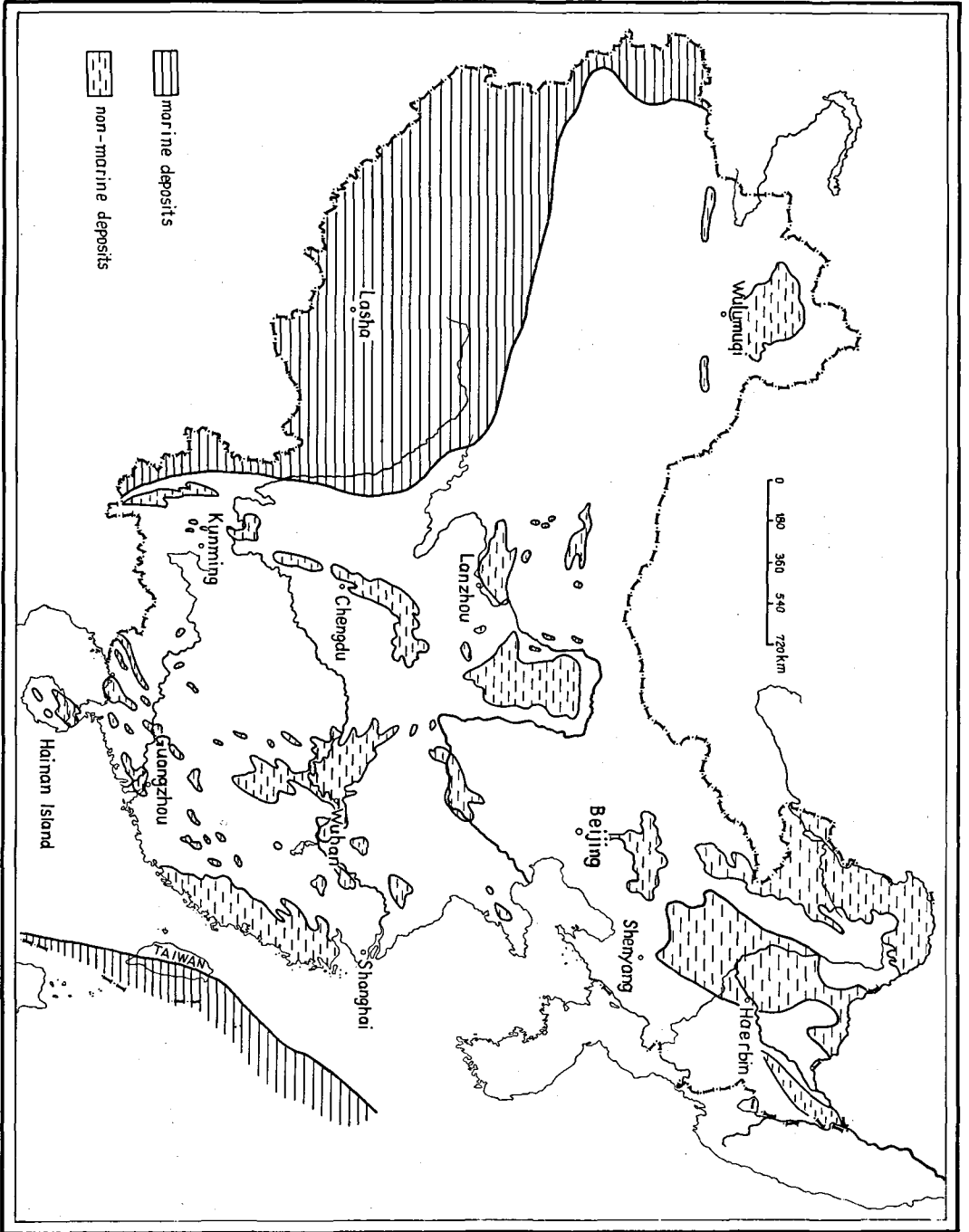


Fig. 1. Cretaceous outcrops in China.

it, which was thought to be Lower Cretaceous terrestrial deposits (table 1). But recently Early Cenomanian foraminifers and bivalves have been reported from the uppermost part of the Kezilesu Formation. This calls for a more detailed study of the Lower-Upper Cretaceous boundary in the Talimu Basin.

