DOI: 10.16359/j.cnki.cn11-1963/q.2015.0015

简报

瑞典乌布萨拉大学博物馆藏品中新发现北京人牙齿化石

Martin Kundrát[1,*], 刘 武[2], Jan Ove R. Ebbestad[3], Per Ahlberg[1], 同号文[2]

1. 瑞典乌布萨拉大学进化生物学中心生物系，乌布萨拉 75236, 瑞典；
2. 中国科学院脊椎动物演化与人类起源重点实验室，中国科学院古脊椎动物与古人类研究所，北京 100044；
3. 瑞典乌布萨拉大学进化博物馆，乌布萨拉 75236, 瑞典

摘要：曾被命名为中国猿人北京种 (*Sinanthropus pekinensis*) 的直立人北京种 (*Homo erectus pekinensis*)（北京人）化石是当时世界上具有最为可靠发掘记录的古人类化石。1941 年大部分北京人化石丢失，仅存的当时发掘出土具有鉴定价值的人类化石为保存在瑞典乌布萨拉大学古生物博物馆的 3 枚北京人牙齿。2011 年在 瑞典乌布萨拉大学古生物博物馆保存的周口店发掘出土的化石中新发现了一枚北京人牙齿化石。本文报道了这枚新发现的北京人牙齿化石并回顾了此前发现的 3 枚北京人牙齿化石的历史。这 4 枚人类牙齿化石代表了在周口店最早发现了的直立人牙齿化石。

中图法分类号： Q981, Q983+.8；**文献标识码**：A；**文章编号**：1000-3193(2015)01-0131-06

关键词： 北京人；周口店；牙齿；乌布萨拉大学

一个世纪以前的 1914 年，瑞典地质学家安特生 (Johan Gunnar Andersson) 来到中国，从此引发了连锁系列事件，最终导致了世界上最为重要的古人类学发现之一 [1]。在 1918 年和 1921 年对周口店附近的龙骨山一处更新世地点的考察过程中，具有丰富专业知识的安特生注意到一些特殊的石英碎片，这些石英碎片并非来自地点附近，很像是古人类制作使用的石器。为此，他对这个地点组织进行了系列发掘，试图寻找古老石器工具的制造者。

对周口店的最初发掘主要是由来自瑞典乌布萨拉大学的年轻学者师丹师基 (Otto Zdansky) 主持的。他的发掘工作导致了第一批北京人化石的发现 [2]。1921 年对周口店的发掘期间，在第 5 层发现了第一枚人类牙齿化石 (右侧上颌第三前臼齿，编号 PMU M3550，图 1a) [2-4]。第二枚人类牙齿化石 (左侧下颌第三前臼齿，编号 PMU M3549，图 1b) 是在整理装箱运送到乌布萨拉大学的脊椎动物化石中发现的。这枚牙齿应该是师丹师基 1924 年 1 月从中国返回瑞典之后，安特生在 1926 年 10 月 22 日宣布在周口店发现这 2 枚牙齿之前这个时间段内发现的。而在周口店发掘出土的时间是在 1923 年 [5]。安特生利

收稿日期：2014-12-12；定稿日期：2014-12-30

基金项目：中国科学院战略性先导科技专项 (XDA05130101) 资助

作者简介：Martin Kundrát，瑞典乌布萨拉大学进化生物学中心生物系，Email：martin.kundrat@ebc.uu.se

Citation: Martin Kundrát, Liu W, Jan Ove R. Ebbestad, et al. New tooth of Peking Man recognized in the Museum of Evolution of Uppsala University[J]. Acta Anthropologica Sinica, 2015, 34(1): 1-14

用瑞典皇太子访问北京这个特殊的时间宣布这个敏感和尚未发表的 2 枚北京人牙齿的发现。师丹师基从一开始就意识到这 2 枚牙齿的重要科学价值，并经过研究慎重将其归如人属 [5]。 随后对周口店的系统发掘由中国地质调查所所长翁文灏、加拿大古人类学家步达生 (Davidson Black)、乌布萨拉大学研究生步林 (Anders Birger Bohlin) 分别主持。1927 年 10 月 16 日，布林在师丹师基发现第一枚北京人牙齿的相同地层（第五层）又发现了另外一枚北京人牙齿化石（左侧下颌第一臼齿，图 1c）[4]。步达生研究了步林发现的这枚北京人牙齿，成为这个绝灭古人类的正型标本。值得注意的是，步达生在他的研究论文中指出：“ 这个古人类种可以命名为中国猿人北京种，师丹师基应为种名命名人之一 ”[4]。

