

长鼻北碚鳄 (*Peipehsuchus teleorhinus*) 的 补 充 修 订

李 锦 玲

(中国科学院古脊椎动物与古人类研究所)

关键词 四川达县 早一中侏罗世 真蜥鳄科

内 容 提 要

在四川达县一新材料的基础上,全面地记述了长鼻北碚鳄的头骨结构;补充和修订了该属的鉴定特征;将其从大头鳄科 (*Pholidosauridae*) 移入真蜥鳄科 (*Teleosauridae*)。

1948年杨钟健在对采自四川北碚草街子的一鳄类吻部进行补充描述时,否定了他本人1944年的观点,将这一材料自蛇颈龙类移入中鳄亚目的大头鳄科 (*Mesosuchia*, *Pholidosauridae*),命名为长鼻北碚鳄 (*Peipehsuchus teleorhinus*)。同时将1935年记述的同一产地三颗单独的牙齿,1939年记述的牙齿,1944年鉴定为中国上龙 (*Sinopliosaurus*),产自威远的一个牙齿,1942年鉴定为中国上龙,产自广元的三个牙齿,及威远自流井组的一右股骨都归入到北碚鳄中。正模材料十分有限,为一长吻鳄类的吻部前端(古脊椎所标本馆,补充编号 RV 48001)。吻端适度扩展,呈半圆形;单一的外鼻孔大;骨表面粗糙,波状起伏;中线部位有一长的深沟。1961年刘宪亭将四川大足自流井组发现的一鳄类腹甲和三节脊椎订为真蜥鳄未定种 (*Teleosaurus* sp.)。杨钟健(1964)依据其形态特征和产出层位认为这一材料当归入北碚鳄。

本文记述的是四川达县一近于完整的鳄类头骨(古脊椎所标本登记号 V 10098)。它与北碚鳄材料的层位一致,大小相近,其吻端形态相似,前上颌骨齿数相同,因此有理由认为它们代表同一种动物。新材料的发现为全面地记述长鼻北碚鳄头骨的解剖形态,修订这一属种的鉴定特征和讨论其系统分类位置奠定了基础。

一、新材料的记述

鳄类头骨保存在一薄层含铁质的硬壳内,这给修理工作带来了很大困难,但化石却得以十分完美地保存下来。除牙齿断失外,只有左右下颞弓受到损坏。

头骨形态与欧洲的真蜥鳄属 (*Teleosaurus*) 及狭蜥鳄属 (*Steneosaurus*) 十分相似。头长 63 厘米。眼孔小,卵圆形,面向上方;上颞孔大,近于矩形,其长度几乎为眼孔的两倍。两上颞孔间的部分形成一窄的中嵴,下颞弓断失,颞骨残留的部分暗示侧颞孔为窄长的三角形。头骨最大宽度位于鳞骨后端一线,为 18.5 厘米。头骨两侧自眼孔部向前收缩

变窄。眶前部长 42 厘米,为头骨全长的 66.7%。吻部自后向前逐渐变窄,近吻端扩展为半圆形,同时向上隆起。单一的外鼻孔大,位于吻部的最前端,面向前上方,为前上颌骨所合围。

前上颌骨自前端向两侧及上方扩展,使吻端形成明显的膨大部分。左右前上颌骨在中线缝合,腹面的中线上有一小孔—前上颌孔 (premaxillary foramen)。它与上颌骨的骨缝不清。前上颌齿均已断失:每侧留有三个大的椭圆形齿孔,从保存的部分推断,牙齿伸向前下方。

上颌骨极为长大,左右上颌骨在中线缝合,这阻隔了鼻骨与前上颌骨的相接。上颌骨腹面在齿列内侧明显地向下凸起,使吻部的横断面近似凸镜状。同时使上颌骨前半部的齿孔面向外下侧。推测其牙齿象 (*Steneosaurus*) 一样,也是指向下侧方的。

右上颌骨可见 26 个,左上颌骨 27 个近似圆形的齿孔,但无一完整的牙齿保存。右侧第 1, 21, 22, 24, 左侧第 2, 5, 10, 20, 22, 24 齿孔中程度不同地保存了部分断齿。其中除左侧第 22 齿由于化石断裂仅保存了一小部分外,多数牙齿保留了齿基部。其中左侧第 10 齿保存了牙齿的大部,齿尖断失;左侧第 5 齿为一失去了齿尖的新生齿。这些牙齿虽不完整但它们从不同侧面反映出北碚鳄牙齿的特征。综合来看,这些牙齿粗壮程度适中,齿冠不高,齿基部断面次椭圆形—圆形;发育完全牙齿的基部几乎占据整个齿孔,如左侧第 2, 20, 24 齿;右侧第 21, 22 齿。齿干较直,略侧扁,具微弱的前后嵴,牙齿表面具细的纵纹。