The Cretaceous-Tertiary Boundary

The Yingjisha Group of the Talimu Basin has its two uppermost formations, the Yigeziya Formation and the Tuyiloke Formation in ascending order (Hao et al. 1982c), yielding rudists, oysters and a sporopollen assemblage of Late Cretaceous age. The Aertashen Formation disconformably overlying the Tuyiloke Formation consists of gypsum mudstones and gypsum beds, almost barren of fossils. However, in its overlying Qimugen Formation, a *Spiroplectammina-Globigerina-Nonionellina* fauna of Foraminifera is found, indicating Middle to Late Paleocene age (Hao et al. 1982c). Thus, the Cretaceous-Tertiary boundary lies between the Tuyiloke Formation and the Aertashen Formation (table 1), which is correlated with the Danian Buhar Beds in the Fergana Basin of the Soviet Union, according to both the lithologic character and the stratigraphic position.

In the Gangba region of southern Tibet, the Maastrichtian algae, *Cymopolia tibetica* Morellet and *Neomeris cretacea* Steinmann are found in the Jidula Formation and its underlying Zongshan Formation. The former also contains Maastrichtian foraminifers, *Orbitoides media* (d'Archiac), *O. apiculata* Schlumberger, *Omphalocyclus macroporus* (Lamarck) and echinoids. *Hemipneustes compressus* Noetling, *Bolbaster madagascariensis* (Cotteau) (He et al. 1976, Zhang et al. 1981). The Cretaceous-Tertiary boundary here is marked by the contact between the Jidula Formation and its overlying first member of the Zongpu Group (Table 1), represented mainly by massive limestones with Danian gastropods, *Bermaya expansa* d'Archiac et Haime, *Diconomorpha elegans* (Douvillé), *Confusiscalia indica* Douvillé (Yü 1976) and Paleocene Foraminifera, *Keramosphaera tergestina* (Stache), *Miscellanea miscella* (d'Archiac et Haime) and *Operculina subsalsa* Davies (He et al. 1976),

which is thought to be equivalent to the Cardita Beaumonti Beds in the Sind Province of Pakistan.

Nonmarine Cretaceous

The nonmarine Cretaceous in China is abundant in fossil remains represented mainly by reptilians, fishes, freshwater bivalves and ostracodes, conchostracans, insects, plants, sporopollen assemblages and charophytes (Hao et al. 1982a, 1982b). These faunas and floras serve as one of the most important bases for stratigraphic classification and correlation.

The Lower-Upper Cretaceous Boundary

In northeastern China, the Songliao Basin was the largest subsiding depression during Cretaceous time and received more than 6,000 m of chiefly terrestrial clastic deposits, which are stratigraphically divided into nine formations (Hao et al. 1982a). The Lower-Upper Cretaceous boundary should be put at the base of the Nenjiang Formation (table 1) owing to the fact that the ostracode genus *Talicypridea*, which is characteristic for Upper Cretaceous of eastern Asia, made its first appearance in it. The ostracode assemblage comprising various species of *Talicypridea* and *Cadoniella* in association with *Cypridea cavernosa* Galeeva of this formation (Hao et al. 1974) also occurs in the lower Upper Cretaceous Nemegt Beds of the People's Republic of Mongolia and in the Wangshi Formation, the Donggou Formation, the Subashen Formation and the Paomagang Formation of different regions in China (table 1 and table 2), the Late Cretaceous age of which is ascertained by their containing fossil dinosaurs. Palaeontologists working on nonmarine bivalves also put the Lower-Upper Cretaceous boundary between the Nenjiang Formation and its underlying Yaohia Formation, according to the biostratigraphic sequence of the bivalve *Trigonioides-Plicatounio-Nippononaia* fauna (Hao et al. 1982a) which is characteristic for upper Lower Cretaceous and the *Pseudohyria* fauna occurs only in the Upper Cretaceous. But some palaeobotanists assign the Quantou Formation and the Qingshankou Formation also to the Upper Cretaceous, since a

primitive angiosperm flora including *Trapa? microphylla* Lesq., *T? angulata* (Newb.) Brown and *Dryophyllum subfalcatum* Lesq. has been found in the former (Li 1959).

