古脊椎动物与古人类
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周口店第一地点下部各层的地层、古生物学观察及第一地点的时代

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1957 年作者(卡尔克及胡长康, 1957)[39] 在概略的总結更新世初、中期欧洲和亚洲化石鹿类 (Cervidae) 的一文中,曾确定 (根据古生物学的証据) 周口店第一地点即中国猿人地点的堆积,时代相当于第二冰期的末期或者欧洲赫尔斯坦間冰期 (Holsteinian) 的初期 (=阿尔卑斯地层,明德冰期之末或明德—里斯間冰期之初)。此外,我們还曾提出,就第一地点化石哺乳动物羣的性質来看,它已經属于"大間冰期"(=赫尔斯坦)的旧北区(Palaearctic region) 动物区系了。

裴文中[68,69,70] 和柯登(B. Kurtén)[42,43] 曾提出第一地点堆积的时代为中更新世的早期(相当于欧洲地层的克罗默尔层 (Cromerian), 黄万波[1] 最近提出底砾石层的时代为更新世初期 (=維拉方期)。 柯登[46,48] 后来又根据維沙利 (Y. Vasary) 所作的周口店 (第一地点) 花粉孢子的分析結果, 另行提出第一地点相当于明德冰期II/ 艾尔斯特冰期 (Mindel II/Elster)[2] 的看法。 这一时代問題 (明德 II/艾尔斯特冰期=欧洲第二冰期的綜合) 在本文内亦将討論[13,39]。

一、周口店第一地点的化石动物羣(脊椎动物)*

灵长类 (PRIMATES)

1. 中国猿人 (*Homo erectus pekinensis* (Black))
2. 碩獼猴 (*Macaca robustus* Young)

食虫类 (INSECTIVORA)

3. 原始麝鼩 (*Scaptochirus primitivus* Zdansky)
4. 中国水鼩 (*Neomys sinensis* Zdansky)
5. 步氏水鼩 (*Neomys bohlini* Young)

1) 黄万波 [1960a—c] 認为底砾石层属早更新世(=維拉方期)似还有問題,因为缺少化石及其它方面的証据。

2) 参考文献 [46] 第 174 頁, "我的意見是既然这一取代 (指短吻鬣狗 *Hyaena brevirostris* 被斑鬣狗 *Crocuta crocuta* 所代替——作者) 可能发生于艾尔斯特冰期 (Elster II ……) 二者的矛盾即可大大消除"。 周口店属于明德冰期的提法,看来現在为維沙利最近所作的花粉孢子分析的結果所支持,說明当时的气候肯定要比現代寒冷(参考文献 [48] 第 19 頁)。

* 根据原著,周口店及北京所保存的标本(两栖、爬行及鳥类不包括在內)及文献 [13]、[98]、[120]、[64]、[66]、[17、18]、[15、16] 等。

6. 麝鼩 (*Crocidura* sp.)
7. 韓氏刺猬 (*Erinaceus olgai* Young)
8. 鼩鼱 (*Sorex* sp.)[67] (化石保存在下层的堆积中)

翼手类 (CHIROPTERA)

9. 更新世菊头蝠 (*Rhinolophus pleistocaenicus* Young)
10. 鼠耳蝠 (*Myotis* sp.)
11. ? 巨暮翼蝠 (? *Hesperoptenus giganteus* Young)
12. ? 伏翼(原譯油蝠) (? *Pipistrellus* sp.)

嚙齿类 (RODENTIA)

13. 蒙古黃鼠 (*Citellus* cf. *mongolicus* (Milne Edwards))
14. 維氏金花鼠 (*Tamias wimani* Young)
15. 低冠鼯鼠 (*Petaurista brachyodus* (Young))
16. 旱獺 (*Marmota bobak* (Radde))[1)]
17. 复齿旱獺 (*Marmota complicidens* (Young))
18. 旱獺(种名未定) (*Marmota* sp.)
19. ? 河狸 (? *Castor* sp.)[2)]
20. 居氏大河狸 (*Trogontherium cuvieri* Fischer v. Waldheim)
21. 古倉鼠 (*Cricetinus varians* Zdansky)
22. 紋背倉鼠 (*Cricetulus* cf. *griseus* Milne Edwards)
23. 倉鼠 (*Cricetulus* cf. *obscurus* Milne Edwards)
24. 小鼠 (*Mus sylvaticus* Linnaeus)
25. 卞氏鼠 (*Mus musculus bieni* Young)
26. 巢鼠 (*Micromys* cf. *minutus* Pallas)
27. 黑鼠 (*Rattus rattus* (Linnaeus))
28. 野原鼠 (*Gerbillus roborowskii* Büchner)
29. 棕背鼹 (*Clethrionomys rufocanus* (Sundvell))[3)]
30. ? 絨鼠 (? *Eothenomys* sp.)
31. 山鼠 (*Alticola* sp.)
32. 簡牙鼠 (*Pitymys simplicidens* Young)
33. 似兰氏小耳鼠 (*Microtus brandtioides* Young)
34. 簡田鼠 (*Microtus epiratticeps* Young)
35. ? 費鼠 (? *Phaiomys* sp.)
36. 翁氏鼢鼠 (*Myospalax wongi* (Young))[4)]
37. 鼢鼠(种名未定) (*Myospalax* sp.)
38. 豪猪(箭猪) (*Hystrix* cf. *subcristata* Swinhoe)

1) 楊鍾健鑑定为 *Marmota robustus* (M. E.) (参考文献 [120]), 德日进和裴文中鑑定为 *Marmota bobak* (Radde) (参考文献 [97])。
2) 根据参考文献 [81], 第 27 頁, 周口店的标本屬于 *Chalicomys anderssoni* Schlosser。
3) *Clethrionomys* Tilesius 1850 = *Evotomys* Coues 1874.
4) *Myospalax* Laxmann 1768 = *Siphneus* Brants 1827.

39. 翁氏兔 (*Lepus* cf. *wongi* Young)
40. 兔(未定种甲) (*Lepus* sp. A)
41. 兔(未定种乙) (*Lepus* sp. B)
42. 柯氏鼠兔 (*Ochotona koslowi* Büchner)
43. 鼠兔(未定种甲) (*Ochotona* sp. A)
44. 鼠兔(未定种乙) (*Ochotona* sp. B)

食肉类 (CARNIVORA)

45. 狼 (*Canis lupus* Linnaeus)
46. 变种狼 (*Canis lupus variabilis* Pei)
47. 豺狼 (*Canis cyonides* Pei)
48. 中国狸(貉) (*Nyctereutes sinensis* (Schlosser))
49. 豺狗 (*Cuon antiquus* Matthew and Granger)
50. 赤狐 (*Vulpes* cf. *vulpes* (Linnaeus))
51. 狐 (*Vulpes* cf. *corsac* (Linnaeus))
52. 犬科(种、属名未定) (Canidae gen. et sp. indet.)
53. 柯氏西藏熊 (*Ursus thibetanus kokeni* Matthew and Granger)[1)]
54. 馬熊(棕熊) (*Ursus arctos* Linnaeus)
55. 洞熊 (*Ursus* cf. *spelaeus* Rosenmüller and Heinroth)
56. ? 大猫熊 (? *Ailuropoda* sp.)
57. 獾 (*Meles* cf. *leucurus* Hodgeson)
58. 水獭 (*Lutra melina* Pei)
59. 狼貚(貂熊) (*Gulo* sp.)
60. 黃鼬 (*Mustela* cf. *sibirica* Pallas)
61. 黃鼬(种名未定) (*Mustela* sp.)[2)]
62. 貂(种名未定) (*Martes* sp.)
63. 中国鬣狗 (*Hyaena brevirostris sinensis* Owen)[3)]
64. 最晚斑鬣狗 (*Crocuta crocuta ultima* (Matsumoto))
65. 剑齿虎 (*Machairodus inexpectatus* Teilhard de Chardin)
66. 虎 (*Panthera* cf. *tigris* (Linnaeus))
67. 楊氏虎 (*Panthera youngi* (Pei))
68. 豹 (*Panthera* cf. *pardus* (Linnaeus))
69. 德氏狸 (*Felis teilhardi* Pei)
70. 猫属(未定种甲) (*Felis* sp. A)
71. 猫属(未定种乙) (*Felis* sp. B)
72. 野狸 (*Felis* cf. *microtis* Milne Edwards)

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1) *Ursus thibetanus kokeni* Matthew and Granger 1923 = *Ursus angustidens* Zdansky 1928, cf. Kurten, B., 1958, P. 4.