北碚鳄的牙齿与杨钟健 1935, 1939, 1942, 1944 年记述的一些单独牙齿不无相似之处。如 1935 年文中所述二岩的三枚牙齿,表面也具纵纹和微弱的侧嵴,牙齿横断面圆形。目前,由于原始化石材料的缺失,仅从文字描述的某些相似之处,很难作出它们都属北碚鳄的肯定结论。

泪骨大,它不仅占据了眼眶前缘的大部分,而且在眼眶的外侧向后延伸,与颧骨相接。泪骨表面具微弱的嵴状雕饰。泪骨与上颌骨的接触处有小的缝隙状的眶前孔。

前额骨相对较小,它在眼眶的前内缘占据一小部分,与额骨一样具凹坑雕饰,但比后者稀疏。

鼻骨短小,后宽前窄,形状不规则。左右鼻骨分别向上呈弧状凸起,在中线部相遇,形成一窄的深沟。骨面平滑。鼻骨前端位于第 17 上颌齿一线。

额骨宽,顶视为不规则的菱形,前端插入两鼻骨间。后端收缩,形成窄长的颞间嵴的前部。两侧与眶后骨可能还有颧骨相接,骨缝不清。左右额骨愈合为一两侧高,中央低的凹面。表面具清晰的,放射状排列的凹坑雕饰。

顶骨组成上颞凹的内侧缘和后缘的一部分,但仅有一极小的带有雕饰的三角形面在顶面上出露。顶骨沿上颞凹的后缘向两侧伸展,与鳞骨相接,二者合围着眶颞动脉管孔。顶骨在腹侧与侧蝶骨及方骨相连。后端它仅出露于枕面的上缘,其下为两个大的后颞孔。

眶后骨的前端粗大,它似乎是压盖在颧骨之上。象其它的真蜥鳄一样,眶后骨弓在头骨表面未下沉,它垂直于头骨的纵轴延伸。额骨的侧支及颧骨在这一部位出露,但界线不清。令人不解的是眶后骨的前端未伸及眼眶的后缘。这一结构的特殊性似乎是难以置信

