

人类生态视野中的 长江下游农业起源

The Emergence of Agriculture in the Lower Yangzi:
A Human Ecological View

潘艳 著



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序

陈 淳

农业起源是国际考古学研究的三大基石之一,这个领域的发展如科林·伦福儒(Colin Renfrew)爵士所言,不只表现为出土新材料的增加,更重要的是在于分析方法的改进及思想观念上的突破。这项课题已经从传统考古学“何时”与“何地”,转向“如何”与“为何”问题的探索。潘艳博士的这本专著就是对后两个问题的尝试性研究,运用国际学界流行的理论方法,试图为长江下游稻作及农业起源提供一种全新的解读。本书以她的博士论文为基础,之后又做了进一步的打磨和优化,无论在理论探讨的深度和广度还是材料定性和定量分析方面都有许多亮点,因此从学术创新和科学价值上,获得上海市优秀博士论文的荣誉应该是实至名归。

潘艳自本科开始就在我的指导下阅读欧美考古学界许多有关环境考古学和文化生态学方面的原典,如朱利安·斯图尔特(J. Steward)和肯特·弗兰纳利(Kent Flannery)等人的著作,并将一些经典译成中文,在《南方文物》的“域外视野”栏目中发表。她在复旦大学本科的箝政课题中以三峡地区史前生态为目标,探索了该地区特殊的人地关系。直博之后,她得到国家教育部联合培养项目的支持,到加拿大多伦多大学人类学系教授、国际著名植物考古学家加里·克劳福德(Gary Crawford)教授门下学习了两年,夯实了她在环境考古和植物考古方面的理论基础和分析能力,特别是加深了对美国植物考古学家布鲁斯·史密斯就人类生态位构建理论所展开的多方面思考与论述的了解。两年的强化系统训练,为其论文和本书的写作打下了坚实的基础。与此同时,她也在考古材料上得到了浙江文物考古研究所同仁的鼎力相助。他们毫无保留地向她开放上山、跨湖桥、河姆渡和田螺山等遗址出土的植物遗存,使得这本著作能

够用第一手资料来详尽分析全新世初长江三角洲和钱塘江流域古代先民的生计和对野生资源的利用和操纵,从而管窥水稻驯化和农业经济发展的过程。浙江文物考古研究所的同仁思想开放,与时俱进,意识到生态物对考古研究的重要性,所以尽可能在田野发掘中保留一切有价值的生态材料。这也为植物考古的定性和定量分析创造了必要的条件。在此,我特别要对为本书研究提供材料和帮助的郑云飞、王海明、孙国平、蒋乐平、郑建明,还有萧山博物馆的施加农、朱倩等诸位同仁深表激赏。因此,国外前沿思想方法的训练和国内同行的大力支持,对于这本书来说都是缺一不可的,此外当然还有赖于潘艳本人的悟性、努力以及对这门学科的执着。

我觉得本书的创意和洞见有以下几点:(一)从全球农业起源的视角来看待和分析长江下游的农业起源,充分讨论和介绍了国际上有关农业起源的理论和最新动态,并紧跟学术前沿,为研究设立了明确的问题导向。(二)引入生态位构建的概念分析农业起源的过程,并从人类对资源的被动利用的过程论视角,转向关注古代先民对生态系统进行积极和主动操纵的后过程论思考。(三)把长江下游农业起源探索从对水稻单一作物驯化过程的关注转向先民对生态系统里各种资源的操纵和综合利用,然后从这些野生资源的比例变化来看植食种类开发和利用的变迁,进而判断植物驯化的背景与过程。特别是注意到跨湖桥遗址水稻和非水稻植物的利用有一种起落的过程,表明水稻的驯化与对其的强化利用并不同步,似乎表明当时开发和利用多种生态位要比水稻栽培更省力更有效。还有,量化分析表明,田螺山资源前三种主要淀粉类植物橡子、芡实和菱角表现出被水稻所取代的趋势。(四)对作为判断野生和栽培水稻标志的小穗轴基盘做了详细的量化分析,为水稻利用和栽培提供了一种历时变迁和动态过程的洞见,并为判断野生稻和栽培稻区分提供了行之有效的途径。我觉得,如果这些观察和分析能够扩大到长江三角洲整个区域大多数史前遗址的植物考古分析中去,将能进一步深入了解和重建水稻和其他食物种类的驯化过程以及农业起源的具体轨迹。