In the Laiyang Basin of Shandong Peninsula, the Lower-Upper Cretaceous boundary lies between the Qingshan Formation and the Wangshi Formation (table 1). The former, represented by andesites and coarse clastic sediments, contains the Lower Cretaceous dinosaur *Psittacosaurus sinensis* Young and overlies the Laiyang Formation with a fauna consisting mainly of *Cypridea koskulensis* Mandelstam, *Yanjiestheria sinensis* (Chi), *Coptoclava longipoda* Ping, *Mesotendipes melanura* (Ping) and *Lycoptera sinensis* Woodward and of Early Cretaceous age. The Wangshi Formation is represented by mudstones and sandstones, and yields a Late Cretaceous fauna including bivalves represented by the *Pseudohyria* assemblage, ostracodes by the *Talicypridea-Cypridea-Candona* assemblage and dinosaurs by *Tyrannosaurus* cf. *rex* Osborn, *Tanius sinensis* Wiman, *T. chingkankouensis* Young, *Tsintaosaurus spinorhinus* Young, *Shantungosaurus giganteus* Hu, and dinosaur eggs by *Oolithus elongatus* Young (Hao et al. 1982a, 1982b).

In northwestern China, the Lower Cretaceous is well developed in a lot of inland basins, but the Upper Cretaceous is poorly developed and scattered. The Lower-Upper Cretaceous boundary has been studied in greater detail in the Zhungeer Basin of Xinjiang, where the Upper Cretaceous Donggou Formation disconformably overlying the Lower Cretaceous Tugulu Group (table 1), contains the ostracode *Talicypridea* assemblage, dominated by *Talicypridea amoena* (Liu) and *T. gemma* (Galeeva). The Tugulu Group, on the other hand, contains the ostracode assemblage of Early Cretaceous age, represented by *Cypridea unicostata* Galeeva, *C. koskulensis* Mandelstam, *Clinocypris scolia* Mandelstam and the reptilian fauna of early Early Cretaceous age, including *Psittacosaurus mongoliensis* Young, *Wuerhosaurus homheni* Dong and *Drungaripterus weii* Young (Young 1973). There is probably a gap from the uppermost lower part to the lowermost upper part of the Cretaceous. A similar gap also exists between the Lower Cretaceous Hekou Formation and the Upper Cretaceous Minghe Formation in the Minghe Basin of Gansu. In the Guyang Basin of Inner Mongolia and the Shan-

xi-Gansu-Ninxian Basin in the Great Bend area of the Yellow River, Upper Cretaceous is poorly developed and restricted in distribution; the Lower Cretaceous is often covered by Tertiary or Pleistocene deposits.

In southwestern China, the Lower-Upper Cretaceous boundary in western Sichuan is marked by continuous deposition between the Jiaguan Formation with an Early Cretaceous fossil assemblage including plant, *Brachyphyllum* sp., ostracods, *Latonia yunnanensis* (Hou et al.), *L. subovata* (Hou et al.), *Cypridea (Cypridea) angusticaudata* Cao et Yang in association with dinosaur footprints and fishes and the Guankou Formation yielding Upper Cretaceous ostracodes and charophytes, such as *Talicypridea longa* (Hou), *T. latiovata* (Hou), *Cypridea (Pseudocypridina) tera* Su and *Grambastchara longiconica* Wang. The Jiaguan Formation is disconformably underlain by the Tianmashan Formation containing fossil remains of early Early Cretaceous age (table 1) (Hao et al. 1982a, Li 1979, Ye, 1982).

In western Yunnan, strata equivalent to the Jiaguan Formation are divided into two units, the Mangang Formation below and the Bashahe Formation above. An Early Cretaceous biota consisting mainly of charophytes, *Atopochara trivolvis* Peck; bivalves, *Trigonioides (Trigonioides) sinensis* Gu et Ma, *Nakamuranaia chingshanensis* (Grabau); ostracodes, *Latonia yunnanensis* (Hou et al.), *Rhinocypris jurassica jurassica* (Martin) together with conchostracans, plants and spores and pollen has been found in the former, while no organic remains have ever been found in the latter, which is represented mainly by arkosic sandstone. The Mankuanhe Formation conformably overlying the Bashahe Formation consists of fine clastic deposits with salt beds and contains a Late Cretaceous biota predominated by ostracodes, *Talicypridea* cf. *amoena* (Liu), *Cypridea (Cypridea) cavernosa* Galeeva, *Ziziphocypris simakovi* (Mandelstam) and charophytes, *Porochara anluensis* Z. Wang, *P. sphaerica* Z. Wang and *Charites tenuis* Z. Wang. The Lower-Upper Cretaceous boundary therefore lies between the Bashahe and the Mankuanhe Formations (table 1) (Hao et al. 1982a, Ye & Jiang 1981, Nanjing Inst. 1975).