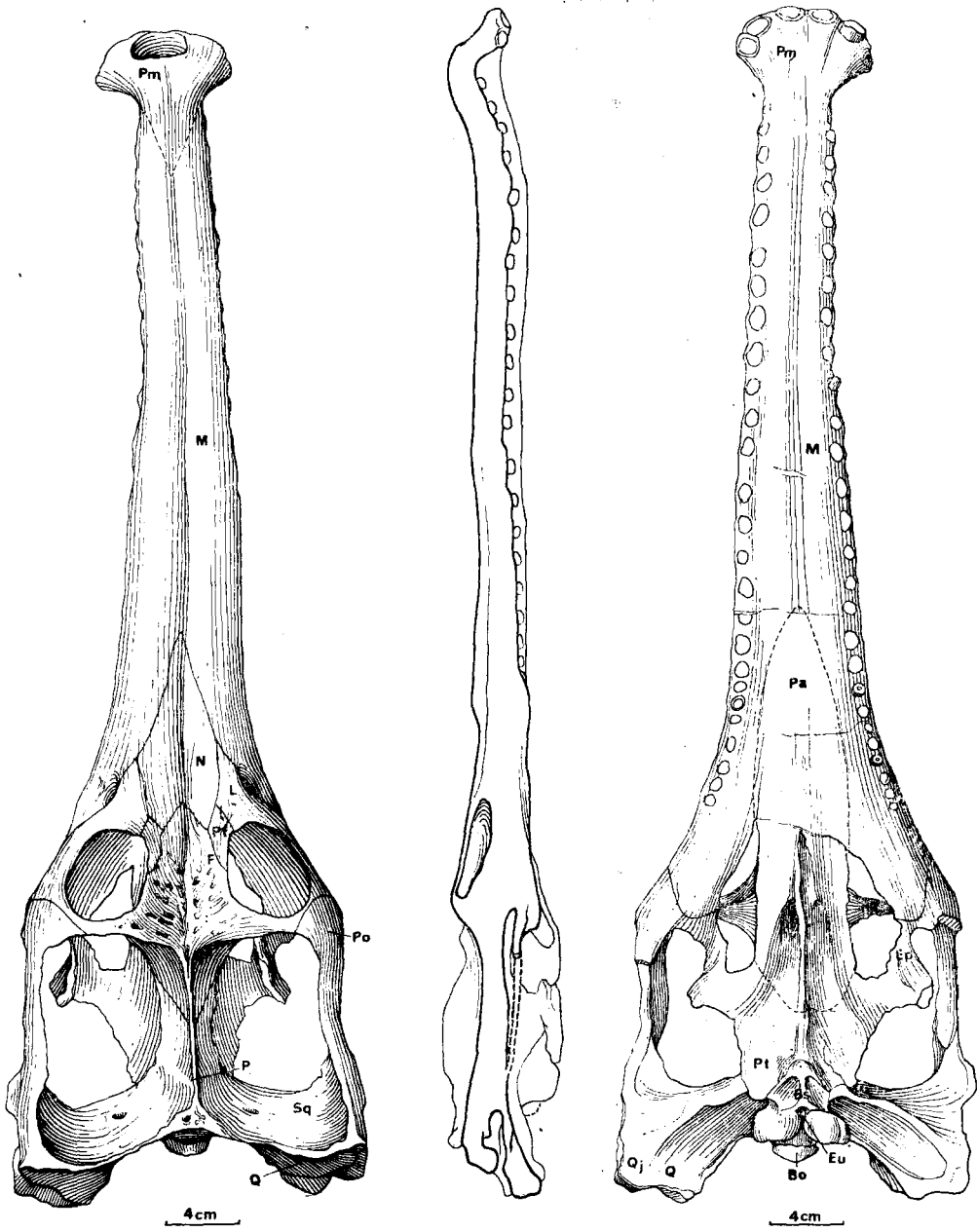


图 1 长鼻北碚鳄头骨顶视, 右侧视和腹视。

Fig. 1 The dorsal, right side and ventral views of the skull of *Peipehsuchus teleorhinus*.

简字说明, Abbreviations: Bo. 基枕骨, basioccipital; Bs. 基蝶骨, basisphenoid; Eo. 外枕骨, exoccipital; Ep. 外翼骨, ectopterygoid; Eu. 欧氏管孔, opening of eustachian tubes; F. 额骨, frontal; f. cp. 颈动脉后孔, foramen caroticum posterius; f. cq. 颅方管孔, foramen cranio-quadrato passage; L. 泪骨, lacrimal; M. 上颌骨, maxilla; N. 鼻骨, nasal; P. 顶骨, parietal; Pa. 腭骨, palatine; Pf. 前额骨, prefrontal; Pm. 前上颌骨, premaxilla; Po. 眶后骨, postorbital; Pt. 翼骨, pterygoid; p. t. 后颞孔 posterior temporal fenestra; Q. 方骨 quadrato; Qj. 方颞骨, quadratojugal; So. 上枕骨 supraoccipital; Sq. 鳞骨, squamosal; X.XII. 第 X 或 XII 脑神经孔, foramen for cranial nerve X or XII.

的,但左右眶后骨同时清晰地 在眶后骨弓的中部结束,又难以让人作出另外的解释。如果此处对骨片的解释是无误的话,北碚鳄以此点区别于真蜥鳄类的其它成员。眶后骨的后端破损,它与鳞骨的界线不清。

颞骨是头骨中破损最为严重的一块骨片,它的后端断失,前端与上颌骨、泪骨、眶后骨相连。颞骨后支的残留部分与眶后骨之间仅有 5 毫米宽的间距,这可能标示着侧颞孔的最大宽度。依颞骨向后延伸的方向,推测颞骨后端贴接在方颞骨外侧,这样形成的侧颞孔为一前宽后窄,狭长的三角形。

鳞骨位于头骨后上侧角,在顶面、枕面、侧面都有出露,因其骨缝无法探查,鳞骨的形态难以详述。鳞骨在枕面顶端以一窄条露出,靠近外端加宽,下延,盖于外枕骨之上。鳞骨一外枕骨在这一部位悬于方骨一方颞骨之上,二者之间为耳凹的后开口。侧视鳞骨在耳凹之前与方颞骨相连。与现生的扬子鳄不同,在鳞骨的侧缘,耳凹之上并未有一附着上耳盖 (superior earflap) 的纵嵴,而代之以一很奇特的凹缺。侧视这个凹与原鳄类 *Orthosuchus* 鼓膜的位置十分相似。但北碚鳄的耳凹深陷,且向后开口,此处是否有一个鼓膜的存在是很难估量的。

