

## 规划师应该去了解的另一门语言 ——地质遗迹与古生物研究

### Another Language that Designers Need to Understand — Geological Heritage and Paleontological Research

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**摘要 /** 化石是古代生物的遗存，是自然界留给我们的不可再生的资源。它们是我们人类了解地球上生物演化过程的唯一资料，化石及其所存在的环境都应当得到保留。本访谈介绍了国家重点保护古生物化石集中产地在城镇化的进程中所面临的问题，并指出古生物化石集中产地的规划需要多专业、多部门的配合，以实现化石遗迹保护、当地经济发展、科学研究的共赢。而对于规划师而言，只有提升自身素养，并有效地与地质学家沟通，才能引导公众去了解地质知识、探索自然。

**关键词 /** 地质遗迹；古生物研究；国家重点保护古生物化石集中产地；城镇发展；规划

**Abstract /** Fossils are the remains of ancient organisms, they are our non-renewable resource; they are the only data we have to understand the evolution of human life on Earth. Fossils and its existing environments must be preserved. This article introduces the issues what National Protected Important Paleontological Fossils Sites are facing in the urbanization process, and points out planning for these sites needs a multi-disciplinary and -sectoral collaboration for site preservation, local economic growth, and scientific research. Planners have to enhance their knowledge and productively communicate with geologists in order to guide the public to learn geology, and explore the nature.

**Key words /** Geological Heritage; Paleontological Research; National Protected Important Paleontological Fossils Site; City and Town Development; Planning

#### 您能否先为我们简单介绍一下您所从事的“地质遗迹和古生物研究”领域？当前的城镇化进程对该研究领域造成了怎样的影响？

江大勇（以下简称江）：首先，我想说明的是，地质遗迹和古生物研究并不属于考古学的范畴，在某种程度上，考古学范畴内的环境考古倒是与我们这个学科有一定的相近之处。然而，它们与常见的文物考古之间也有相同点和差异。相同点是都具有遗址或发掘场，但从研究对象来看，文物考古研究的是人类的文化、文明的演进及其与环境之间的关系，研究的是社会属性的变化；而地质遗迹和古生物、甚至是环境考古，研究的都是生物演化与环境之间的关系，研究的是自然属性的变化。

其次，在立法层面上，古生物化石的保护落后于文物考古。我国有明确的《文物保护法》，而人们对古生物化石却少有关心。目前仅出台了一项《古

#### Can you briefly explain your "geological heritage and paleontological research"? What are the impacts of current urbanization on this field of research?

**Dayong JIANG (JIANG Hereafter):** First of all, I would like to clarify that geological and paleontological research do not belong to the same category as archaeology. There are some similarities between environmental archaeology and archaeology, but the key differences are worth noting. Both are field based and often operated on archaeological sites, but the studying object of relics archaeology is the relationship between human culture within the evolution of civilization and the environment. It is about changes in social properties, whereas geological, paleontological, or even the environmental archaeology is about the relationship between biological evolution and the environment.

生物化石保护条例》，而且是2011年才颁布的。

此外，古生物化石的保护现状方面也远不如文物。比如在工程建设过程中，文物勘探要先于破土施工。如果勘探出了文物，必须首先进行抢救性发掘；如果你在施工过程中发现了文物，必须马上停工，并报告文管所，文物部门鉴定完毕后方可再开工。而在当前的城市建设过程中，化石环境保护往往要为经济让路。例如，很多国家地质公园的规划都经过了多次“修编”，一次次以各种城镇发展理由将其范围不断缩减。一个100多平方公里的国家地质公园最后可以缩至70多平方公里！还有更痛心疾首的情况，例如当年云贵交界处要修建高速路，道路会通过一段出产非常著名的贵州龙化石的地层，宝贵的化石资源被挖掘机严重毁坏。还有安徽巢湖地区：巢湖当地于1972年因修建铁路发现了一块化石，这块化石有可能是最早下海的鱼龙。当时当地政府没有化石保护意识，地质保护部门也缺乏全局观。当地的巢湖水泥厂因出产优质的水泥而闻名全国，而其制造水泥的原料就采于化石丰富的马家山——那水泥里面不知道烧了多少龙骨头！