就一本学术专著来说,写作过程中得到各位同行专家的审阅、批评和

建议非常重要。正如著名美国人类学家埃尔曼·塞维斯(Elman Service)在其《国家与文明的起源》一书的序中所言,在漫长的写作过程中,最大的乐趣之一就是得到各位审阅者的反馈。他的这本名著就是在许多同仁的批评建议下,显著偏离其最初设计方向而日趋完善的。本书基本是潘艳个人独立完成的,因为加里·克劳福德教授无法阅读中文,而我的专攻无法在许多细节上提供建议。如果本书是用英文写作,并能让国际上一些著名专家审阅并提供意见,最后的终稿质量肯定会更好,所以这本专著应该还有值得提高的地方。

由于作者主攻植物考古,加上时间和精力所限,所以本书除了对鸟的利用略有提及外,并不涉及动物考古。原因可以理解,但是就长江下游农业起源的探索而言,这显然是不全面的。希望以后这个课题能够与动物考古结合来加以完善。我觉得生态位构建作为一种概念应该可以发挥更大的分析和阐释作用,与其相近的几个术语如栖息地或生境(habitat)和遗址域(catchment area)在运用上究竟有什么不同,在讨论中比较含糊。根据书中引用的定义,生态位是指“一个物种在群落中所占有的生境以及它在该生境中所需的环境要素”。而且,生态位构建可以帮助我们分析人类对资源的管理和动植物驯化的过程,以及人类塑造、改善和维持其生计,拓展自身发展空间的各种手段。由于每个物种都占据着自身特殊的一种生态位,并与其他物种的生态位有一定的重叠和竞争,所以,人类自身生态位的构建就是与其他生计物种一起建立起一种共生关系的过程。人们对环境和资源的利用和操纵使他们成为这种共生生态系统的工程师。

如果借鉴美国考古学家肯特·弗兰纳利偏差放大的概念来审视对不同物种利用的生态位构建,水稻栽培和驯化很可能是人类生态系统动态平衡过程的一种偏差放大。与广谱资源的许多其他物种相比,从水稻栽培成本高、回报率低的特点来看,其优越性并不明显,并非最佳觅食对象。但是,水稻相对他物种的优势很可能是它的储藏潜力。因为,人类觅食的高回报物种,大多只能当季消费,很难长期储藏。所以,自更新世末和全新世初以来,人类日益定居的趋势使得储藏变得越发重要,因为储藏能够

应付不期而遇的食物短缺,以及保证人群在一年生存周期中度过食物匮乏的冬季。从跨湖桥和田螺山遗址来看,数量最多的几种淀粉类植物可能都有长短不一的储藏能力,能够应付短期的食物波动。而应付较长冬季食物短缺的橡子因为回报率高,可能会受到更大的青睐,水稻因回报率很低很可能是作为储藏的候补选项而被利用和栽培的。而它在跨湖桥与其他物种相比地位不升反降的情况来看,似乎表明橡子和其他食物种类的供应在人类操控的生态系统中足以应付全年周期的食物波动与供应,使得水稻作为储藏的候补选项地位下降。而田螺山的情况则体现了水稻取代前三类淀粉类主食橡子、菱、芡实的趋势,尽管目前还不清楚这几类主食消费和储藏比例所蕴含的意义,但是很可能野生橡子等资源的波动或某些其他原因,使得田螺山先民逐渐偏重对水稻的依赖。所以,如果对人类依赖和操纵的几类主要物种的生态位进行分析,并将它们放到人类生态系统中进行动态观察,它们的历时波动和变迁,应该可以重建从最初的低水平食物生产到少数几种高产驯化物种的发展过程,了解人类从原始自然生态适应向今天农业人工生态的转变。

本书的一个遗憾是,最后一章对国际流行的几种农业起源主要理论只是根据自己的案例分析做了评述,并没有利用它们或提出自己的理论来解释长江下游的农业起源。我觉得用人口压力说和竞争宴享说来审视水稻的起源还是可以发现各自的合理之处,可以加以利用和充实。我觉得,从水稻最初似乎用来应付食物季节波动到最后成为主食,人口压力在其最终取胜的长期过程中应该是一个不可忽视的潜在动力。从考古证据来看,水稻在崧泽晚期之前似乎一直是野生资源利用的一种补充,并不一定处于主食的地位。一直到良渚才突然出现强化栽培和利用的迹象,并伴以大量精耕细作农具的出现。这显然和人口增长和复杂社会对剩余产品的需求有关。随着良渚文明的崩溃和可能的人口减少,马桥时期水稻的利用又回落到较低的水平。因此,人口压力虽然不宜被看作稻作农业起源的主动动力,但是对于水稻作为主食而最终取胜的长期趋势而言,还是一种值得考虑的潜在动力。