头骨腹面保存的相当完整,但骨缝不清,大部分骨片无法分辨。比起 *Steneosaurus* 和 *Teleosaurus* 来,北碚鳄的前颌骨更向横向扩展,六个前颌齿排列为半圆形。前颌孔为小的水滴状,其左右两侧各有一深凹。上颌骨与前颌骨、腭骨的骨缝不明显,但与外翼骨、颞骨的缝合线清晰。上颌骨在中央缝合线的两侧各有一道平行的浅沟。腭骨前端似乎也伸达第 17 上颌齿处。

一对大的内鼻孔张开在腭骨后部,其构造形态与 *Teleosaurus* 的相似。内鼻孔无明显的后缘,它向后开口,其后由腭骨形成一对拱顶,在拱顶的后端腭骨与翼骨相接。腭骨的侧面与上颌骨、外翼骨环围着三角形的眶下孔。就整体来看翼骨相对较小,它与外翼骨界线不清。与 *Steneosaurus* 不一样,外翼骨不是水平,而是倾斜地向后延伸。致使翼骨凸缘伸到齿列之下,当然其强烈程度大大地小于现生鳄类。

翼骨与基蝶骨的分界由一尖端指向前方的“V”字形深沟所标示,虽然骨缝仍然是无法探查的。粗大的方骨的翼骨支直抵翼骨的背部,从保存情况推测它可能压盖在翼骨的方骨支之上。基蝶骨以一小小三角形出露在腹面,中央具一下突的嵴,两侧向上拱起。基翼突部向下扩展,关节面与翼骨紧密愈合,无活动性。在脑颅的前方基蝶骨吻存在,它与侧蝶骨的界线不明。受头骨较低性质的影响,这一中央骨片似乎与头骨的顶底板相接触。

北碚鳄的头骨极低。枕面近于一长边是短边三倍的矩形。其中线代表着头骨的最大高度,仅 6 厘米。头长为头高的 10.5 倍。与枕面的低而宽相适应,枕骨大孔为一横置的椭圆形,枕髁圆大而突出。

一般来说上枕骨为一不伸达枕骨大孔边缘的小骨片,在北碚鳄上由于两个大的后颞孔的存在,它就更显得狭小。外枕骨则大面积出露。其上侧支与鳞骨相接悬于方骨,方颞骨之上。在与方骨相接部可见大的颅方管孔 (foramen cranioquadrate passage)。除此之外,外枕骨上具三对小孔。最上面的一对靠近枕骨大孔的两侧,呈圆形,为舌下神经管的外口 (XII); 其侧下方为一对斜向狭长的孔,迷走神经管孔 (X); 下方内侧为一对较小的圆形孔,颈动脉管的后孔 (foramen caroticum posterius)。

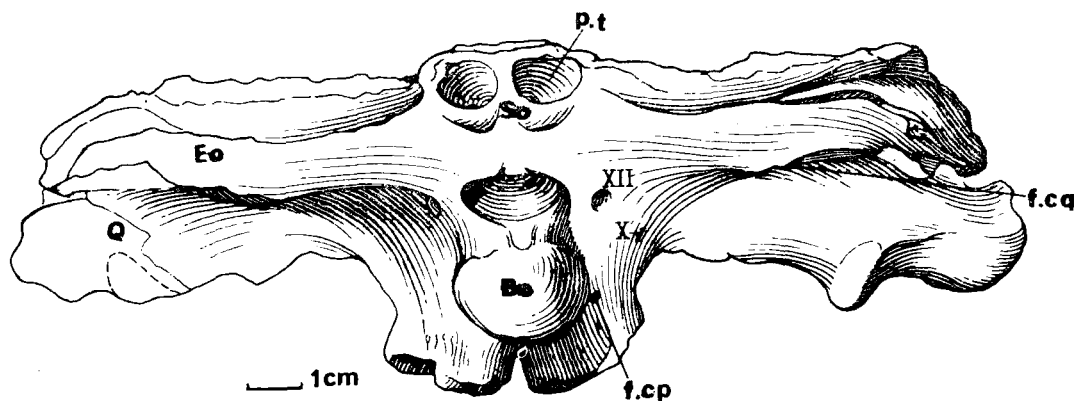


图 2 长鼻北碚鳄头骨枕视。简字说明见图1。

Fig. 2 The occipital view of the skull of *Peipehsuchus telecorhinus*.
Abbreviations as in Fig. 1.