2) 可能与 *Mustela nivalis* Linnaeus 相同,見参考文献 [64] 第 88 頁; [15] 第 31—32 頁; [16] 第 99 頁。

3) 等于 *Hyaena zdansky* PEI (cf. Colbert, E. H. and Hooijer, D. A. 1953 p. 67), 但属名应改为 *Crocota* 見参考文献 [41] 第 2 頁。

73. 猎豹 (*Acinonyx* sp.)[1)]

长鼻类 (PROBOSCIDEA)

74. 納瑪古稜象 (*Palaeoloxodon* cf. *namadicus* (Falconer and Cautley)

奇蹄类 (PERISSODACTYLA)

75. 梅氏犀 (*Dicerorhinus* cf. *kirchbergensis* (Jäger))[2)]
76. 披毛犀 (*Coelodonta* sp.)
77. 三門馬 (*Equus* cf. *sanmeniensis* Teilhard de Chardin and Piveteau)[3)]

偶蹄类 (ARTIODACTYLA)

78. 李氏野猪 (*Sus lydekkeri* Zdansky)
79. 巨駝 (*Paracamelus gigas* Schlosser)
80. 駱駝科(种、属名未定) (Camelidae gen. et sp. indet.)
81. 北京麝 (*Moschus moschiferus pekinensis* Young)
82. ? 鼷(河麂)(种名未定) (? *Hydropotes* sp.)
83. 麅(种名未定) (*Capreolus* sp.)
84. 葛氏斑鹿 (*Pseudaxis grayi* Zdański)
85. 肿骨鹿 (*Megaceros pachyosteus* (Young))
86. 鹿属(种名未定) (*Cervus* sp.)
87. 羚羊(种名未定) (*Gazella* sp.)
88. 裴氏轉角羚羊 (*Spirocerus peii* Young)
89. 翁氏轉角羚羊 (*Spirocerus* cf. *wongi* Teilhard and Piveteau)
90. 盘羊 (*Ovis* cf. *ammon* Linnaeus)
91. 盘羊属(种名未定) (*Ovis* sp.)
92. 羊牛类(种、属名未定) (Ovibovinae gen. et sp. indet.)
93. 德氏水牛 (*Bubalus teilhardi* Young)
94. 轉角牛(野牛)(种名未定) (*Bison* sp.)
95. ? 青羊(种名未定) (? *Naemorhedus* sp.)
96. 牛科(种、属名未定) (Bovidae gen. et sp. indet.)

周口店第一地点的哺乳类化石，过去沒有一层一层的比較过，所以也沒有发表过各层内的化石名目表。如今要作出各层完全的化石名目表是很困难的，因为早期发掘的化石材料不一定都标有准确的层位記录。因此需要在今后継續的发掘工作中，对新取得的化石除了作系統性的描述之外，也需要一层一层的分层記录，补充本文現在所列出的目录。此外，还有必要作每一层内所含的不同动物种的百分比統計，以便供古生态研究方面的比較。

1) *Acinonyx* Brookes 1828 = *Cynailurus* Wagler 1830.
2) 周口店的犀类化石将由周本雄修訂研究。
3) 周口店的馬类化石将由刘后一修訂研究。

周口店第一地点各层的化石动物羣(脊椎动物)目录[1)]

(一) 第 1—3 层的化石动物羣

上角砾岩层和上石灰华层——粗角砾岩层及多层未經扰动的砂質石灰华层,下部(第 3 层)为包含有石灰岩巨块的不規則角砾岩带[2)]。厚約 7.5 米。

灵长类 (PRIMATES)

中国猿人 (*Homo erectus pekinensis* (Black))[96,92]

碩獼猴 (*Macaca robustus* Young)[3)]

食肉类[64] (CARNIVORA)

变种狼 (*Canis lupus variabilis* Pei)

狐 (*Vulpes* cf. *corsac* (Linnaeus))

棕熊(馬熊) (*Ursus arctos* Linnaeus)

柯氏西藏熊 (*Ursus thibetanus kokeni* Matthew and Granger)

獾 (*Meles* cf. *leucurus* Hodgeson)

最晚斑鬣狗 (*Crocuta crocuta ultima* (Matsumoto))[64,96]

虎 (*Panthera* cf. *tigris* (Linnaeus))[64,96]

奇蹄类 (PERISSODACTYLA)

梅氏犀 (*Dicerorhinus* cf. *kirchbergensis* (Jäger))[96]

三門馬 (*Equus* cf. *sanmeniensis* Teilhard and Piveteau)[4)]

偶蹄类 (ARTIODACTYLA)

肿骨鹿 (*Megaceros pachyosteus* (Young))[119,96]

葛氏斑鹿 (*Pseudaxis grayi* Zdansky)[119]

鹿属(种名未定) (*Cervus* sp.)[66] (堆积的頂部)

(二) 第 4 层的化石动物羣

灰烬层,上文化层(A)——很厚的紅色、黃色和黑色的細土堆积,薄层的碳質灰烬及細土层。厚約 5.5 米[98,13]。

灵长类 (PRIMATES)

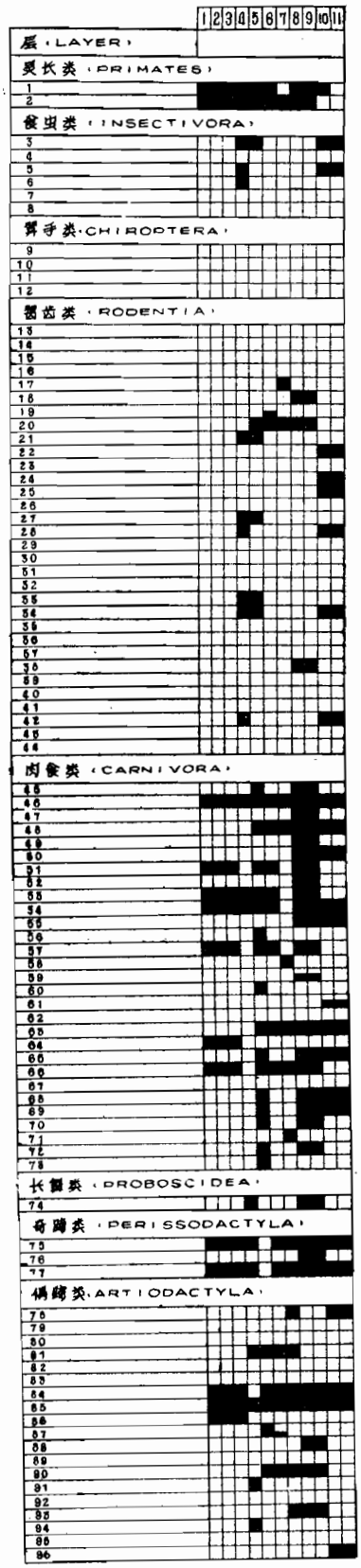
中国猿人 (*Homo erectus pekinensis* (Black))[13]

1) 由于早期发掘的化石缺少水平层位的記录,所以本文列出的化石目录很不完全,尤其是上部各层的。不过即便在北京也很难做到十分完全。(参考插图)

2) 参考文献 [98] 第 179—182 頁; [13] 第 17 頁。我們根据早期的著作按岩性的变化进行分层。在发掘工作沒有达到裂隙的最底部之前,我們仍旧采用由頂到底的层序,待以后达到洞底时再采用按照地层时代的新老由下而上的順序命名。

3) 根据賈兰坡未发表的記录。

4) 根据刘后一提供資料。



周口店第一地点哺乳类化石記录图
(化石編号,参看 212—215 頁)

The fossil record of Choukoutien, locality 1, (mammals) (Figures cf. pages 212—215).

碩獮猴 (*Macaca robustus* Young)[120]

食虫类 (INSECTIVORA)

原始麝鼩 (*Scaptochirus primitivus* Zdansky)[120]

步氏水鼩 (*Neomys bohlini* Young)[120]

麝鼩 (*Crocidura* sp.)[120]

嚙齿类 (RODENTIA)[120]

古倉鼠 (*Cricetinus varians* Zdansky)

黑鼠 (*Rattus rattus* (Linnaeus)

野原鼠 (*Gerbillus roborowskii* Büchner)

似兰氏小耳鼠 (*Microtus brandtioides* Young)

簡田鼠(鼱) (*Microtus epiratticeps* Young)

柯氏鼠兔 (*Ochotona koslowi* Büchner)

食肉类 (CARNIVORA)[64]

变种狼 (*Canis lupus variabilis* Pei)

柯氏西藏熊 (*Ursus thibetanus kokeni* Matthew and Granger)

棕熊(馬熊) (*Ursus arctos* Linnaeus)

长鼻类 (PROBOSCIDEA)

納瑪古稜象 (*Palaeoloxodon* cf. *namadicus* (Falconer and Cautley)[98,13]

奇蹄类 (PERISSODACTYLA)

梅氏犀 (*Dicerorhinus* cf. *kirchbergensis* (Jäger))[1)]

三門馬 (*Equus* cf. *sanmeniensis* Teilhard de Chardin and Piveteau)[2)]

偶蹄类 (ARTIODACTYLA)[13]

肿骨鹿 (*Megaceros pachyosteus* Young)

北京麝 (*Moschus moschiferus pekinensis* Young)

盘羊(种名未定) (*Ovis* sp.)

轉角牛(野牛)(种名未定) (*Bison* sp.)