在 1927-1937 年周口店发掘的黄金年代，出土了丰富的北京人化石材料（包括 5 件头盖骨的 40 多个个体的标本）[5-6]。1941 年，包括正型标本在内的全部北京人化石在装船在即将前往美国时刻神秘失踪。这个巨大的化石发现成就顷刻之间成为古人类学史上的最大损失 [7]。在所有第二次世界大战之前发掘出土的北京人化石中，只有一件胫骨残段和一件股骨残段（1951 年发现），以及 1924 年运到乌布萨拉大学的 2 枚牙齿得以保留。上世纪 20 年代，多箱在周口店发掘出土的化石标本被运往乌布萨拉大学。对这些化石标本的整理与研究发现了新的北京人化石。

在周口店第一次发掘 30 年之后，师丹师基从保存在乌布萨拉大学的周口店化石标本中发现了第 3 枚北京人牙齿化石 (右侧下颌第四前臼齿，编号 PMU M3887，图 1d) [4]。这枚化石可能发现于师丹师基访问乌布萨拉大学的 1951 年 3 月 19 日与他正式发表论文的 1952 年 6 月之间 [8]。但也有学者提出这枚牙齿的发现时间在 1950 年 [5]。

2011 年，在中断几乎 60 年之后，两位本文作者 (M.K. and J.O.R.E) 出于好奇查看了一直存放在乌布萨拉大学进化生物学研究中心地下室的大约 40 箱中国的化石标本，其中 3 箱化石标本有表明属于周口店的字母标签 (ZKD)。2011 年 3 月 21 日，M.K. 在其中一个箱子的化石中发现了一枚人类牙齿化石，后经本文另一作者刘武鉴定确认为 (右侧上颌犬齿，编号 PMU 25719，图 1e)。这枚牙齿发现时破碎为 13 块，后由乌布萨拉大学古生物博物馆的 Pär Eriksson 拼接复原。如同其它保存在乌布萨拉大学的北京人牙齿一样，这枚新发现的牙齿也出自周口店第一地点的第五层，年代范围在 60-50 万年之间 [9]。

新发现的这枚北京人上犬齿齿冠咬合面磨耗较重，提示该牙齿属于一个成年个体。除咬合面磨耗外，这枚犬齿的形态与其它北京人犬齿接近，呈现粗壮的齿冠和齿根。但其齿冠尺寸 (MD=~8.6 mm; BL=8.8 mm) 小于其它周口店犬齿的平均值 (MD=9.4 mm; BL=10.2 mm)，其中 MD 位于北京人变异范围 (8.5-10.5 mm) 的最小值边缘，而 BL 则位于北京人变异范围 (9.8-10.6 mm) 之外，这些差别或许与性别差异有关 [10]。

虽然这枚牙齿在化石箱子中没有专门特殊包装和标签，但却用纸张包裹作为一件单独的标本。这枚犬齿所在的箱子内的标签既有 1921 年的，也有 1923 年的（图 1f）。箱子顶盖标签 (Z 231) 与箱子侧面的标签 (Z 228) 不符。我们推测师丹师基在这个化石箱子运抵乌布萨拉大学之后确实检查过这个箱子，然后根据未来研究的重要性对化石进行重新打包。目前还无法确认师丹师基是否见过这枚犬齿。但在 90 年之后重新发现这枚牙齿为学术界提供了周口店发掘最早期阶段的珍贵北京人化石材料。