基枕骨组成大而突出的枕髁。基枕骨垂直板下延,在远端扩张,形成一对面向腹侧的髁。每个髁上有一深沟将其分成内外两部分。由于骨缝不清,目前无法确定外侧部分属基枕骨还是外枕骨。基枕骨和基蝶骨之间,可见大的欧氏管孔和两侧的侧欧氏管孔。

表 1 头骨测量 (The measurements of skull)

单位: 厘米 (cm)

| | |
|---|------|
| 头骨全长(吻端—方骨后端一线) The skull length (from the anterior end of premaxilla to the level of posterior ends of quadrates) | 63 |
| 眶前部长度 The length of preorbital region | 42 |
| 头骨最大宽度 The skull width at the level of posterior ends of squamosals | 18.5 |
| 吻端最大宽度 The snout width at the level of external naris | 7 |
| 长吻最小宽度 The snout width at the level of anterior ends of maxillae | 3.5 |
| 头骨最大高度 The skull height (from the dorsal surface of parietal to the lower process of basioccipital) | 6 |
| 眼眶长度 The orbital length | 5 |
| 眼眶宽度 The orbital width | 3.8 |
| 上颞凹长度 The supratemporal fossa length | 11 |
| 上颞凹宽度 The supratemporal fossa width | 6.5 |

Nash(1975)在记述原鳄类 *Orthosuchus* 时,曾提及在中鳄类如 *Pelagosuchus* 和 *Steneosaurus* 中,“中央欧氏管的前支以及它的水平分支被发现……。侧欧氏管和中央欧氏管一样是膜质的。每一个侧欧氏管向上张开指向菱形窝。可能作为基枕骨和基蝶骨生长的结果,这些管道被骨片所封闭,这伴随着翼骨有限的向后延伸,可以解释欧氏管位置的明显变化。”北碚鳄的脑颅保存完整,欧氏管系统没有暴露。它的欧氏管孔位置与中鳄类的一致,位于基枕骨与基蝶骨的骨缝上,这明显地有别于 *Orthosuchus*, 后者的欧氏管孔原始地靠前,位于基蝶骨与翼骨的骨缝上。

方骨粗大,它与方颞骨的骨缝无法分辨。方骨形成的颌关节由内外两髁组成,外髁比内髁位置靠前。两髁连线的延长部分与头骨的中线呈 75° 的角相交。方骨自后端向前上方延伸,插入上颞凹的下缘,在脑颅的侧壁与侧蝶骨环围着大的三叉神经孔(V)。Nash(1975)称“*Steneosaurus*和 *Orthosuchus* 的翼骨有一个后突,沿着基脑(basis cranii)的侧面后延至基枕骨—基蝶骨骨缝,与外枕骨相接,以至方骨不能象现生鳄类一样与基蝶骨相连”。北碚鳄与 *Steneosaurus* 属同一科,但其脑颅各部骨片紧密愈合,无骨缝可循。从结构形态上看,无法确认一个翼骨后突的存在。虽然目前尚难作出肯定的结论,但方骨与基蝶骨的连接是很可能存在的。

二、讨 论

如前所述,北碚鳄在命名之初被归入中鳄亚目的大头鳄科(杨钟健,1948)。后来虽然将产自四川大足,鉴定为(*Teleosaurus* sp.)的腹甲和脊椎材料归入北碚鳄(杨钟健,1964),但由于正模材料的不完整,对其特征的认识存在误解,北碚鳄仍被看作是大头鳄科的成员(中国脊椎动物化石手册,1979年版)。

四川达县新材料的发现为讨论北碚鳄的系统分类位置提供了充分的依据。大头鳄科的成员也有长的吻部和横向扩展的吻端,但它的前上颌骨与鼻骨是相连接的;眶后棒稍稍下沉到头骨表面之下;上颞凹相对较小,头顶平台明显。北碚鳄有配备着为数众多的牙齿的长吻,但前上颌骨与鼻骨之间被上颌骨所阻隔;眶后棒仍位于头骨表面,这些特征清楚地表明它是真蜥鳄科的成员。

真蜥鳄类的材料广泛地发现于欧洲的侏罗纪地层,同时一些属也见于北美,南美,北非,马达加斯加等地。发现于亚洲的真蜥鳄材料十分稀少,除北碚鳄外,仅有印度 Kota 组鉴定为真蜥鳄类的一些甲片,一股骨和一些碎骨被报道(S. L. Jain, 1980)。真蜥鳄类的特征,如长吻,为数众多的牙齿,后肢长度是前肢的两倍,表明它们营水生生活。常常活动于河口三角洲和沿海一带,也可溯源而上,在河流和湖泊中留下踪迹。

四川盆地中达县北碚鳄材料的产出层位不明;北碚草街子发现的北碚鳄正模产出层位有不同看法。杨钟健(1948)认为化石发现于“自流井和大安寨灰岩”。按常规及当今的地层划分,即发现于自流井组大安寨段。但董枝明(1983)在总结四川恐龙化石时,在未作任何解释的情况下,将北碚鳄放入自流井组马鞍山段,认为它与岳氏三巴龙(*Sanpasaurus yaoi*),虚骨龙类,妖龙类,威远中国上龙(*Sinopliosaurus weiyuanensis*),四川角齿鱼(*Ceratotes szechuanensis*)和龟鳖类等共生。