### 我们得知，前不久我国确立了第一批的国家重点保护古生物化石集中产地，这会对当地的城镇发展带来怎样的影响？

江：2013年年底，我国国土资源部确立了第一批共38个国家重点保护古生物化石集中产地。大家对此可能比较陌生，我简单解释一下：我国根据化石的重要等级，将化石分为重点化石和非重点化石。其中重点化石又分为一级重点化石（相当于国家一级文物）、二级重点化石和三级重点化石。国家将一级和二级重点化石的集中区域确立为重点化石集中产地。这些集中产地分布于内蒙古、辽宁、山东、山西、湖北等19个省份，且往往规模较大，例如贵州兴义的化石产地的面积就约100km<sup>2</sup>。而且，这些化石产地是被永久性划定了下来。因为化石是古代生物的遗存，是自然界留给我们的不可再生的资源。它们是我们人类了解地球上生物演化过程的唯一资料。而现阶段我们认识的太少，未知的太多，所以说化石是我们永远研究不透，永远也研究不完的。然而化石所存在的环境也应当得到保留。因为



1. 安徽巢湖水泥厂被破坏的化石层。  
1. The fossil strata was destroyed by the stone extraction of the Anhui Chaohu cement plant.

On the legislative level, the protection of ancient fossils is far behind the field of relics archaeology. China has a clear “Cultural Relics Protection Law”, but there are few people who truly care about preservation of ancient fossils. China only issued an “Ancient Fossils Protection Ordinance” in 2011.

In addition, fossil protection is often not considered as important as protection of a cultural relic. For example, cultural exploration must be concluded prior to the groundbreaking of new construction. If new artifacts are found during the construction process it must be shut down immediately and reported to the Agency of Cultural Relics. Construction cannot continue until the agency has completed its work. In the current process, environmental protection often makes way for the economic. The idea of a national geological park has gone through initial planning, but urban development continues to shrink its scope. A one hundred square kilometer national geological park site has been reduced to less than 70 square kilometers! There are even more discouraging examples, such as when the Yunnan-Guizhou highway junction that continued its construction even though it passed by some very famous dinosaur fossil strata. Valuable fossils at Guizhou were severely damaged by excavator. In another example from Chaohu in Anhui Province, the earliest fossil sea dragon may be found during the construction of Chaohu local railway in 1972. However, the local government lacked of fossil protection awareness and the nation department for geological protection lacked the resources to stop the construction. The Chaohu cement plant produces national quality cement; its raw material was collected from the fossil-rich Majiashan Mountain — we cannot imagine how many dragon bones had been burned in this extraction!

### Recently China has identified the first batch of National Protected Important Paleontological Fossil Sites. How does it affect the related local city and town development?

JIANG: At the end of 2013, China’s Ministry of Land and Resources established the first batch of 38 National Protected Important Paleontological Fossil Sites. Only few professionals know this, so I will explain: China receives an international rating based on importance of key and non-key fossil. Key fossils are divided into three levels based on their national importance, with the first level being of the greatest importance to national heritage — A first level fossil is legally regarded as a first grade cultural relic. A fossil site will be established around the first and second level fossil producing area. The first batch of fossil sites are located in 19 provinces, such as Inner Mongolia, Liaoning, Shandong, Shanxi, and Hubei, and when necessary at a larger scale of approximately 100 km<sup>2</sup>, such as in the case of Xingyi in Guizhou Province. Because fossils are remains of ancient organisms, they are our non-renewable resource; they are the only data we have to understand the evolution of human life on Earth. At this stage we know too little, there are too many unknowns, making the study of fossils an impervious, never ending search. Existing environments surrounding a fossil site also must be preserved.