图 1 最早在周口店发现的 5 枚北京直立人 (***Homo erectus pekinensis***)（北京人）牙齿

a．1921 年师丹师基在周口店发现的第一枚北京人牙齿 (PMU M3550); b．1924-1926 年间师丹师基在乌布萨拉大学发现的第二枚北京人牙齿 (PMU M3549); c. 1927 年布林在周口店发现的北京人牙齿 (K11337: 3) 模型。这件被确定为中国猿人北京种 (*Sinanthropus pekinensis*) 正型标本的牙齿化石在 1941 年丢失 ; d. 1951-1952 年间师丹师基在乌布萨拉大学发现的第三枚北京人牙齿 (PMU M3887); e. 2011 年 Kundrát 在乌布萨拉大学从师丹师基 1921 年或 1923 年在周口店采集的化石中发现的第四枚北京人牙齿 (PMU 25719). 图中箭头显示齿冠颊面有两处釉质破损，其中一处破损表面具有磨耗痕迹，说明破损是在生前形成 ; f. 在发现第四枚北京人牙齿的化石箱子中找到的两张标签纸 . 显示有周口店名称、师丹师基及日期。

New Tooth of Peking Man Recognized in the Museum of Evolution of Uppsala University

Martin KUNDRÁT[1], LIU Wu[2], Jan Ove R. EBBESTAD[3], Per AHLBERG[1], TONG Haowen[2]

1. Department of Organismal Biology, Evolutionary Biology Centre, Uppsala University, Uppsala 75236, Sweden;
2. Key Laboratory of Vertebrate Evolution and Human Origins of Chinese Academy of Sciences, Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, Beijing 100044, China;
3. Museum of Evolution, Uppsala University, Uppsala 75236, Sweden

Abstract: Peking Man, originally named *Sinanthropus pekinensis* and now known as *Homo erectus pekinensis*, was among the best documented extinct hominids before the catastrophic loss of almost all the material in 1941. The only diagnostic specimens to survive from the original excavations are some teeth in the paleontological collections of Uppsala University, Sweden (PMU). Here we report on the discovery of a new tooth in the PMU collection with notes on the history of the three previously known teeth. Together they represent the first four specimens of Peking Man ever collected.

Key words: Peking Man; Zhoukoudian; Tooth; Uppsala University

Introduction

Exactly a century ago, in 1914, the Swedish geologist Johan Gunnar Andersson arrived in China, triggering a chain of events that eventually led to one of the most important discoveries in paleoanthropology (Andersson 1934)[1]. During visits to a Pleistocene locality at the Dragon Bone Hill near the village of Chou K´ou-tien (Zhoukoudian) in 1918 and again in 1921, Andersson´s trained eye noticed the peculiar nature of some quartz fragments, which were not native to the site and resembled primitive stone tools. He initiated a series of excavations to search for the ancient tool maker.

Results and discussion

The initial excavations at Zhoukoudian were carried out mostly by Otto Zdansky, a young researcher from Uppsala University who eventually unearthed the first dental remains of the Peking Man. The first tooth (right upper third molar PMU M3550; Fig.1a)[1)] was discovered

1) Fig.1 see the page 133, The first five fossil remains of the Peking Man, *Homo erectus pekinensis*, from Zhoukoudian: a. The very first tooth (PMU M3550) discovered by Zdansky in 1921; b. The second tooth (PMU M3549) revealed by Zdansky in Uppsala in 1924-1926. c. The cast of Bohlin´s tooth (K11337: 3) found in 1927, the holotype of '*Sinanthropus pekinensis*' (Black and Zdansky) lost in 1941; d. The third tooth (PMU M3887) revealed by Zdansky in Uppsala in 1951-1952; e. The fourth tooth (PMU 25719) collected by Zdansky in 1921 or 1923, revealed by Kundrát in Uppsala in 2011. Note the two chips (arrows) in the enamel; the distal one has been partly smoothed by wear, showing that it was formed long before the death of the individual; f. The two labels found in the crate

during the longer field season (layer 5) in 1921 (Zdansky 1927; Black 1927; Thor 1984)[2-4]. The second tooth (left lower third premolar PMU M3549; Fig. 1b) was found among other vertebrate fossils in the crates that were shipped to Uppsala. It must have been discovered after Zdansky returned from China in January 1924 and before Andersson eventually announced the discovery of the two teeth on the 22nd of October 1926, *contra* Wang and Sun´s suggestion that it was discovered in 1923 (Wang and Sun 2000)[5]. The announcement was made on the occasion of the visit of His Majesty the Crown Prince of Sweden to Beijing. Zdansky released his sensational and still unpublished discovery for this special event; we believe that he was aware of the scientific importance of the two teeth from the very beginning, and indeed his cautious attribution of the fossil to the genus *Homo* (Zdansky 1927) has been borne out by subsequent research.