四川达县北碚鳄新材料的发现, 为修订北碚鳄的鉴定特征提供了依据。北碚鳄以其下述综合特征区别于真蜥鳄科的其它成员:

吻部长而细, 吻端横向扩展明显。牙齿表面具纵纹, 牙齿数目相对较少, 前上颌骨 3 齿, 上颌骨 26—27 齿。一对大的内鼻孔失去了后缘, 开口面向头骨的后方, 为腭骨和翼骨所包围。眶后骨未伸达眼眶边缘(?)。腹甲 5 列, 甲片为不规则的六角形, 表面具均匀的内凹坑雕饰。

据 Steel(1973), 真蜥鳄科包括 13 属 (Carroll, 1987, 将其归并为 9 属), 它们大体上可以分为具有细长吻部的类型, 和相对较短宽吻部的类型。前者以 *Teleosaurus* 和 *Steneosaurus* 为代表, 后者以 *Teleidosaurus* 和 *Machimosaurus* 为代表。北碚鳄在形态特征上更接近于前者。它在一些特征上与真蜥鳄一致, 有别于狭蜥鳄, 又在另一些特征上与狭蜥鳄一致, 有别于真蜥鳄。如北碚鳄的明显扩展的吻部和内鼻孔的形态都更类似于真蜥鳄; 而它狭窄的下颞孔形态却与狭蜥鳄的某些种相一致。除了目前还很难作出解释的眶后骨未伸达眼眶这一特征之外, 北碚鳄以牙齿数目较少区别这两个属。北碚鳄前上颌骨齿数为 3, 真蜥鳄为 5, 狭蜥鳄为 4—5。北碚鳄上颌骨齿数 26, 每个上颌支齿数为 29。真蜥鳄每个颌支齿数近 50, 上下颌牙齿总数可高达 200。狭蜥鳄的齿数居中, 每个颌支上可达 31—37 齿。

本文记述的化石材料由王存义, 张宏精心修理, 图版由张宏摄制, 插图由杨明婉绘制, 笔者在此一并致谢。

(1992 年 3 月 3 日收稿)

参 考 文 献

- Buffetaut, E., 1979: Jurassic marine crocodilians (Mesosuchia, Teleosauridae) from central Oregon; first record in North America. *J. Paleont.* 53(1), 210—215.
- Buffetaut, E. and M. Makinsky, 1984: Un crane de *Steneosaurus* (Crocodylia, Teleosauridae) dans le Kimmeridgien de Villerville (Calvados), *Bull. trim. Soc. Geol. Normandie et Amis du Mus. du Havre.* 71(4), 19—24.
- Carroll, R. C. 1987: Vertebrate paleontology and evolution. Freeman, New York. 1—698.
- Dong, Zh.-M., Sh.-W. Zhou and Y.-H. Zhang, 1983: The dinosaur remains from Sichuan Basin, China. *Falaeont. Sin. N. Ser. C* 23, 1—145.
- Jain, S. L., 1980: The continental Lower Jurassic fauna from the Kota Formation, India. in L. L. Jacobs (ed.): Aspects of vertebrate History. Essays in honor of Edwin Harris Colbert. 99—123.
- Liu, H.-T., 1961: The discovery of *Teleosaurus* in China. *Vert. PalAsia.* 1961(1), 69—70.
- Michelin, C., E. Buffetaut and R. Enay, 1985: Le crocodylien *Steneosaurus* (Mesosuchia, Teleosauridae) dans le Jurassique superieur Frane-Comtois (Jura, France). *Geobios.* 18(1), 115—120.
- Nash, D. S., 1975: The morphology and relationships of a crocodylian *Orithosuchus stormbergi*, from the Upper Triassic of Lesotho. *Ann. South Afr. Mus.* 67(7), 227—329.
- Phizackerley, P. H., 1951: A revision of the Teleosauridae in the Oxford University Museum and the British Museum (Natural History). *Ann. Mag. Nat. Hist. Ser. 12. V. 4,* 1169—1192.
- Steel, R., 1973, Crocodylia, in O. Kuhn (ed.) *Handbuch der Paleoherpetologie, Teil. 15.* Gustav Fisher Verlag Stuttgart, 1—86.
- Walkden, G. M., N. C. Fraser and J. Muir, 1987: A new specimen of *Steneosaurus* (Mesosuchia, Crocodylia) from the Toarcian of the Yorkshire coast. *Proc. Yorkshire Geol. Soc.* 46(3), 279—287.
- Young, C. C., 1935: On the reptilian remains of Tzuliuching Formation (Tzekuei Series) near Chungking, Szechuan. *Bull. Geol. Soc. China.* 14, 67—70.
- , 1939 On a new Sauropoda, with notes on other fragmentary reptiles from Szechuan. *Ibid.* 19(3),

279—315.