Fossil sites can be preserved at a national level by designating core-protected and secondary protected areas. No new construction projects would be allowed in core-protected areas. New constructions such as roads, reservoirs and housing construction would be allowed in secondary protection zone based on local social and economic development planning.

One way of thinking about this plan is as a hoop — it is not as simple as drawing a circle and allowing no one to enter for hundreds of kilometers. We want local economic development and social organization that considers fossil protection integral to achieving long-term development goals. How protected areas help to catalyze economic benefits for local communities has become one of the most important issues to consider in new development. A typical approach is to combine tourism and fossils, such as establishing a fossil

化石蕴含的就是它形成时的环境信息，你把环境改变了，那么化石也就没有了所依附的载体。

目前国家需要对这些产地进行规划，划分出核心保护区和次级保护区。核心保护区内不允许有任何工程性建设（例如公路、水库、房屋建设工程），在次级保护区中才可以根据当地的社会、经济发展规划进行限制性建设。

规划一经通过，就相当于给当地政府戴上了一个“箍”。这个规划不是简单得划一个圈，谁都不许进就可以了，在上百平方公里内，我们要将当地的经济和社会组织统筹考虑，寻求一种既保护化石，也能够有利于实现当地长远目标的方式。如何使这些被保护的地区为当地带来经济收益就成为了规划面临的重要问题之一。一种比较典型的做法是使化石产地与旅游业相结合，建立化石保护村等。规划者要考虑如何带动村民参与其中。村民如果得不到新的经济补偿，就往往会成为化石产地的“破坏者”——他们会挖掘并倒卖化石，从中谋利。因此这些产地需要一种整体性的、预见性的规划。

除此之外，还要使得保护有益于研究。不少化石集中产地的管理人员会只知道一味保护，而对包括科学研究在内的一切进入行为进行阻碍，“只要是重点化石你就不能动”。这是极端的一种理解。那么在目前这种情况下，我们只能求助于国土资源部门出面去协商。这就涉及到多部门之间的沟通与协调。

#### 目前来讲，这些化石集中产地的发展面临着哪些问题？

江：虽然这些产地从确立到现在仅过去了一年，但有不少是在确立之前就已经开始经营当地的化石文化。目前比较不错的包括贵州的兴义和关岭、云南的禄丰等地。前两者都将化石集中产地与国家地质公园结合起来，而禄丰的做法更是超前，建立了一个“恐龙谷”，是一个国内比较成熟的古生物化石主题的地质公园。虽然化石资源和这个产地都属于国家资产，但其引进了民间资本，也依赖民间运营，当地政府只在其中起到监管作用。这样一来，既不用动用地方财政，又能够带动经济发展，当地政府何乐而不为？但其是否值得推广还值得思考。



2. 被破坏的化石  
2. Damaged fossils

其中的部分隐患在于，如果交给民营资本运营，就可能产生化石保护问题。他们倒卖化石怎么办？我们可以设想，要卖多少张门票才能抵上倒卖一条“龙”（爬行动物）化石的盈利？另外，民营资本可能会对科学研究加以进一步限制。

遗憾的是，到目前为止，我国第一批38个国家重点化石集中产地，还没有一个拿出合格的规划方案。贵州兴义的产地规划有望于近期送交国土资源部评审，但这个规划也只是粗线条的规划纲要，仅对保护区进行了简单分级。在这里面，我们就期望有更多的规划研究人员参与进来，为我们提供多学科、多角度的规划建议。

#### 但是对于地质公园的规划师而言，环境考古就像是另一门语言，那么规划师如何与地质学家之间建立有效的沟通？

江：这就需要各专业间的沟通与协作，以及规划师

preservation village. However, planners must consider how the villagers will be involved. If they are not given financial compensation, these villages often become fossil “spoilers”, in that they may excavate and resell the fossils, thus making a profit off the destruction of these irreplaceable landscapes. Establishing clear linkages between fossil preservation and tourism requires holistic, anticipatory planning.