(三) 第 5 层的化石动物羣

鈣乳石質壳层——部分角砾質的,含化石的黑色土薄层,厚約 0.4 米[13]。

灵长类 (PRIMATES)

中国猿人 (*Homo erectus pekinensis* (Black))[13]

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1) 标本水平层位号碼: 34:121, 第 5 水平层。

2) 根据刘后一提供資料。

硕獼猴（*Macaca robustus* Young）[120]

食虫类（INSECTIVORA）

原始麝鼩（*Scaptochirus primitivus* Zdansky）[120]

嚙齿类（RODENTIA）[120]

居氏大河狸（*Trogontherium cuvieri* Fischer v. Waldheim）

倉鼠（*Cricetinus varians* Zdansky）

黑鼠（*Rattus rattus*（Linnaeus））

似兰氏小耳鼠（*Microtus brandtioides* Young）

簡田鼠（亞）（*Microtus epiratticeps* Young）

食肉类（CARNIVORA）[64]

狼（*Canis lupus* Linnaeus）

变种狼（*Canis lupus variabilis* Pei）

中国狸（貉）（*Nyctereutes sinensis*（Schlosser））

狐（*Vulpes* cf. *corsac*（Linnaeus））

柯氏西藏熊（*Ursus thibetanus kokeni* Matthew and Granger）

棕熊（馬熊）（*Ursus arctos* Linnaeus）

？大猫熊（？ *Ailuropoda* sp.）

貛（*Meles* cf. *leucurus* Hodgeson）

黃鼬（*Mustela* cf. *sibirica* Pallas）

中国鬣狗（*Hyaena brevirostris sinensis* Owen）

剑齿虎（*Machairodus inexpectatus* Teilhard de Chardin）[13,64,90]

虎（*Panthera* cf. *tigris*（Linnaeus））

豹（*Panthera* cf. *pardus*（Linnaeus））

猫属（未定种甲）（*Felis* sp. A）

德氏狸（*Felis teilhardi* Pei）

野狸（*Felis* cf. *microtis* Milne Edwards）

猎豹（*Acinonyx* sp.）

偶蹄类（ARTIODACTYLA）[119]

北京麝（*Moschus moschiferus pekinensis* Young）

葛氏斑鹿（*Pseudaxis grayi* Zdansky）

肿骨鹿（*Megaceros pachyosteus*（Young））

羚羊（种名未定）（*Gazella* sp.）

盘羊（*Ovis* cf. *ammon*）

（四）第 6 层的化石动物羣

包括鴿子堂中文化层（B）的坚硬角砾岩层——含化石的坚硬角砾层，其上部为胶結很紧的鈣乳石层，厚約 8 米[98,13]。

灵长类 (PRIMATES)

中国猿人 (*Homo erectus pekinensis* (Black))[1)]

碩獼猴 (*Macaca robustus* Young)[120]

嚙齿类 (RODENTIA)[120]

河狸(种名未定,第 6 层?) (*Castor* sp.)

居氏大河狸 (*Trogontherium cuvieri* Fischer v. Waldheim)[120]

食肉类 (CARNIVORA)[64]

变种狼 (*Canis lupus variabilis* Pei)

中国狸(貉) (*Nyctereutes sinensis* (Schlosser))

狐 (*Vulpes* cf. *corsac* (Linnaeus))

柯氏西藏熊 (*Ursus thibetanus kokeni* Matthew and Granger)

棕熊(馬熊) (*Ursus arctos* Linnaeus)

獾 (*Meles* cf. *leucurus* Hodgeson)

中国鬣狗 (*Hyaena brevirostris sinensis* Owen)

虎 (*Panthera* cf. *tigris* (Linnaeus))

奇蹄类 (PERISSODACTYLA)

梅氏犀 (*Dicerorhinus* cf. *kirchbergensis* (Jäger))[2)]

三門馬 (*Equus* cf. *sanmeniensis* Teilhard and Piveteau)[3)]

偶蹄类 (ARTIODACTYLA)[119]

北京麝 (*Moschus moschiferus pekinensis* Young)

葛氏斑鹿 (*Pseudaxis grayi* Zdansky)

肿骨鹿 (*Megaceros pachyosteus* Young)

羚羊(种名未定,第 6 层?) (*Gazella* sp.)

盘羊 (*Ovis* cf. *ammon* Linnaeus)

(五) 第 7 层的化石动物羣

砂层(深灰色的松散砂质物,含有零块的石灰岩块,厚約 6.5 米[98,13]。

灵长类 (PRIMATES)

碩獼猴 (*Macaca robustus* Young)[120]

嚙齿类 (RODENTIA)

复齿鼯獼 (*Marmota complicidens* (Young))[120]

1) 賈兰坡未发表的資料。

2) 标本号碼, 36:11:K—3, 第 18 水平层。

3) 刘后一同志提供資料。

居氏大河狸 (*Trogontherium cuvieri* Fischer v. Waldheim)[120]

食肉类 (CARNIVORA)[64]

变种狼 (*Canis lupus variabilis* Pei)

中国狸(貉) (*Nyctereutes sinensis* (Schlosser))

水獭 (*Lutra melina* Pei)

中国鬣狗 (*Hyaena brevirostris sinensis* Owen)

虎 (*Panthera* cf. *tigris* (Linnaeus))

猫属(未定种乙) (*Felis* sp. B)

奇蹄类 (PERISSODACTYLA)

梅氏犀 (*Dicerorhinus* cf. *kirchbergensis* (Jäger))[1)]

三門馬 (*Equus* cf. *sanmeniensis* Teilhard and Piveteau)[2)]

偶蹄类 (ARTIODACTYLA)[119]

李氏野猪 (*Sus lydekkeri* Zdansky)

北京麝 (*Moschus moschiferus pekinensis* Young)

葛氏斑鹿 (*Pseudaxis grayi* Zdansky)

肿骨鹿 (*Megaceros pachyosteus* (Young))

盘羊 (*Ovis* cf. *ammon* Linnaeus)

德氏水牛 (*Bubalus teilhardi* Young)

(六) 第 8—9 层的化石动物羣

包括下文化层(C)?的中部角砾岩层及灰烬层——食肉类层，为一层不規則的角砾质层，厚約 6.5 米[98,13]。

灵长类 (PRIMATES)

中国猿人 (*Homo erectus pekinensis* (Black))[13,64]

碩獼猴 (*Macaca robustus* Young)[120]

嚙齿类 (RODENTIA)[13]

居氏大河狸 (*Trogontherium cuvieri* Fischer v. Waldheim)

旱獭(种名未定) (*Marmota* sp.)

豪猪(箭猪) (*Hystrix* cf. *subcristata* Swinhoe)

食肉类 (CARNIVORA)[64]

狼 (*Canis lupus* Linnaeus)

变种狼 (*Canis lupus variabilis* Pei)

1) 标本号碼，Loc. 1. 36:8:0—2。

2) 刘后一提供資料。

豺狼 (*Canis cyonides* Pei)

豺狗 (*Cuon antiquus* Matthew and Granger)[1)]

赤狐 (*Vulpes* cf. *vulpes* (Linnaeus))

狐 (*Vulpes* cf. *corsac* (Linnaeus))

中国狸(貉) (*Nyctereutes sinensis* (Schlosser))

犬科(种、属名未定) (Canidae gen. et. sp. indet.)

柯氏西藏熊 (*Ursus thibetanus kokeni* Matthew and Granger)

棕熊(馬熊) (*Ursus arctos* Linnaeus)

洞熊 (*Ursus* cf. *spelaeus* Rosenmüller)

獾 (*Meles* cf. *leucurus* Hodgeson)

狼獾(貂熊) (*Gulo* sp.) (第 8—9 层?)

中国鬣狗 (*Hyaena brevirostris sinensis* Owen)

剑齿虎 (*Machairodus inexpectatus* Teilhard de Chardin)[13,90]

虎 (*Panthera* cf. *tigris* (Linnaeus))

豹 (*Panthera* cf. *pardus* (Linnaeus))

猫属(未定种甲) (*Felis* sp. A)

德氏狸 (*Felis teilhardi* Pei)

野狸 (*Felis* cf. *microtus* Milne Edwards)

长鼻类 (PROBOSCIDEA)

納瑪古稜象 (*Palaeoloxodon* cf. *namadicus* (Falconer and Cautley)[2)]

奇蹄类 (PERISSODACTYLA)

梅氏犀 (*Dicerorhinus* cf. *kirchbergensis* (Jäger))[3)]

披毛犀 (*Coelodonta* sp.)[4)]

三門馬 (*Equus* cf. *sanmeniensis* Teilhard and Piveteau)[5)]

偶蹄类 (ARTIODACTYLA)

葛氏斑鹿 (*Pseudaxis grayi* Zdansky)[119]

肿骨鹿 (*Megaceros pachyosteus* (Young))[119]

盘羊 (*Ovis* cf. *ammon* Linnaeus)[6)]

裴氏轉角羚羊 (*Spirocerus peii* Young)[7)]

德氏水牛 (*Bubalus teilhardi* Young)[8)]

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1) 标本編号, Loc. 1. 36:100:D—4。
2) 标本編号, Loc. 1. 36:61:K—2。
3) 賈兰坡,未发表記录。
4) 标本編号, Loc. 1. 36:57:B—4, 第 21 水平层; Loc. 1. 37:107:E—0, 第 26 水平层。
5) 刘后一同志提供資料。
6) 賈兰坡,未发表記录。
7) 同上。
8) 标本編号, Loc. 1. 36:77:A—5, 第 22 水平层。

（七）第 10—11 层的化石动物羣

紅色的細土层——浅紅色的土层含有經过強烈风化了的石灰岩块及多层的灰烬层，厚度約 2 米。下角砾岩层——(含化石的淡紅色角砾岩层，厚約 2—4 米)[1]。

灵长类 (PRIMATES)

中国猿人 (*Homo erectus pekinensis* (Black))[13,117]

食虫类 (INSECTIVORA)

原始麝鼩 (*Scaptochirus primitivus* Zdansky)[15,16]

步氏水鼩 (*Neomys bohlini* Young)[15,16]

嚙齿类 (RODENTIA)[15,16]

倉鼠 (*Cricetulus* cf. *griseus* Milne Edwards)

小鼠 (*Mus sylvaticus* Linnaeus)

卞氏鼠 (*Mus musculus bieni* Young)

野原鼠 (*Gerbillus roborowskii* Büchner)