———, 1942: Fossil vertebrates from Kuanyuan, N. Szechuan. *Ibid.* 22(3—4), 293—308.

———, 1944: On the reptilian remains from Weiyuan, Szechuan China. *Ibid.* 24(3—4), 187—210.

———, 1948: Fossil crocodiles in China, with notes on dinosaurian remains associated with the Kansu crocodiles. *Ibid.* 28(3—4), 255—288.

———, 1964: New fossil crocodiles from China. *Vert. Palasiat.* 8(2), 189—208.

A NEW SPECIMEN OF *PEIPEHSUCHUS TELEORHINUS* FROM ZILIUJING FORMATION OF DAXIAN, SICHUAN

Li Jinling

(*Institute of Vertebrate Paleontology and Paleoanthropology Academia Sinica*)

Key words Daxian Sichuan; Early—Middle Jurassic; Teleosauridae

Summary

The mesosuchian species *Peipehsuchus teleorhinus* was erected and further described in 1948 by Young on the basis of an incomplete snout, which originally assigned to a plesiosaurs *Sinopliosaurus* (Young, 1944). The specimen was collected from Ziliujing (Tzeliuching) Formation of Beipei (Peipeh), Sichuan (Szechuan). Meanwhile several isolated teeth, as they fit well both in size with the alveoles of the snout and show striking similar characters with those of crocodile, were referred to *Peipehsuchus*. They are three teeth from Eryan (Ehyen) (Young, 1935), various teeth (Young, 1939), one tooth from Weiyuan described as *Sinopliosaurus* (Young, 1944), and three teeth from Kuangyuan described also as *Sinopliosaurus* (Young, 1942). A crocodilian ventral scutes and three vertebrae from Ziliujing Formation of Dazu (Datzu), Sichuan, originally assigned to *Teleosaurus* sp. (Liu, 1961), have been grouped with *Peipehsuchus* on the basis of similarities in scutes morphology and stratigraphic horizon (Young, 1964). Since the holotype (IVPP RV 48001) is preserved only an anterior portion of snout with the tip moderately broadening in a semi-circular outline, the *Peipehsuchus* has long been regarded as a member of pholidosauridae.

An almost complete skull (IVPP V 10098), described as *Peipehsuchus* in the present paper, was found in Ziliujing Formation of Daxian, Sichuan. The discovery of new material makes it possible to ascertain some skull features of the unique teleosaur genus from China, to revise its diagnosis and discuss its phylogenetic position.

The skull with an elongated rostron, expanded extremity, small round orbit and large, rectangular supratemporal fenestra resembles to that of two Europe teleosaur genera, *Teleosaurus* and *Steneosaurus*, in skull morphology and characters.

The premaxillae as in the other teleosaur are obliquely truncated, but more markedly deflected. The expanded extremity of snout is broader than that of *Teleosaurus* and *Steneosaurus*. In contrast to bearing 4 or 5 premaxillary teeth in *Teleosaurus* and *Steneosaurus*, 3 oval alveoli present on each premaxilla, but all the teeth are broken. There is a small water drop-like premaxillary foramen on the ventral medial suture.

The long maxillae meet in the mid-line, and separate nasal from premaxilla. The maxillae, being lens-like on the anterior cross section, are convex in anterior portion, but flattened back-

wards. There are 26 and 27 almost roundd alveoli on the right and left maxilla respectively. In the 1st, 21st, 22nd and 24th alveolus of the right side and the 2nd, 5th, 10th, 20th, 22nd and 24th alveolus of the left, the teeth are preserved in various condition, but none of them is complete. Synthesizing all the informations provided by the broken teeth, the maxillary teeth may be described as follows: The teeth are medium in size, subround round on the basal cross section, slightly laterally compressed at the upper part. The tooth crowns are almost straight with shallow fluted surfaces and faint carinae. The direction of alveoli implies that the maxillary teeth point downward as well as outward.

The lacrimal is a large bone occupying the most part of anterior border of the orbit. Its surface is ornated with irregular thin ridges. A small antorbital fenestra is present on the suture of the maxilla and lacrimal.

The prefrontal is relatively small. The pitting and ornament on the surface are similar to, but sparser than that of the frontal.