In central China, the Cretaceous is better developed in the Jiangnan Basin of Hubei and the

sedimentary facies		Marine facies						Nonmarine facies					
stage	area	Western Xinjiang		Tibet		Taiwan	Songliao Basin	Eastern Shandong	Inner Mongolia	Tulufan Basin of Xinjiang	Zhungeer of Basin Xinjiang	Western Sichuan	Western Yunnan
		Qimugen Formation	Aertashen Form.	Zongpu Group	Jidula Form. Zongshan Form.	Biho Group	Minshui Form.	Wangshi Form.	Naomugen Form. E ₁ -E ₃	Taizichun Form.	Zinquanzi Form. E ₁ -2	Mingshan Group	Mengyejiang Form.
Upper Cretaceous	Thanetian			III									
	Montian			II									
	Danian			I									
	Maestrichtian												
	Campanian												
Lower Cretaceous	Santonian												
	Coniacian												
	Turonian												
	Cenomanian												
Lower Cretaceous	Albian												
	Aptian												
	Barremian												
	Hauterivian												
	Valanginian												
Berriasian													

Table 1. Correlation of Cretaceous and Paleocene in China.

Hengyang Basin of Hunan, but the lower part of the Lower Cretaceous is lacking in both regions (table 2) (Hao et al. 1982a). The lowermost division of the Cretaceous in the Hengyang Basin, the Dongjing Formation, contains the *Trigonioides* (*Trigonioides*) *kodairai* Kobayashi et Suzuki, which is a guide fossil of middle Lower Cretaceous and occurs in association with the charophytes, *Perimnest ancora* L. Grambast and *Triclypella calcitrata* L. Grambast, ostracodes and sporopollen assemblages. The overlying Shenhuan Formation yields the late Early Cretaceous sporopollen assemblage together with the ostracode *Mandelstamia recta* Guan and plant, *Pseudofrenelopsis parceramosa* (Fontaine). The Lower-Upper Cretaceous boundary lies at the top of the Shenhuan Formation, because in the Daijiangpin Formation above it, a typical Late Cretaceous fauna is found, dominated by ostracodes, *Cypridea* (*Cypridea*) *cavernosa* Galeeva, *C. (C.) profusa* Lübmova, *Talicypridea amoena* (Liu), *T. hemiselenata* Guan, *Clinocypris aculeata* Guan (Guan 1979) together with teeth of *Tyrannosaurus* and dinosaur eggs.

The Cretaceous strata along the western border of the Jiangnan Basin are divided, in ascending order, into the Shimen Formation, the Wulong Formation, the Lojingtan Formation, the Honghuatao Formation and the Paomagang Formation (table 2). In the Shimen Formation, the *Tricolpites-Cicatricosisporites-Exesipollenites* assemblage of spores and pollen is found, the age of which is Aptian to Early Albian. From the Wulong Formation, the Early Cretaceous dinosaur, *Prodeinodon* and plant, *Pseudofrenelopsis parceramosa* (Fontaine) and the Middle to Late Albian *Wulongspora reticulata-Hubeipollis plicatus-Tricolpites micromunus* sporopollen assemblage are reported. The Lojingtan Formation overlying the Wulong Formation consists of massive conglomerates and constitutes the basal part of a continuous cycle of sedimentation together with the Honghuatao and Paomagang Formations. In the Paomagang Formation, late Late Cretaceous *Öolithus*, ostracodes, charophytes and sporopollen assemblage are found. Therefore, the Lower-Upper Cretaceous boundary should be drawn between the Wulong and Lojingtan Formations (table 2).