簡田鼠(鼢) (*Microtus epiratticeps* Young)

柯氏鼠兔 (*Ochotona koslowi* Büchner)

食肉类 (CARNIVORA)[15,16]

变种狼 (*Canis lupus variabilis* Pei)

赤狐 (*Vulpes* cf. *vulpes* (Linnaeus))

中国狸(貉) (*Nyctereutes sinensis* (Schlosser))

棕熊(馬熊) (*Ursus arctos* Linnaeus)[2]

洞熊 (*Ursus* cf. *spelaeus* Rosenmuller)

中国鬣狗 (*Hyaena brevirostris sinensis* Owen)

剑齿虎 (*Machairodus inexpectatus* Teilhard de Chardin)[13,66,90]

豹 (*Panthera* cf. *pardus* (Linnaeus))[3]

德氏狸 (*Felis teilhardi* Pei)

黃鼬 (*Mustela nivalis* (Linnaeus))

奇蹄类 (PERISSODACTYLA)[15,16]

梅氏犀 (*Dicerorhinus* cf. *kirchbergensis* (Jäger))

三門馬 (*Equus* cf. *sanmeniensis* Teilhard and Piveteau)

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1) 参考文献 [98] 第 181—182 頁；[13] 第 18 頁，这两层的化石种中有少数是采自 8—9 层的底部，其它的出自第 11 层的底部。依参考文献 [15] 第 30—31 頁及 [16] 第 97—99 頁。

2) 标本編号，Loc. 1.37:108:F—0。

3) 水平层第 28 层。

偶蹄类 (ARTIODACTYLA)

李氏野猪 (*Sus lydekkeri* Zdansky)

葛氏斑鹿 (*Pseudaxis grayi* Zdansky)

肿骨鹿 (*Megaceros pachyosteus* (Young))

牛科(种、属名未定) Bovidae gen. et sp. indet.

(八) 第 12 层及第 13 层的化石动物羣

包括底砾石层(1958 年发掘),未发表[17]。

二、周口店第一地点的时代

(一) 动物羣中"进步的"成分

在周口店第一地点动物羣目录中有棕熊(馬熊)(*Ursus arctos* L.)和洞熊(*Ursus* cf. *spelaeus*),依照柯登[45]的意見,这两种熊"一起存在于同一个地区"其最早的时代可能是赫尔斯坦間冰期。

根据現有的材料[1],在周口店洞熊仅有采自下层的化石記录。同样的,在英国的康特(Kent)洞熊(*Ursus spelaeus* R. and H.)也是被发現保存在斯万斯孔(Swanscombe)的下层[早赫尔斯坦間冰期 = 早霍克斯尼期(early Hoxnian)],至于棕熊(*Ursus arctos* L.)則仅在霍克斯尼相当晚期的埃色克斯(Essex)的灰砖土层(Grays brick-earth)里才有。在伊密安(Eemian)[埃林斯多夫(Ehringsdorf)]和陶巴赫(Taubach)也有类似的情况[75,36]。有洞熊型的熊类存在,总是可以說明这一地区邻近冰川[相当于赫彭洛(Heppenloch) = 阿尔卑斯相的明德—里斯間冰期的晚期]。周口店第一地点有"洞熊型"的熊类(比較进步的或者似 *deningeri* 型的棕熊 (*Ursus arctos* L.)[2],均說明第一地点堆积的时代当属于明德冰期/艾尔斯特冰期或明德/艾尔斯特冰期的后期[39],而不是克罗默尔期。

周口店第一地点动物羣中的最晚斑鬣狗 (*Crocuta crocuta ultima* (Matsumoto)) 和中国猿人 (*Homo erectus pekinensis* (Black)) 一起保存在第 1—3 层中,也排斥了时代为克罗默尔期的可能性。一般認为在整个旧北区內 *Hyaena brevirostris* ssp. 被斑鬣狗 (*Crocuta crocuta* ssp.) 所替代的生态上的替換时期大致是同时发生的,而在欧洲克罗默尔期并沒有发現过洞穴鬣狗 (*Crocuta crocuta spelaea*)。无論在毛尔 (Mauer) 或者慕斯巴赫 (Mosbach) 的晚克罗默尔期/早明德冰期,都沒有斑鬣狗 (*Crocuta*) 的化石記录,因此被認为时代相同的諾佛克 (Norfolk) 化石产地与克罗默尔森林层 (Cromer Forest bed),是否确实时代相同,还是成問題的[29]。

第一地点的犀类化石曾經被描述为一个新种(*Dicerorhinus choukoutiensis* Wang)[107],不过周口店犀类的系統分类和演化問題迄今尚未得到解决。周口店的双角犀类 (*Dicero-*

1) 参考文献 [64] 第 63 頁; [15] 第 31 頁; [16] 第 97—99 頁, 周口店第 27—29 水平层中洞熊 (*Ursus* cf. *spelaeus*) 的新記录还待証实,因为报导的文章中未附标本的描述、測量及图版等。

2) 参考文献 [45] 第 97 頁,柯登将 (*Ursus deningeri* v. Reichenau) 划分为棕熊(*Ursus arctos* Linnaeus)的一个亚种。

rhinus）可能是和梅氏犀（*Dicerorhinus kirchbergensis*（Jäger））很相近的种[13]。除了双角犀类之外，第 8—9 层中还有披毛犀的化石，其下牙的牙冠很高[1]，具有这一属的典型特征。不过周口店的"披毛犀"（*Coelodonta* sp.）和"欧亚大陆"典型的"披毛犀"（*Coelodonta antiquitatis* Blumenbach）并不完全相同，有可能是泥河湾、临潞[23]、青海共和等地"披毛犀化石羣"（*Coelodonta* group）的后一时期的代表。在西欧，"披毛犀化石羣"中的典型种（*Coelodonta antiquitatis* Blumen.）化石記录的最早的时代始于里斯冰期/薩勒冰期（Riss/Saale）的早期，相当于德意志联邦共和国斯特因汗姆（Steinheim a. d. Murr）的猛獁象砾石层（*trogontherii-primigenius* gravels）。周口店犀类化石的重新研究，将为"中国猿人化石堆积"的大陆之間层位对比方面提供重要的資料。

周口店的大角鹿——正如过去已經提到的[39]——是一种高度特化了的类型，在斯特因汗姆（赫尔斯坦間冰期）的古象（*antiquus*-）砾石层中有一类与之很相近的西方枝系。周口店无論在时代比較早些、相当于第一地点下层的第十三地点[39]，或者第一地点已然发掘出露的最下层中，都发现有另一个类型的大角鹿，也即是由肿骨鹿（*Megaceros pachyosteus* Young）中另行分出来的扁角大角鹿（*Megaceros flabellatus*（Teilhard））[17]，但是楊鍾健[119]、卡尔克和胡长康[39,37]均曾先后指出过，后者实包括在肿骨鹿（*Megaceros pachyosteus* Young）的变异范围之內。根据現有关于旧北区大角鹿的了解，就周口店大角鹿的特化程度看来，周口店地层堆积的时代也不可能是克罗默尔期。

长鼻类（Proboscidea）仅有少数的化石碎片，过去将其鑑定为納瑪古稜象（*Palaeoloxodon* cf. *namadicus*（Falconer and Cautley）但是由于資料太少，不可能作更多的比較。

（二）动物羣中"古老的"成分

"古老的"动物"属"和"种"，在欧亚大陆北部（旧北区）的絕灭期，一般比在南方早乃是公認的事实。实际上大陆的南部，可以看做"古老动物"的"避难所"，这里甚至能找到自蓬蒂期（Pontian）殘存至今的动物种。如果我們把周口店第一地点动物羣，作为一个整体来和华南的剑齿象-大猫熊动物羣（*Stegodon-Ailuropoda*-Complex）[2] 相比較，就能发現在周口店动物羣里和华南的情况相反，仅有少数具有"古老"特征的种。

居氏大河狸（*Trogontherium cuvieri* Fischer v. Waldheim）。在第一地点的化石記录是采自下、中层（9—5 层）。在欧洲，居氏大河狸是和早霍克斯尼期（＝赫尔斯坦間冰期）动物羣生活在一起的，这一动物羣中包括有猛獁象（*Mammonteus trogontherii*）、古稜象（*Palaeoloxodon antiquus*）、原始牛（*Bos primigensis*）、梅氏犀（*Dicerorhinus kirchbergensis*）和黃鹿（*Dama clactoniana*）等动物[60]。依照我們的比較，斯万斯孔的下砾石层和周口店第一地点的下层是时代相同的。

中国鬣狗（*Hyaena brevirostris sinensis* Owen）也是采自周口店第一地点的下、中层（11—5 层）。在較上层（3—1 层），中国鬣狗即为最后斑鬣狗（*Crocuta crocuta ultima*

1）周口店第一地点的披毛犀（*Coelodonta* sp.）化石比較少，根据采自第 8—9 层的一块下頜骨的观察，其特征与参考文献 [13] 第 38 頁所述相同。

2）H. D. 卡尔克，1961 古脊椎动物与古人类 1961 (2) 83—108。

(Matsumoto)) 所代替。短吻鬣狗 (*Hyaena brevirostris* Aymard) 在欧洲时代最晚的化石記录是早期明德/艾尔斯特冰期 (Mindel/Elster)。