In this initial program there is also a protective benefit where everything with regard to the fossil site is centralizing managed and blindly protected. In other words, anything considered for scientific research cannot be touched. This is an extreme approach. In the current situation, we can only ask the National Land and Resources Department to negotiate the terms for each site, something will involve cross-agency communication and coordination.

#### What problems do the fossil sites face during their ongoing development?

JIANG: The fossil sites have been established for only a year, but many of them were all ready under some kind of local protection. In some places, local protection has been quite good, including Xingyi and Guanling, in Guizhou and Lufeng in Yunnan. The two sites in Guizhou established national geologic parks and Lufeng made a more diverse proposal and built a “Dinosaur Valley” fossil theme park. Although fossil resources are owned by the state, private businesses have been introduced to the site, which helps to alleviate some of the local financial burden and promote local economic development, while the local government playing a regulatory role. There are also risks with this model. For example, how can private institutions be best regulated? How to guarantee that the private capital will not scalp fossils in the park? How to ensure that the private capital will not restrict the on-site scientific researches?

Unfortunately, so far, none effective plan has been proposed for any of the first batch of 38 national fossil

sites. The plan for Xingyi is to be sent to the Ministry of Land and Resource for review in the near future, but which is just a rough outline. Multi-disciplinary collaborations based on a comprehensive consideration of the site are need.

#### For geological park planners, environmental archeology is like another language. How do planners build effective communication with geologists?

JIANG: This requires communication and collaboration between professionals and increased education of the other’s knowledge and specialties.

China’s current geological park planning is lackluster at best. For instance, in the Anhui Majiashan example that was mentioned previously, the government stopped all cement production activities in the area around 2011. The government plans to develop the location as a tourist hotspot through ecological restoration. The government has invited a Hong Kong planning firm to design the project, which will include planting vegetation in the pit. Their sense of protection is right, but they have not taken into account the follow up results, such as how a beautiful, lush park will cover up the stratigraphic section, the very thing that makes the site so unique. This not only hinders research, but may cause damage to the fossil layers once the plant roots grow into the strata where fossils exist.

Planning a geological park calls not only for geological protection, but interpretive design and education to explain the geological significance through tour routes, interpretation system and service facilities. The park should be designed in such a way that conveys the historical significance and helps guide the public to understand get interested, and love the site. The most important first step is to translate geologic information and scientific knowledge into a simple, popular and attractive language. Now most people only glance at the signage, it leaves a quick, but deep impression. The

自身素质的提升与知识的积累。

我国目前的地质公园的规划项目还乏善可陈，有的甚至让人哭笑不得。例如刚才提到的安徽马家山，2011年左右，安徽政府停止了巢湖水泥厂的工业采石活动，将场地作为化石重要产地加以保护起来，打算通过生态修复，将之打造为未来的旅游热点。当地请来香港的规划公司为之规划，在矿坑遍植草木。他们有这种保护的意识是对的，但他们没有考虑到后续的结果：如此一个美丽的、葱郁的公园，却把地层剖面全部覆盖起来了。这不仅妨碍了科学研究，使山体无法展示它的自然信息，一些植物的根系甚至深入地层，还会对化石层造成破坏。

我认为对于地质公园的规划不仅包括对地质环境的保护、地质信息的科学展示、游览路线设计、配套服务设施设计，还应当格外重视解说系统的设计。我认为规划规划师首先得懂得地质学家想要说的是什么，然后规划师再用设计的语言将这些东西传达出来，才能引导公众去了解，从而感兴趣，并热爱。其中最重要的第一步，我认为如果规划师能够听懂我在说什么，那么一般老百姓就会看懂规划师在说什么。这涉及到怎么把地质知识和它的科学意义用一种简明、通俗、吸引人的语言阐述出来。在一些地质公园中，人们只会在爬山的旅途中对沿路的解说系统匆匆一瞥，并不会留下什么深刻印象。因为解说牌大多仅为“这块化石有多少亿年的历史”，这种苍白的语言并不能让人感到兴奋。我觉得美国的科罗拉多大峡谷是一个很好的范例。其解说系统充分发掘、利用了大峡谷的地质条件，对解说系统进行了整体规划，配有解说标识、解说员，同时还印制了各种相关书籍与导览手册，加之多种能够强烈调动人类感观的体验式设计，以及各类纪念品，使得美国本土游客乃至国际游客都能在欣赏大峡谷壮观的自然地貌的同时，也对大峡谷的地质信息有所了解。