Along middle and lower reaches of the Yangtze River, the Cretaceous stratigraphy is

better studied in Jiangsu, southern Anhui and western Zhejiang. In the Jurong region of Jiangsu, the Lower-Upper Cretaceous boundary lies at the base of the Pukou Formation, which possesses an early Late Cretaceous biota mainly represented by the *Schizaeoisporites-Welwitschiapites* assemblage of spores and pollen and ostracodes, *Tangxiella extrana* Yu, *Talicypridea* cf. *parallela* (Hou). It unconformably overlies the Gechun Formation with Early Cretaceous fossils, such as *Pseudofrenelopsis* cf. *parceramosa* (Fontaine), *Flabellochara jurongica* S. Wang et Zhang, *Euaclistochara mundula* (Peck), *Djungarica stolidia* Jiang, *Cypridea* (*Cypridea*) *postiangusta* Chen etc. Above the Pukou Formation is the Chishan Formation, in which occurs a late Late Cretaceous biota represented mainly by *Talicypridea obesa* (Li), *T. elliptica* He, *Cypridea* (*Pseudocypridina*) *vulgaris* Yang, *C. (P.) chishanensis* Yang, *Eucypris subscalariformis* He, *Pseudohyria* aff. *gobiensis* MacNeil, *Porochara anluensis* Z. Wang, *P. jingshanensis* Z. Wang, *Mesochara yanbianensis* Z. Wang et al. and *Nemegtichara prima* Karcz & Ziemb (table 2) (Hu 1979, Hou et al. 1982, Wang et al. 1979, Song et al. 1982).

In southern Anhui the Lower-Upper Cretaceous boundary is indicated by a break between the Qifangchun Formation equivalent to the Gechun Formation and the Xuannan Formation which most likely is equivalent to the Chishan Formation of Jiangsu and may also comprise the uppermost part of the Pukou Formation (table 2). The Qujiang Group developed in the Jinqu Basin of western Zhejiang probably includes the uppermost Lower and the Upper Cretaceous. It is appropriate to lay the Lower-Upper Cretaceous boundary between its 2nd and 3rd members, the late Early Cretaceous dinosaur, *Chilantaisaurus zhejiangensis* Dong being found in the former and the *Tangxiella-Talicypridea* assemblage of ostracodes (Gou et al. 1978) *Pseudohyria* cf. *gobiensis* MacNeil and *Sphaerium shantungense* (Grabau) of bivalves together with the charophyte flora represented mainly by *Euaclistochara mundula* (Peck) in the latter.

In the provinces Guangdong and Guangxi along the southeastern border of the country, more complete exposure of Cretaceous is known in the Shanshui Basin and the Siwandashan Mountains region (Hao et al. 1982a). The Lower-Upper

sedimentary facies		Nonmarin facies											
		stage	area	Luanchuan Basin of Western Henan	Jianghan Basin of Hubei	Hengyang Basin of Hunan	Nanxiang Basin of Guangdong	Chijiang Basin of Jiangxi	Shanshui Basin of Guangdong	Hepu Basin of Guangxi	Southern Anhui	Jiangsu	Western Zhejiang
Paleocene	Thanetian	Dazhang Formation	Gongjiachong Form.	Xialushi Form.	Nonshan Form.	Chijiang Form.	Chengzhuang Form.	Sangyang Form.	Shuangta Group	Funing Group I Form.	Quijiang Group		
	Montian	Gaoyugou Form.		Dongtang Form.	Shanghu Form.	Shizikou Form.	Dalangshan Form.			Taizhou Form.			
	Danian												
Upper Cretaceous	Maestrichtian	Qiuba Form.	Paomagang Form.		Nanxiang Form.	Nanxiang Form.	Shanshui Form.	Wujia Form.	Xuannan Form.	Chishan Form.	Quijiang Group	5	
	Campanian			Daijiapin Form.									4
	Santonian		Hunghuatao Form.				Baihedong Form.						3
	Coniacian		Lojingtai Form.										2
	Turonian												1
	Cenomanian		Wulong Form.										
Lower Cretaceous	Albian	Shimen Form.		Senhuangshan Form.									
	Aptian												
	Barremian			Dongjing Form.									
	Hauterivian												
	Valanginian												
Berriasian													

Table 2. Correlation of Cretaceous and Paleocene in China.