剑齿虎 (*Machairodus inexpectatus* Teilhard)。第一地点的第 11、8—9 和第 5 层中均有剑齿虎的記录。欧洲剑齿虎化石的已知最晚的記录是出自斯特因汗姆的古象(*antiquus*)和猛犸象 (*primigenius*) 砾石层的过渡层 (赫尔斯坦間冰期的晚期—里斯/薩勒冰期的早期)[6]。

第一地点的猞猁 (林猄) 型的德氏狸 (*Felis teilhardi* Pei)[64,43] 具有很高度的变异性;既有"原始型"的也有"进步型"的[表現在第一下臼齿 (M_1) 的特征上]。

总起来說,从化石动物羣的性質上看,周口店中国猿人化石产地的时代不可能属于克罗默尔期[1]。实际上和欧洲的情况比較起来,第一地点的下层和中层內只有两种"老資格"("oldtimers") 的大型哺乳动物,即 (*brevirostris* 羣的一种鬣狗和 *issiodorensis–teilhardi* 羣的一种猞猁型的猫类)。欧洲的化石鬣狗和猞猁,誠然在赫尔斯坦間冰期的早期地层中就已經見不到了,但是我們并不清楚,这些动物在旧北区的西部究竟延續到什么时候为止。*issiodorensis–teilhardi* 羣的猞猁在欧洲已知时代最晚的化石記录是出自慕斯巴赫的中部砂层[74,104]。(克罗默尔期的最晚期及明德冰期的早期),短吻鬣狗 *Hyaena brevirostris* Aymard 的最晚的化石記录大致与猞猁的时代相同 (Süssenborn) 或者稍晚一些 (明德/艾尔斯特冰期的早期)。

(三) 周口店第一地点:冰期抑或間冰期?

周口店第一地点这一著名化石产地,自 1921 年被发現以来,关于动物羣具有比現代气候还要温和一些的"温带性質",是沒有疑义的[13]。不过第一地点,是否与被訊为和它时代相同的毛尔 (Mauer) 沙层确属同一时代还有問題。由以上对动物羣的論証看来,时代終归不可能是克罗默尔期。

1. 动物羣中北方的("冰期的")成分 周口店第一地点的化石旱獭类,一种經楊鍾健教授描述为新种复齿旱獭 (*Marmota complicidens* Young),其它的标本最初被鑑定为大型的西藏旱獭 (*Marmota robustus* Milne Edwards),后来德日进和裴文中提出修訂的意見,訊为从地理分布的因素来考虑,后者更有可能属于蒙古旱獭(*Marmota bobak*(Radde))。

第一地点有狼獾(貂熊)(*Gulo* sp.) 的化石記录,大概是采自"食肉类化石层"(第8—9层)。不过材料很少,在数百件其它的食肉类化石之中,只有一件狼獾的标本被发現。

洞熊型的熊类 (*Ursus* cf. *spelaeus* Rosenmüler and Heinorth) 与棕熊 (馬熊) 同时并存在一起,一般似乎可以說明是"邻近"冰期的时代的証据 [相当德意志联邦共和国赫彭洛克洞穴动物羣 (Heppenloch-Cave)]。不过在斯特因汗姆的間冰期动物羣里和斯万斯孔的下砾石层中都只发現有洞熊 (*Ursus spelaeus*) 的化石。

正如前面已經談到过的,周口店中更新世的"披毛犀"(*Coelodonta* sp.) 可能是泥河湾

1) 与莫維士 (Movius, H. L., 1944), 第 1—125 頁意見相同(另一方面的意見,見裴文中, 1957, 第 13 頁; 黃万波, 1960a, 第 45—46 頁; 1960b, 第 47—48 頁), 在上述的文章中, 黃万波提出周口店第一地点的堆积的时代, 由早更新世 (=維拉方期) 起 (底砾石层及同层的紅色粘土层和糙砂层) 直到中更新世的晚期止 (IV—VI层 = 过去文献中划分的第 7—1 层)。但他并未解释这种說法如何与化石方面的資料相符合。

——青海羣[1] 的后一期的代表，这一类羣甚至在华北与华南剑齿象-大猫熊动物羣的中間过渡带的动物羣也有过发現[31,32]。

第一地点的"披毛犀"化石比較少，而且根据我們現在的了解，披毛犀也并不是十分严寒气候的"代表者"，与欧洲 *Coelodonta antiquitatis* (Blumenbach) 的情况相似。

第一地点有羊牛类(Ovibovinae)的化石記录(种、属未定)，但层位不詳[119]。羊牛类在欧洲确实是冰期堆积中的代表性化石，在中亚地区时代分布相当老[2]，不过周口店的羊牛类，由于沒有作到"种"的深入細致鑑定，自然也就不可能对这类动物当时所生存的气候条件，作任何的判断。泥河湾的三門系堆积和山西榆社系中都有过羊牛亚科(Ovibovinae)的化石記录。这类动物化石除在周口店第九地点，有一个中更新世的种[中国羊牛(*Boopsis sinensis* Teilhard de Chardin)[85]] 被描述过以外，在中国及蒙古人民共和国的更新世地层里尚未曾有过其它的发現[85]。

2. 动物羣中南方的("間冰期的")成分　豪猪(箭猪)(*Hystrix* cf. *subcristata* Swinhoe)——豪猪是在华南与周口店第一地点时代相同的剑齿象-大猫熊动物羣里的常見种。第一地点第 8—9 层中有这种动物化石的存在，也否定了当时气候条件比現代寒冷的說法。

柯氏西藏熊 (*Ursus thibetanus kokeni* Matthew and Granger) (同物异名：师氏熊 (*Ursus zdansky* Pei)——在第一地点好几个层里都有記录，它也是华南剑齿象-大猫熊动物羣組中的典型代表种。

大猫熊 (*Ailuropoda* sp.)——自然是华南剑齿象-大猫熊动物羣組中的常見种。第一地点的大猫熊 (? *Ailuropoda* sp.) 化石記录虽不能肯定，但是既然有水牛 (*Bubalus*) 和豪猪(箭猪) (*Hystrix*) 一同存在，大猫熊也就未尝沒有可能，成功地輻射到周口店地区。

納瑪古稜象 (*Palaeoloxodon* cf. *namadicus*) 和梅氏犀 (*Dicerorhinus* cf. *kirchbergensis* (Jäger))——古稜象化石羣 (*Palaeoloxodon*-group) 是整个旧北区内典型的間冰期动物。納瑪古稜象也是剑齿象-大猫熊动物羣組里的常見种，經常是和双角犀化石羣 (*Dicerorhinus*-group) 的犀牛保存在一起。后者在周口店第一地点被发現的标本很丰富。

德氏水牛 (*Bubalus teilhardi* Young)——水牛化石羣 (*Bubalus*-group) 是南方特有的动物，也是剑齿象-大猫熊动物羣組里的习見种。在旧北区的西部[斯特因汗姆和舍內貝克 (Schönerbeck)[3]] 的赫尔斯坦間冰期动物羣中也特别多。根据楊鍾健"第一地点的偶蹄类化石"一书的記載，周口店动物羣中沒有属于旧北区的另一个"典型的""間冰期的"牛类(原始牛 (*Bos primigenius* Bojanus))[119]。

(四) 周口店第一地点：动物羣是連續的抑或是間断的？

經过对各层內的化石的比較之后，我們覚得在連續的化石記录中不存在任何眞实的"間断"，在动物羣的組成方面也是一致的。至于上层的化石記录較少的原因，一方面是由

1) Teilhard de Chardin, P. et Piveteau, J., 1930, 第 17 頁。参考文献 [23] 第 89—97 頁。

2) Teilhard de Chardin, P. et Piveteau, J., 1930, p. 76.

3) 斯特因汗姆和舍內貝克的水牛化石与亚洲的水牛很近似(参考文献 [80] 第 70 頁)。在意大利也还有一些水牛化石，不过化石不是沒有确实的化石地点記录，就是化石的时代不能肯定。

于早期的发掘物缺少詳細的登記，另一方面也因为坚硬的角砾岩层彼此牢固的粘在一起，导致細小的哺乳类化石的缺失。

洞熊（*Ursus* cf. *spelaeus*） 第一地点的洞熊仅限于下层（第 8—11 层?）（但同时也有棕熊存在），似乎可以說明在相隔不太早的前一个时期为"寒冷时期"（多雨的时期），这一点由第一地点的底砾石层的存在以及狼獾（*Gulo* sp.）仅发現于下层（可能是 8/9 层）；即使标本的层位是不确定的，也都可以証明。 第一地点的羊牛类（Ovibovinae）仅由两段掌骨的远端部分所代表，肯定属于周口店第九地点的中国羊牛（*Boopsis sinensis* Teilhard de Chardin[85]）而不属于麝牛（*Ovibos*）。

在保存以上这些为数甚少的"北方的"（"大陆性的"）动物化石的层位里，我們同样也能发現不少"南方的"类型，例如豪猪（*Hystrix* cf. *subcristata* Swinhoe），納瑪古稜象（*Palaeoloxodon* cf. *namadicus*（Falconer and Cautley）），梅氏犀（*Dicerohonus* cf. *kirchbergensis*（Jäger））和德氏水牛（*Bubalus teilhardi* Young）等。 这一事实說明由第一点的下层到中部各层之間，存在一个緩慢的过渡时期，也就是說，由保存在第一地点下层（底砾石层以上）中的、时代属于冰期晚期/間冰期早期（洪积期晚期/間洪积期早期），成分中包含有"先驅性的"間冰期类型的动物羣，緩慢地过渡到保存在中部各层的"眞正的"間冰期（"間洪积期"）的动物羣。