### 为了有效地向公众展示地质环境信息，主要有哪些途径或方式呢？

江：目前主要包括建立国家地质公园和自然博物馆。目前而言，我国的国家地质公园还主要被视为

一般旅游景点来经营。在此方面我们应该向美国的国家地质公园体系学习，例如黄石公园，以因地制宜的方式，将化石美妙与神奇的内涵展现在游人面前。而目前我国的自然博物馆还是一种比较被动的向民众科普、宣传的方式，其面临着两个突出问题：一个是数量少，一个是特色乏。举例来说，北京仅有屈指可数的几家自然博物馆，而且同质化严重，陈列的差不多全是恐龙。相比之下，自然博物馆在美国和欧洲地区非常普遍，且都具有各种各样的鲜明主题特色，这些主题都与地域特色密切相关。而且一些民营博物馆中存在化石造假的问题，那么这些陈列的展品不仅起不到科普的作用，还可能误导公众。我个人认为我国应该加强自然博物馆的建设，因为它们古生物化石保护与科普中非常重要的一个环节，是让人们了解自然历史、生物进化的很好的窗口。我想如果中国的孩子们如果可以少上些课外班，多去些博物馆，将会是件很幸福的事！

总体来说，我国目前尚未形成比较明确的展示思路，古生物学家、地质学家、规划师和教育学者等等也一直在不断地努力探索。我认为宣传教育是一方面，公众自身素养的提升则是另一方面。目前大众普遍还没有强烈的尊重地球、尊重历史、尊重自然的意识。随着人们对了解地球的意愿与渴望的不断增强，我相信会有越来越多的人愿意去主动探索自然。LAF

United States Grand Canyon is a good example: its interpretational system uses the geological conditions of the Grand Canyon to drive the overall site planning. It is featured on logos and narrative materials. The image of the Grand Canyon used over and over creates a visceral response to the geological features of the site that can be equally interpreted by international tourists and US alike.

### What are the main means or methods to effectively communicate geological information to the public?

JIANG: Geological park and natural history museum are the main places to communicate and educate the public. For now, most China's national geological parks are considered as a normal tourist attraction. We should look to the United States system for maintaining national geologic parks, such as Yellowstone National Park, where the wonderful and magical fossil collective is shown to visitors. At present, most China's natural history museums are open to the public as a more passive mode of propaganda. In this regard, it faces two major problems: one is its small number, and

the other is its small collection and lack of capital. Beijing has only a handful of natural history museums, and they lack variety and depth, with almost all the displays being of dinosaurs. In contrast, natural history museums in the United States and Europe are very common, and have wide and varied collections, often organized around regional characteristics. Additionally, the private fossil museums in China often have fraud problems, visitors could be misled rather than educated. China would benefit from national history museums, as both a cultural resource and public platform to expand knowledge about the importance of natural history and biological evolution. If Chinese kids spend less time on extra-curricular classes and more time in museums, that would be a very happy thing!

Overall, China has yet to show a clear approach to the establishing a linked network of paleontologists, geologists, planners and educators. There must be a stronger respect for the earth, history and nature of consciousness. I believe more and more people will be interested in exploring nature with the enhancement of our awareness and aspiration of understanding the Earth. LAF



3. 化石贩子盗取化石的洞口目前已被政府查封。
3. The mouth of an illegal extraction cave has been sealed up by the local government.