Cretaceous boundary of the latter lies between the Napai Formation below and the Bali Formation above. The Napai Formation contains the dinosaur *Prodeinodon kwangshiensis* Hou et al. of late Early or middle to late Early Cretaceous age, together with the bivalves *Trigonioides (Trigonioides) trigonus* Hoffet, *Plicatounio (Plicatounio)* aff. *suzukii* Hoffet and the Bali Formation yields angiosperm remains, *Cinnamomum hesperium* Knowlton and *Nectandra prolifica* Berry of Cenomanian-Turonian age and the bivalves, *Trigonioides (Diversicostata)* aff. *diversicostata* Hoffet and *Pseudohyria hoffeti* Kobayashi. In the Hepu Basin of Guangxi, the stratum equivalent to the Bali Formation is the Xidong Formation, but the Lower Cretaceous is lacking (table 2).

The Cretaceous-Tertiary Boundary

In the Songliao Basin of northeastern China, above the lower Upper Cretaceous Nenjiang Formation (see above), are the Sifangtai Formation and the Minshui Formation in ascending order (Hao et al. 1982a). The Sifangtai Formation and the lower member of the Minshui Formation possess the same biota predominated by *Talicypridea amoena* (Liu), *Cypridea (Cypridea) eximia* (Ye), *C. (C.) cavernosa* Galeeva, *C. (Pseudocypridina) apiculata* Cea, *Candona disjuncta* Hao (Hao et al. 1982c), *Porochara anluensis* Z. Wang, *Nemegichara prima* Karcz. et Ziemb., *Collichara* cf. *taizhouensis* S. Wang et Zhang as well as the *Schizaeoisporites-Aquilapollenites* assemblage of spores and pollen. Meanwhile, the Sifangtai Formation also yields *Pseudohyria cardiiformis* (Martinson), which is especially characteristic for the Upper Cretaceous, and the *Schizaeoisporites-Aquilapollenites* assemblage bears a close resemblance to the Maastrichtian assemblage reported from the Chagayansk Formation in Zeisko-Bureinsk Basin in the Far East of Soviet Union and from the Lance Beds of the United States. But the sporopollen assemblage found in the upper member of the Minshui Formation is represented by *Deltoideospora-Ulmipollenites*, which is correlative with that which occurs in the Kivdensk Formation of the Zeisko-Bureinsk Basin, in the Horseshoe Canyon Beds of Canada and in the Fort Union Beds of the United States. The age of the Kivdensk Formation is ascertained to be Paleocene with its basal part assigned to the Danian.

Therefore the Cretaceous-Tertiary boundary is between the lower and upper members of the Minshui Formation (table 1) (Hao, Yu, Guan & Sun 1979).

In northwestern China, the Cretaceous-Tertiary boundary is well marked in the Tulufan Basin of Xinjiang. Here, the Subashen Formation proved to be of middle to late Late Cretaceous age by its fossil content including dinosaurs, *Shanshanosaurus houwanshanensis* Chao, *Tyrannosaurus turfanensis* Chao, *Nemegtosaurus pachi* Chao, *Euplocephalis* sp.; dinosaur eggs, *Oolithus elongatus* Young and ostracode *Talicypridea-Cypridea* assemblage. This is overlain with no indication of depositional break by the Taizichun Formation containing Late Paleocene mammals, such as *Jiaoluotherium turfanensis* (Chao), *Prodinoceras diconicus* Tong, *Pseudictops chaili* Tong and *Dilambda speciosa* Tong; the horizon of their occurrence lies only 5 m above the horizon yielding dinosaur skeletons.

In the Erlian Basin of Inner Mongolia, the Upper Cretaceous Erliandabushu Formation containing dinosaurs, *Manchurosaurus mongoliensis* Gilmore, *Bactrosaurus johnsoni* Gilmore, *Ornithomimus asiaticus* Gilmore and the ostracode *Talicypridea-Cypridea (Pseudocypridina)-Candona* assemblage, is overlain by the Upper Oligocene Shannaogandai Formation or by the Naomugen Formation, the age of which is probably Late Paleocene to Early Eocene (table 1).