在第一地点的上层（3—1 层）出現了两种新的成分（?），即最晚斑鬣狗（*Crocuta crocuta ultima*）和一种种名未定的鹿（*Cervus* sp.），不过我們只訊为最晚斑鬣狗代替了中国鬣狗（*Hyaena brevirostris sinensis*）是一种新的成分出現，至于未定种名的鹿类（*Cervus* sp.）則不能算作是新成分，因为这种所謂的新成分在整个堆积里，始終都和另一种大型的鹿类保存在一起[1]。

（五）第一地点下层的地层观察

根据賈兰坡（1959）的簡报及黃万波（1960）的报导，第一地点堆积物已經出露的最下层，即尚未接触到裂隙底的第 13 层，是由一小层砾石及砾岩（底砾石层）、紅粘土和粗砂层所組成[2]。上述这些底部的砾石显然是由洞穴或者裂隙[3]之外經水力的搬运进入洞內的。从第一地点中段西南角的一个小探井里，可以观察到保存在粗糙沉积物中的大块砾石的数量以及层的厚度，都是由北向南递增的，这証明砾石被搬运所經过的道路主要是沿着裂隙的这一部分。

下层就其目前所显示出的性質来看，代表由一个水的侵蝕和搬运作用很強（底砾石层）的时期，紧接着就轉向一个初期仍然比較湿潤（13—12 层）而后来愈見干燥（11—3 层）和温暖的时期，同时这一过程还被下层的一些薄的风化面及两个中間性的湿潤期（第 10 层和 7 层）所間隔。根据賈兰坡（1959）的剖面图及我們的观察（1960 年的发掘）整个第一地点的堆积是連續的，中間沒有"不整合"的現象。关于紅粘土和粗砂层中的底砾石层的性質，正如德日进对西山地区的地文方面特征的观察所指出的[92,93]；即是說，在山谷的深处，通常总是并存着类型上截然不同的两类阶地：时代老的"紅色系統"（"red system"）和

1）参考文献 [66] 第 227 頁，未定种名的麂角虽因标本破碎不能作"种"的鑒定，但仍能見到在其主枝和眉枝之間有一小附属枝与葛氏斑鹿的（*Pseudaxis grayi* Zdansky）相似。
2）等于黃万波（1960）所划定的第 I 层，参考文献 [33] 第 45 頁。
3）中国猿人在第一地点居住的时期，該处为洞穴裂隙地区。

时代新的"灰色系統"("gray system")。在西山有几个地点，保存有由圓形的，部分胶結的砾石和巨砾(boulders)所組成的、时代較老的紅色系統阶地和扇形地，其厚度可以达到25—30米[93]。

德日进曾經提出：中国猿人化石层(*Sinanthropus*-beds)相当于"上三門期"的"老紅色系統"。根据目前的观察，我們認为紅色系統(紅色阶地、巨砾石扇形地和紅色坡积粘土)并不相当于广义的中国猿人化石层，而是相当于第一地点的"底部系統"(Basal system)(＝底砾石层和第13—12层)。第一地点的底砾石层相当于巨砾石扇形堆积[93]，而13—12层則等于狹义的紅色阶地系統。

北京西山地区的紅色系統过去被認为可以和山西高原的"紅色土扇形地"相比，或者換句話說相当于"上三門期"的山西"丁氏鼢鼠层"("*Siphneus tingi*-beds")[1]。这样对比的看法似乎可以用由周口店第十三地点发現"大丁氏鼢鼠"(*Myospalax epitingi* (Teilhard de Chardin and Pei)来証实，因为从化石方面来看，"大丁氏鼢鼠"(*M. epitingi*)是与丁氏鼢鼠很接近的类型，所区别的只是前者的体形較大和头骨上的稜脊更为显著一些[2]。而第十三地点无論就古生物方面[37]或者地层方面[13]来看，都相当于第一地点的下层。

既然山西和陝西含丁氏鼢鼠(*M. tingi*)的紅色或者浅紅色土扇形地(即德日进和楊鍾健所划分的紅色土"B"带)属于"上三門期"[96,92]，同时根据古生物学的証据，三門期相当于欧洲中更新世的早期(～ Altpleistozan)[57,24,39]，那末周口店第一地点第12层(＝下砾石层)以上的堆积物的时代就不是"上三門期"而是三門期以后的堆积，也就是說属于中更新世，相当于欧洲地层的赫尔斯坦間冰期。

这一时代的确定，与过去从对比更新世中期，旧北区内东方和西方的化石动物羣所得到的結論也是一致的。

在北京西山地区是否有过眞正的冰川活动，虽然尚待进一步的証实，但是我們完全同意这里曾有过与欧洲、中亚和北美更新世的冰川活动相当的"亚冰川"("sub-glacial")或者"洪积期"("pluvial")的意見[92]。現在通过对华北的动物羣的系統分析，使我們愈来愈清楚地認識到，在华北更新世中期及晚期曾发生过气候变化的这一事实。同时也說明，包含着不少中国-馬来亚动物成分的"周口店式"的动物羣，是不可能生存在具有与現代气候条件相似的，即是說季节性变化影响很大的，大陆性气候的西山地区。

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1) *Siphneus* Brants 1827 = *Myospalax* Laxmann 1769.

2) 参考文献[97]第57頁，大丁氏鼢鼠是一个成年的个体，而丁氏鼢鼠可能是前者尚未完全发育的未成年的个体。

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A SUMMARY OF STRATIGRAPHICAL AND PALEONTOLOGICAL OBSERVATIONS IN THE LOWER LAYERS OF CHOUKOUTIEN, LOCALITY 1, AND ON THE CHRONOLOGICAL POSITION OF THE SITE

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(Summary)

In giving a summary of early and middle Pleistocene Cervidae of Europe and Asia (Kahlke and Hu, 1957), we came to the conclusion to correlate (on paleontological evidence) the Choukoutien deposits of locality 1, Sinanthropus-Site, with the closing phases of the second glacial or the early phases of the European Holsteinian (=late Mindel or early Mindel/Riss of Alpine stratigraphy). Nevertheless we pointed out, that the mammalian fauna of locality 1 faunistically already belongs to the palaearctic block of the "Great Interglacial" (=Holsteinian) s. l.

Pei, W. C. and Kurtén, B.——only refer to the most recent studies to this time[1]——suggested an early middle Pleistocene correlation (Cromerian of European stratigraphy), but later on, however, Kurtén, on the evidence of the results of pollen-analysis as carried out by Y. Vasary, suggested a correlation of Choukoutien (locality 1) with the Mindel II/Elster of European stratigraphy[2]. This date (Mindel II/Elster=maximum of the second glacial-complex of Europe) will be discussed in this paper[3].

A. FOSSIL FAUNA OF CHOUKOUTIEN, LOCALITY 1 (VERTEBRATA)[4]

(IN CHINESE TEXT P. 212—215)

The mammalian remains from Choukoutien, locality 1, never have been compared layer by layer and there are no published lists of the fossils of the different layers. Today it is very difficult to give complete lists because the materials of the earlier excavations are not always recorded with definite level. It may be one of the points in the programme of the current excavations to complete

1) The correlation by Huang, W. P., 1960 a—c: Basal gravels = early Pleistocene (= Villafranchian) seems to be very doubtful. Because there is no fossil record; there is no proof.

2) "My opinion is now that this replacement" (*Hyaena brevirostris* by *Crocuta crocuta*, the writer) "probably took place in Elster II (for a synthetic....), and thus the discrepancy between the two datings is largely abolished" (Kurtén, B., 1959b, p. 174).

"The Mindel date suggested for Choukoutien appears now to be supported by results of pollen analyses being carried out at present by Mr. Y. Vasary and suggesting a definitely cooler climate than the recent" (Kurtén, B., 1960, p. 19).

3) A late Mindel date was already suggested by Black, D., Teilhard de Chardin, P., Young, C. C. and Pei, W. C., 1933, p. 59, and further by Kahlke, H. D. and Hu, C. K., 1957, p. 279 (late phases of the Mindel glacial).

4) According to the first-hand publications and the fossil materials available in Peking and Choukoutien (Amphibia, Reptilia and Aves excluded).

the given lists here in publishing the new materials——aside the systematical description——layer by layer and to give the percentage of the different species of each layer to allow ecological comparisions as well.

FAUNA-LISTS OF THE DIFFERENT LAYERS OF CHOUKOUTIEN, LOCALITY 1 (VERTEBRATA)[1]

I. Fossil fauna of the layers 1—3 (cf. p. 216) Upper breccia and upper travertine——A coarse breccia associated with several layers of well bedded undisturbed sandy travertine, including in the lower part layer 3——an irregular brecciated zone with huge limestone blocks[2], ca. 7.5 m.

II. Fossil fauna of layer 4 (cf. p. 216—218) Ash layer, Upper Cultural Zone (A)——A thick accumulation of red, yellow and black, thinly laminated carbonaceous ash and clay, ca. 5.5 m.

III. Fossil fauna of layer 5 (cf. p. 218—219) Stalacmitic crust layer——A thin zone of partly brecciated, black fossiliferous clay, ca. 0.4 m.

IV. Fossil fauna of layer 6 (cf. p. 219—220) Hard breccia layer with the Middle Cultural Zone (B), Kotzedang——A fossiliferous hard breccia forming in its upper part a strongly consolidated stalacmitic floor, ca. 8 m.