The nasal with smooth surface is short. The arched dorsal surfaces of the left and right nasal contact each other at the mid-line and form a distinct groove. The anterior end of nasals opposite the 14th maxillary tooth.

The frontals are fused. Its posterior process contacts the parietal at one third of the length of the narrow intertemporal ridge. The concave surface of the frontals is ornated with distinct pits being arranged in radiate line.

The parietals form the main part of medial and posterior rim of the supratemporal fenestrae, and meet the frontal, squamosal, laterosphenoid and quadrate respectively. But only a quite small triangular sculptured facet appears on the skull table and a small portion of the upper edge on the occipital surface.

The post-orbital bar is not submerged beneath the surface. It is approximately at right angle to the long axis of the skull as that of *Steneosaurus*. The postorbital is an enigmatic bone in *Peipehsuchus* for it takes no part in the border of the orbit. This special feature seems to be unbelievable, but the stout anterior end of the postorbital on the left and right is clearly finished on the middle of the postorbital bar. In that case the jugal should contact the frontal directly, unfortunately, the suture between them cannot be detected completely. If the interpretation about the postorbital is correct, in which *Peipehsuchus* is distinguished from the other teleosaurs.

The squamosal can not be described in detail, since most of sutures with the peripheral bones are indistinct. On the occipital view the squamosal contacts the exoccipital and suspends above the quadrate-quadratojugal, forming a distinct otic notch. Nash(1975) described a similar posterior opened otic notch in *Orthosuchus* and supposed that a tympanic membrane might adhere to a curved rear of the quadrate within the otic recess and the tip of the squamosal and paroccipital process. On the lateral side of the squamosal there is an evident notch rather than a longitudinal groove or ridge marking a conjunction between scales covering the skull and those covering the upper ear flaps as in living crocodiles and in *Orthosuchus*.

The jugals are rather incomplete for loss of the most part of its posterior ramus. An interval of 5mm between the remainder of the jugal and the postorbital indicates the width of the laterotemporal fenestra, which is narrower than that of the other teleosaurs.

The ventral part of the skull are quite complete, but the sutures of the bones are unclear. The large internal nares lack a posterior border as in *Teleosaurus*. The palatines form a pair of barrel vaults of the internal nares and contact to the pterygoid at the posterior end of the vaults. The pterygoid is relatively small. In contrast to horizontally in *Steneosaurus* and *Pelagosaurus*

(Nash, 1975) or vertically in living crocodiles, the ectopterygoid extends obliquely, so that the pterygoid flange more or less projects below the level of the alveoli border. The basisphenoid is a small triangular bone on ventral view, having basiptyergoid process fused tightly with the pterygoid. The large medial eustachian foramen lies posterior to the basisphenoid. The lateral eustachian foramen on each side are visible and possibly present on the suture of the basisphenoid and the basioccipital as well. The quadrate is stout. Its ectepicondyle and entepicondyle are in a line at an angle of 75 to the mid-line of the skull. Nash (1975) stated "... in *Steneosaurus* the pterygoid has a posterior process which extends back along the side of the basis cranii as far as the basisphenoid-basioccipital suture and makes contact with the exoccipital, so that the quadrate does not meet the basisphenoid". Although the suture in this position of *Peipehsuchus* can not be recognized, it is probable that a posterior process of the pterygoid is absent and the quadrate contacts the basisphenoid directly.

The occipital part of the *Peipehsuchus* is narrow rectangular in shape with the long side being 3 times of the short one. The height of the skull is only 6cm, which is one tenth of the skull length. The structure in the occipital are quite similar to that of the other teleosaurs. The large foramen cranio-quadrate passage between the exoccipital and the quadrate and three pairs of foramina on exoccipital respectively for the cranial nerve XII, the cranial nerve X and the caroticum posterius are quite distinct.

Since the new material is different from that of pholidosaurs in having the premaxilla separating from the nasal, superficially located postorbital bar and a large supratemporal fenestra, the allocation of *Peipehsuchus* to Teleosauridae remains little doubt.

The *Peipehsuchus* is distinguished from the other teleosaurs in the following complex features: Snout long and slender with extremely expanded tip; tooth number relatively small—3 on premaxilla and 26-27 on maxilla; maxillary tooth almost straight, slightly lateral compressed, and having faint striations on surface; internal nares lacking posterior border, but having a pair of barrel vaults formed by palatines; postorbital not participating border of orbit (?).

图 版 说 明

长鼻北 2 鳄头骨顶视和腹视(原大×1/3)

The dorsal and ventral views of *Peipehsuchus teleorhinus*.