In southwest China, a continuous sequence of Upper Cretaceous and Paleocene is developed in the Sichuan Basin and western Yunnan (Hao et al. 1982a). The Upper Cretaceous Guankou Formation (see above) of western Sichuan is superposed in continuous deposition by the Mingshan Group. The upper part of the latter contains Eocene ostracodes, *Pinnocypris alata* Zhou, *P. postacuta* Zhou, *Limnocythere hubeiensis* Ye, *Ilyocypris manasensis* Mandelstam, but no organic remains of stratigraphic significance have been found in its lower part. The Cretaceous-Tertiary boundary is probably at the top of the Guankou Formation (table 1). The Jiading Group in southern Sichuan has *Talicypridea latiovata* (Hou) and *Tangxiella subrotunda* Yu in its middle member, which is probably equivalent to the Guankou Formation and has *Limnocythere hubeiensis* Ye in its upper member, which is probably equivalent to the upper part of the Mingshan

Group (Ye 1982). In western Yunnan, the Upper Cretaceous Mankuanhe Formation (see above) with the first salt bed is overlain conformably by the Mengyejing Formation with the second salt bed and containing the Paleocene ostracode fauna consisting of *Parailocypris changzhouensis* Yang et Hou, *P. jiangchengensis* Ye et Jiang, *Cypris (Cristocypris) zhengdongensis* (Ye) and *Cypridea cryptorostrata* Ye et Jiang (Ye & Jiang 1981).

To the south of the Yangtze River, the lithologic character and fossil content of both Upper Cretaceous and Paleocene in different localities are very similar. The Cretaceous-Tertiary boundary is well studied in the Nanxiong Basin of Guangdong (Hao et al. 1982a) (table 2). There the Lower and the lower Upper Cretaceous are not developed, the upper Upper Cretaceous Nanxiong Formation is very rich in fossil content, which consists mainly of dinosaurs, *Tarbosaurus* sp., *Nansungosaurus brevispinus* Dong; dinosaur eggs, *Oolithus spheroides* Young, *Ö. rugustus* Young, *Ö. elongatus* Young; ostracodes, *Talicypridea amoena* (Liu), *T. hemiseleneata* Guan, *Cypridea (Cypridea) cavernosa* Galeeva, *C. (C.) profusa* Lüvimova and the *Porochara anluensis-Latochara cylindrica-Charites tenuis* flora of charophyta. From the Shanghu Formation resting conformably upon the Nanxiong Formation, abundant fossil mammals have been reported, most important among them are *Bemalambda nanhsiungensis* Chow et al., *B. pachyoestus* Chow et al. and *Dissacusium shanghoensis* Chow et al., which are characteristic for Paleocene (Minchen M. Chow et al. 1973). The mammalian fauna occurs in association with the ostracode assemblage dominated by *Cypridea (Morinina) nanxiongensis* Guan, *C. (Pseudocypridina) subtera* Hou, *C. (Guangdongia) speciosa* Guan, *Parailocypris taizhouensis* Yang, *Porocypris orbiculata* Guan, *P. sphaeroidalis* Guan; the charophytes assemblage mainly represented by *Stephanochara micrococca* Z. Wang, *Grovesichara changzhouensis* Huang et Z. Wang, *Latochara curtula* Z. Wang and the *Ulmoideipites-Quercoidites* assemblage of spores and pollen. Therefore the Cretaceous-Tertiary boundary lies along the contact of the Nanxiong Formation and the Shanghu Formation (Guan 1979).

In the Chijiang Basin of Jiangxi, the upper part of Upper Cretaceous is also named the Nanxiong

Formation due to the close resemblance of fossil biota to the Nanxiong Formation in Guangdong. Its overlying Shizikou Formation is correlative with the Shanghu Formation (Wang & Ding 1979). The Upper Cretaceous Daijiaping Formation (see above) in the Hengyang Basin and the Paomagang Formation (see above) in the Jianghan Basin, the Xuannan Formation in the Qianshan Basin of southern Anhui as well as the Chishan Formation in northern Jiangsu are equivalent to the Nanxiong Formation, and the Dongtang Formation, the lower and middle parts of the Gongjiachong Formation, the lower and middle parts of the Shuangta Group and the Taizhou Formation overlying them respectively are correlative with the Shanghu Formation, on the basis of close resemblance of both fossil biota and lithologic character (table 2).

Dansk sammendrag

Kinas kridtaflejringer er delt i to hovedfacies: marint, begrænset til nogle marginale bassiner; og ikke-marint som dækker store områder. De marine aflejringer er korreleret især på basis af ammonitter, foraminiferer, rudister og palynomorfer, hvorimod de ikke-marine sekvenser er korreleret på basis af krybdyr (incl. dinosaur æg), fisk, muslinger, muslingekrebs, conochtracer, insekter, planter, charophytter og palynomorfer.

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