The next systematic excavations were carried out by Wenhao Weng (director of the Geological Survey of China), Davidson Black (Canadian paleoanthropologist) and Anders Birger Bohlin (fresh graduate of Uppsala University). It was Bohlin who on the 16th of October, 1927 actually recovered another tooth of the Peking Man (left lower first molar; Fig. 1c) from the same layer (stratum I = layer 5) where Zdansky found his first specimen (Black 1927)[4]. Bohlin´s specimen was described by Black and became the holotype of the new extinct hominid. Notably, in his study (p. 21), Black wrote: “The species…may be named *Sinanthropus pekinensis* (Black and Zdansky) to include Zdansky as a co-designator (Black 1927)[4].

During the golden years of 1928 through 1937, Zhoukoudian yielded numerous remains of Peking Man (> 40 individuals) including five skulls (Pei 1929; Wang and Sun 2000)[5-6]. In 1941, this enormous success soon after dramatically turned into the biggest loss in the history of paleoanthropology, when the whole collection, including the holotype, disappeared in mysterious circumstances as it was about to be shipped to the United States for safe keeping (Berger et al. 2012)[7]. Of all the material collected prior to the war, it seemed for a time that only a tibial and a femoral fragment (rediscovered in China in 1951; Wang and Sun 2000), and the two diagnostic teeth sent to Uppsala in 1924, had survived. However, several crates of Zhoukoudian material that had been shipped to Uppsala University in the 1920s remained unstudied, and these were eventually to yield further specimens.

Zdansky found a third tooth (right lower fourth premolar PMU M3887; Fig. 1d)[4] in the Uppsala material thirty years after his first excavation at Zhoukoudian (Zdansky 1952), most probably sometime between his visit to Uppsala on the 19th of March 1951 and June 1952 when he published it[8]; *contra* Wang and Sun who proposed the year 1950 (Wang and Sun 2000)[5].

In 2011, after a hiatus of almost 60 years, two of the authors (M.K. and J.O.R.E) were moved by curiosity to check the contents of around 40 crates filled with Chinese fossils and still left in the basement of the Evolutionary Biology Centre at Uppsala University. Three of the crates were found

containing the fourth tooth; note date and the locality Chou Kou Tien (asterisk)

to bear the letters ZKD (acronym for Zhoukoudian). On the 21st of March, 2011, M.K. discovered a hominid fossil tooth in one of these crates, later confirmed by L.W. as an upper right canine of Peking Man (PMU 25719) (Fig. 1e). The tooth was found crushed into 13 pieces that were reassembled by Pär Eriksson (PMU). As the other teeth, it is likely that the canine also came from the same layer 5, for which date of ≥600 to ~500 kyr ago was proposed (Shen et al. 2009)[9].

The crown of PMU 25719 is considerably worn indicating that the tooth came from an old individual. In addition to the general wear, there are two large chips in the enamel on the buccal face, extending from the biting edge down towards the base of the crown. One of these chips has been partly smoothed by wear, showing that it was formed long before the death of the individual. The morphology of PMU 25719 resembles those of other canines of Peking Man in robustness of both crown and root. However, its crown dimensions (MD = ~8.6 mm; BL = 8.8 mm) are smaller than means of other ZKD canines (MD = 9.4 mm; BL = 10.2 mm). The MD value of the newly found upper canine is within the variation range of Peking Man (8.5-10.5 mm), but the BL value is out of the variation range of Peking Man (9.8-10.6 mm). These difference might be related to sexual dimorphism (Weidenreich 1937)[10].

Although it had not been packed and labeled in a special way, the new tooth was wrapped in a paper as a single specimen. The crate contained labels from both 1921 and 1923 (Fig. 1f), and the number of the lid (Z 231) did not match the number on the side of the crate (Z 228). We infer that Zdansky indeed checked the contents of the crates after their arrival in Uppsala and repacked specimens probably based on their priority for further study. We will never know how Zdansky came to overlook the canine, but its rediscovery after 90 years has given us one more precious fragment of Peking Man from the earliest phase of the historic Zhoukoudian excavations.

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