V. Fossil fauna of layer 7 (cf. p. 220—221) Sand layer——A dark gray, loose, sandy material, containing isolated limestone blocks, ca. 6.5 m.

VI. Fossil fauna of layers 8—9 (cf. p. 221—222) Middle breccia with ash layers including a Lower Cultural Zone (C)?——Carnivora layer, an irregulary brecciated zone, ca. 6.5 m.

VII. Fossil fauna of layers 10—11 (cf. p. 223—224) Red clay layer——Reddish clay with strongly weathered limestones, including some ash layers, ca. 2 m, and layer 11 (upper level), Lower breccia——A fossiliferous reddish breccia, ca. 2—4 m.

VIII. Fossil fauna of layers 12 and 13 including basal gravels (excavations in 1958), not published.

B. CHRONOLOGICAL POSITION OF CHOUKOUTIEN, LOCALITY 1

1) Progressive elements of the fauna In the faunal list of locality 1, we find *Ursus arctos* and *Ursus* cf. *spelaeus*. According to Kurtén, the Holsteinian seems to be the earliest date at which we find the two species in Europe "associated in one and the same region".

In Choukoutien, *Ursus* cf. *spelaeus* is, according to the present materials, recorded only from the lower layers, a fact, that recalls the statement, that *Ursus spelaeus* is found in the lower horizons of Swanscombe, Kent (early Holsteinian=early Hoxnian), whilst *Ursus arctos* only is present in the Gray brick-earth, Essex, dating relative late within the Hoxnian. An analogous statement is known from the Eemian (Ehringsdorf and Taubach, Germany). The presence of a type of cave-

1) The lists, especially those of the upper layers, are incomplete due to the missing records of levels of the earlier excavations. Even in Peking it was not possible to reach completness (cf. Text figure on page 217).

2) Teilhard de Chardin, P. and Young, C. C., 1929, p. 179—182. Black, D., Teilhard de Chardin, P., Young, C. C. and Pei, W. C., 1933, p. 17.——In counting the different layers indicated by changing lithological characters of the sediments we follow the earlier publications. Until the excavations have not reached the very bottom of the cave (fissure), we prefer to count from top to bottom. Afterwards the numbers of the layers may be reorganized according to the geological age, beginning at the base.

bear always seems to indicate the vicinity of a glacial in these regions (cf. Heppenloch=late Mindel/Riss interglacial, alpine facies). Nevertheless, the presence of a cave-bear type (or a progressive *deningeri*-type, or a progressive *deningeri*-like *Ursus arctos*, cf. B. Kurtén, 1959, p. 94) in Choukoutien, locality 1, indicates a Mindel/Elster or post Mindel/Elster date for the deposit, a Cromerian s. str. is excluded.

The presence of *Crocuta crocuta ultima* (Matsumoto) in the fauna of locality 1, layer 1—3 [associated with *Homo erectus pekinensis* (Black)] excludes a Cromerian date s. str. too. The ecological replacement of *Hyaena brevirostris* ssp. by *Crocuta crocuta* ssp. was suggested to be roughly contemporaneous in the palaearctic region s. l., but there is no evidence in Europe of *Crocuta crocuta spelaea* in the Cromerian. Neither at Mauer nor at Mosbach (late Cromerian/early Mindel) *Crocuta* is on record and there is a real question as to whether the Norfolk fossil localities, referred to as contemporaneous with the Cromer Forest bed, are indeed contemporaneous.

The Rhinocerotidae from locality 1 have been described by Wang, K. M., who established a new species (*Dicerorhinus choukoutiensis* Wang), but status and affinities of both Choukoutien species are still unsolved. The Choukoutien *Dicerorhinus* seems to be a close ally of *Dicerorhinus kirchbergensis* (Jäger). Aside the dicerorhine rhinoceros there are remains of a *Coelodonta* in layers 8/9 of the deposit, showing in the lower dentition extreme hypsodonty and the typical morphology of the genus. Nevertheless the Choukoutien species (*Coelodonta* sp.) is not identical with the European/Asiatic *Coelodonta antiquitatis* but seems to be late representative of the *Coelodonta*-group recorded from Nihowan, Lingyi, Gunghe, Tsinghai etc. The first appearance of the *Coelodonta*-group, *Coelodonta antiquitatis*, in the far western is recorded from the early Riss/Saale (cf. *trogontherii-primigenius*-gravels of Steinheim a. d. Murr, Germany, etc.). The revision of the Rhinocerotidae from Choukoutien will be of great importance in intercontinental correlation of the "Sinanthropus-deposits".

The Choukoutien *Megaceros*——as already stated——is a highly specialized form having a far western ally in the *antiquus*-gravels of Steinheim a. d. Murr (Holsteinian). In Choukoutien, neither in the somewhat earlier locality 13, corresponding with the lower layers of locality 1, nor in the lowest exposed layers of locality 1, a second type of *Megaceros* have been found. The distinction of a *Megaceros flabellatus* (Teilhard de Chardin) aside *Megaceros pachyosteus* Young is due to a negation of the variation demonstrated by Young and later on by Kahlke and Hu. According to the present status of knowledge on palaearctic giant-deer, the grade of specialization in Choukoutien *Megaceros* excludes a Cromerian age of the deposit.

The Proboscidea are represented by a few broken species only, classified as *Palaeoloxodon* cf. *namadicus*, but the record is too poor to allow detailed comparisions.

2) Archaic elements of the fauna It is a well known fact, that the archaic genera and species in general become extinct earlier in the northern (palaearctic) regions of the Eurasiatic continent than in the southern, and that again the southern parts of the continent are refuge-regions of ancient elements, even of the Pontian Block. If we compare the Choukoutien-fauna (locality 1) as a whole we find on contrary with the southern *Stegodon-Ailuropoda*-complex only a few species of "archaic" character and it remains a question if this is not due to the lacking record of European fossil localities.

Trogontherium cuvieri is recorded from the lower and middle horizons of locality 1 (layer 9—5). In Europe (cf. Barnfield-pit, Swanscombe, Kent) we find *Trogontherium cuvieri* associated with an early Hoxnian (=Holsteinian) fauna including *Mammonteus trogontherii, Palaeoloxodon antiquus, Dicerorhinus kirchbergensis, Dama clactoniana* and *Bos primigenius*. According to our

correlation, the lower gravels of Swanscombe are contemporaneous with the lower layers of Choukoutien, locality 1.

Hyaena brevirostris sinensis Owen is recorded from the lower and middle horizons of locality 1 (layers 11—5). In the upper layers (3—1) *H. b. sinensis* is replaced by *Crocuta ultima* (Matsumoto). The latest known record of *Hyaena brevirostris* Aymard in Europe is of early Mindel/Elster date (Süssenborn).

Machairodus inexpectatus Teilhard de Chardin is recorded from layer 11, 8/9 and 5 (locality 1). The latest known remains of a sabre-tooth tiger in Europe are coming from the transitional zone of the *antiquus*—and *primigenius*-gravels of Steinheim a. d. Murr (late Holsteinian—early Riss/Saale glacial).

The lynx-like *Felis teilhardi* Pei of locality 1 shows a high variability including "primitive" as well as "progressive" types (M_1).

In concluding we may point out, that the faunal evidence excludes a Cromerian age of the Choukoutien "Sinanthropus-Site"[1]. Indeed there are only two species of great mammals in the lower and middle horizons of locality 1 which are——comparing with European conditions——"old-timers" (a hyaena of the *brevirostris*-group and a lynx-like felidae of the *issiodorensis-teilhardi*-group). But in Europe fossils of hyenas and lynxes are practical missing in the early horizons of the Holsteinian and we do not know how long these species have been living in the far western prolongation of the Palaearctic. The latest known record of a lynx of the *issiodorensis-teilhardi*-group in Europe dates from the middle sands of Mosbach (latest Cromerian and early Mindel) and the latest record of *Hyaena b. brevirostris* dates from about the same time (Süssenborn), perhaps some later (early Mindel/Elster).

C. CHOUKOUTIEN, LOCALITY 1: GLACIAL OR INTERGLACIAL?

Since the discovery of the famous site in 1921 (locality 1) there was no question about the temperate character of this faunal association corresponding with a climate milder than now, but there was a real question as to whether the Choukoutien fossil locality 1, referred to as contemporaneous with the sands of Mauer, was indeed contemporaneous. The faunal evidence demonstrated above negates a Cromerian age finally.

1) Northern ("glacial") elements of the fauna The fossil marmot of locality 1 has been described by Young as a new species *Marmota complicidens* Young, other specimens have been referred to *Marmota robustus* Milne Edwards, the larger Tibetan marmot. According to Teilhard de Chardin and Pei the materials of the latter species may belong to *Marmota bobak* (Radde), the Mongolian marmot and the record may be explainable by geographic reasons.

Gulo sp. has been recorded from locality 1, coming probably from the "carnivora-layer" (layer 8/9). There is only one specimen among hundreds of other carnivora-remains.

The presence of a cave-bear type (*Ursus* cf. *spelaeus*, associated with the brown-bear always seems to indicate the "vicinity" of a glacial period (cf. fauna of the Heppenloch-cave in

1) Cf. further Movius, H. L., 1944, p. 1—125. Howel, F. C., 1960, p. 224, etc. (For another correlation see Pei, W. C., 1957, p. 13; Huang, W. P., 1960a, p. 45—46; 1960b, p. 47—48, etc.)——In these papers Huang, W. P. suggests the deposits of Choukoutien, locality 1, to range from the early Pleistocene= Villafranchian (basal gravels and equivalent red clay and coarse sand layer) until the late middle Pleistocene (layers IV — VI = layers 7—1 according to the earlier publications). The matter was left unexplained by the author how to bring this correlation in accordance with the faunal evidence as published at present.

Germany). From the interglacial faunas of Steinheim a. d. Murr and Swanscombe (lower gravels), however, only *Ursus spelaeus* has been recorded.

As already mentioned, the middle Pleistocene *Coelodonta* sp. from Choukoutien seems to be a late member of the Nihowan-Tsinghai-group having been found even in the transitional-associations to the *Stegodon-Ailuropoda*-Block of south China.

This species is very rare in the deposits of locality 1 and according to our present knowledge it is not an indicator of extreme cold climate [cf. *Coelodonta antiquitatis* in Europe].

Without definite record of the horizon an Ovibovine (gen. et sp. indet.) was described from locality 1. This group, indicating glacial conditions in European deposits, is very old in central Asia and without a nearer determination of the species it is not possible to make any statement about the climatic conditions the animal was living with. Remains of the Ovibovinae-subfamily have been reported from China in the Sanmenian beds of Nihowan and in the Yushe series. *Boopsis sinensis* Teilhard de Chardin, a middle Pleistocene species of the group was described from locality 9 of the Choukoutien-area, but no traces of a *Ovibos* s. str. have been found so far in the Pleistocene strata of China and Mongolia.

2) Southern ("interglacial") elements of the fauna *Hystrix* cf. *suberistata* is a common element of the contemporary *Stegodon-Ailuropoda* faunal complex of south China. The occurrence of this species in the layers 8/9 excludes climatic conditions colder than today.

Ursus thibetanus kokeni Matthew and Granger (synonym: *Ursus zdanskyi* Pei) is reported from several layers of locality 1. The species is a typical element of the southern *Stegodon-Ailuropoda*-complex.

Ailuropoda sp. A doubtful record of locality 1 is that of *Ailuropoda* sp., a common element of the southern *Stegodon-Ailuropoda*-complex, but together with *Bubalus* and *Hystrix, Ailuropoda* may have succeeded in reaching the Choukoutien-area.

Palaeoloxodon cf. *namadicus* and *Dicerorhinus* cf. *kirchbergensis* (Jäger) The *Palaeoloxodon*-group is a typical interglacial element of the whole Palaearctic region and *Palaeoloxodon namadicus* is a common member of the southern *Stegodon-Ailuropoda*-complex, in general associated with a rhinoceros of the *Dicerorhinus*-group, which group is represented by numerous specimens in Choukoutien, locality 1.

Bubalus teilhardi Young The *Bubalus*-group too is an element of southern character, a common member of the *Stegodon-Ailuropoda*-fauna and typical for the Holsteinian associations of the far western prolongation of the Palaearctic block (Steinheim and Schönebeck[1]). According to Young, the other typical "interglacial" bovide of the Palaearctic block, *Bos primigenius* is not present in the Choukoutien-fauna.

D. CHOUKOUTIEN, LOCALITY 1: FAUNAL SUCCESSION OR FAUNAL BREAK?

Comparing the fossil remains of the different layers we find, that there is no real "break" in the continuity of the record as well as in the composition of the fauna. The rare record of species in the upper layers is due partly to missing dates of the earlier excavations and partly to the consistence of the different layers causing the lack of micro-mammalia in the hard breccia-layers.

1) The *Bubalus*-remains of Steinheim and Schönebeck show high affinities to the Asiatic group. (cf. Schertz, E., 1937, p. 70). There are some more remains of fossil *Bubalus* in Italy, but the specimens are missing either record of the locality or it is impossible to give an exact date of the locality.

Ursus cf. *spelaeus*, restricted to the lower horizons (layer 8—11?) of the site——but associated with *Ursus arctos*——seems to indicate the vicinity of a preceding "cold-time" (Pluvial), represented by the basal gravels of locality 1, as well as *Gulo* sp., even the horizon of the specimen is not certain (perhaps layers 8/9). The Ovibovine of locality 1, represented by two distal parts of metacarpals, certainly belongs to the form of locality 9 of the same region, *Boopsis sinensis* and not to *Ovibos* s. str.

Associated with these few "northern" (continental) elements we find in the same layers "southern" forms like *Hystrix* cf. *subcristata*, *Palaeoloxodon* cf. *namadicus*, *Dicerorhinus* cf. *kirchbergensis* and *Bubalus teilhardi*, showing that there is a slow transition from a fauna of "late glacial/early interglacial" ("late pluvial/early interpluvial") conditions in the lower layers of locality 1 (above the Basal Gravels) with predominance of "interglacial" elements to a real "interglacial" ("interpluvial") fauna in the middle horizons of the complex.

In the upper layers (3—1) of locality 1, two (?) new forms appear, *Crocuta ultima* and *Cervus* sp. But only in *Crocuta* we may speak of an replacement of *Hyaena brevirostris sinensis* Owen because in *Cervus* sp. the other big cervids of the whole deposit are still associated with the new (?) form[1].

E. STRATIGRAPHICAL OBSERVATIONS IN THE LOWER LAYERS OF LOCALITY 1

According to a preliminary note published by Chia, L. P. (1959) and by Huang, W. P. (1960) a patch of gravels and conglomerats (basal gravels) and equivalente red clays and coarse sand layers have been found in the lowermost exposed horizons of locality 1, in the deepest part of layer 13[2] without reaching the very bottom of the fissure. These Basal Gravels evidently were coming from outside the cave or fissure by water agencies. In the small exposure in the southwest corner of the middle section of the locality the number of big gravels in the coarse sediment as well as the thickness of the layer is increasing from north to south indicating the way of the gravels mainly along the Southern Fissure in this part of the locality.

The character of the lower layers as exposed now, seems to indicate the end of a period of high erosions and water activities (basal gravels) turning continuously to a warmer, first still wet (layer 13—12) and later more dry period (layer 11—3), interrupted by some thin weathered levels in the lower horizons of the complex and two intermediate wet periods (layer 10 and 7). The mode of deposition, however, shows——according to the section published by Chia, L. P. (1959) and the observations at the site (excavations 1960)——no discordance all over the section but a continuous filling of locality 1. The basal gravels——bedded in red clay and coarse sand layers ——recall some observations in the physiographic features of the Western Hills made by Teilhard de Chardin "namely the constant occurrence, deep in the valleys, of two associated, but sharply distinct, types of terraces": the older "red system" and the younger "gray system". The older red system of terraces and fans associated with well-rounded, partly hard-cemented gravels and boulders is known to reach a thickness of 25—30 m in some places in the Western Hills.

1) The fragmentary antlers of this *Cervus* sp. do not allow a specific determination (cf. Pei, W. C., 1939a, p. 227), but the possibility is not excluded to see in these specimens antlers of *Pseudaxis grayi* Zdansky, developing an accessory small tine between basal tine and beam (cf. Pei, W. C., 1939a, p. 227; Lehmann, E. v., 1959, p. 54—67, "Winkelsprosse").

2) =layer 1 by Huang, W. P., 1960a. p. 45.

The Sinanthropus-beds s. str. have been suggested by Teilhard de Chardin to correspond with the older red system of "Upper Sanmenian" age. According to the recent observations we are able, not to correlate the Sinanthropus-beds s. str., but the "basal system" of locality 1 (= basal gravels and layers 13—12) with the red system s. l. (red terraces, boulder fans and red slope clay), seeing in the basal gravels of locality 1, an equivalent of the boulder-fans and in the following layers (13—12) of the locality the equivalent of the red terrace-system s. str., due to a period of redepositing the boulder-fans along the river sites.

The red system s. l. of the Western Hills has been correlated with the "reddish clay fans" of the Shansi Plateau etc. or——meaning the same——with the Shansi "*Siphneus tingi-beds* of "Upper Sanmenian" age. This correlation seems to be supported by the presence of *Myospalax epiting*i (Teilhard de Chardin and Pei)——a near ally of *M. tingi*, differing from *M. tingi* only by a larger size and by a stronger sculpture of the skull——in locality 13 (Choukoutien-region), corresponding with the lower levels of locality 1 by paleontological and stratigraphical evidence.

Since the red or reddish clay fans of Shansi, Shensi etc. (reddish clays zone B of Teilhard de Chardin, P. and Young, C. C.) with *M. tingi* are of "Upper Sanmenian" age and the Sanmenian is correlate on paleontological evidence with the European early middle Pleistocene (~Altpleistozän), the Choukoutien deposits of locality 1, above layer 12 (=lower breccia) are not of "Upper Sanmenian" but of post Sanmenian age, thât means of middle Pleistocene age s. str., Holsteinian s. l. of European stratigraphy.

This date, however, was reached by comparing the fossil faunas of the far western and the far eastern prolongations of the Palaearctic block of the middle Pleistocene.

Although the existence of real glaciations is not proved in the Western Hills we may fully agree in the suggestion of "sub-glacial" or "pluvial" periods corresponding with Pleistocene glaciations in Europe, Central Asia and North America. Today by analysing the faunal sequence in northern China it becomes clearer and clearer that in middle and late Pleistocene times climatic changes took place. Under climatic conditions like the present, it would be not possible in the Western Hills——with a climate highly influenced by the extreme seasonal changing of the continental block——to find a fauna of Choukoutien-type with elements of Sino-malayan affinities.