海登(Brian Hayden)的竞争宴享说在用到水稻栽培上似乎与考古证

据所反映的事实不尽相符,因为跨湖桥和田螺山似乎还是原始的平等社会,缺乏少数人用夸富宴来筹办美食、树立个人威望的迹象。但是,跨湖桥精美的黑陶罐和奉食的泥质大陶盆暗示集体宴享的存在。作为维系原始社会关系的集会、祭祀和宴享在现代民族志也多有报道,不一定非得与社会等级分化拉上关系。而水稻在酿酒中的作用也值得深究,酒的起源很早,这在贾湖遗址中已有端倪,世界民族志中也不乏可供借鉴和类比的案例。酒的酿造应该起源很早,并与淀粉类植物和水果及蜂蜜等利用密切相关。酒被认为是社会关系和运转的润滑剂,也可能是祭祀活动和萨满仪式的必备之物。这些活动出现在社会复杂化之前,所以还是值得思考稻米利用的各种其他可能。

最后的期望是,植物考古学的问题导向和研究视野,应当从水稻和少数几种主食谷物的溯源转向人类利用各种植物的探究,包括水果、薯类、蔬菜、调味品、香料、饮品、染料、洗涤、药物、致幻药、编织物等的开发和利用,将神农尝百草的研究上溯到史前时代。同时将植物考古分析与相伴出土的各种工具结合起来,利用学科交叉的分析技术,以期能够在类型学之外,为各种工具的文化分析提供一种功能性解释。

潘艳的这本专著只是她处女航的开始,希望她以后能够继续努力,为我国农业起源研究提供更多的洞见,并将植物考古学拓展到与人类生活相关的、对各类植物的开发和利用,为发展具有中国特色的植物考古学做出自己的贡献。

Preface

Gary W. Crawford

This study has been a long time in the making. That's a good thing. One of my senior colleagues compared writing a monograph to producing a fine wine. Time and patience are two of the most important ingredients. This analogy may seem a little pretentious, but it has been worth the wait to see the results of this project. In these pages is an articulate exploration of the human ecological setting of some of the most extraordinary ancient cultures in pre-Bronze Age China: the Majiabang Culture and the Hemudu Culture including its immediate predecessors, the Shangshan and Kuahuqiao Cultures. The sites that form the substantial body of data in this study are waterlogged with outstanding preservation. House support posts, other architectural features including wooden pads to keep posts from sinking into the sediment, bows, paddles, a dugout canoe, preserved paddy fields, and wooden art forms round out the usual pottery and stone tools that archaeologists are familiar with. But the richness of the plant and animal remains make these sites tantalizing because they represent the debris left by people who were leading humanity, at least in this part of the world, for the first time along an unrelenting path to agriculture.

When I was first exposed to the archaeology of China as a student in the 1970s the Hemudu Culture was just beginning to be noticed. The excavations at the Hemudu site began in the early 1970s and details were being published in the late 1970s. At the time, no one knew much about the circumstances of early rice farming. Western scholars

were also intrigued at the time and into the early 1980s by research in Thailand that was recovering rice chaff in pottery, rice that was being interpreted in the context of what was then thought to have been a Southeast Asian non-centre of rice domestication according to T. T. Chang and Doug Yen. The “non-centre” point was a reference to Jack Harlan who rejected the notion that a plant’s place of domestication could be pinpointed to a particular point or centre. Not only we were seeing snippets of insight coming out of Asia but new results were also coming out of Mexico, Southwest Asia and Eastern North America. Hunter-gatherer studies were changing how we thought about their way of life too. Their earlier portrayal as hand-to-mouth, struggling people was wrong. Preconceptions about early agriculture everywhere were being upended. It was an exciting time to be in archaeology because so much was being exposed but every new piece of information seemed to confuse us more. It was the excavations at Hemudu that focused attention north to the Yangzi region from Southeast Asia as an important locus of early rice production, perhaps *the* locus and a locus with no clear ties elsewhere. This population appeared to be independently developing agriculture. The first reports seemed unbelievable, that huge layers of rice were uncovered in a waterlogged context well before any signs of metallurgy, yet they were true. Beyond all this, Hemudu could not have been the earliest culture with rice production in the region. It was too well-developed. Subsequent projects such as the ones at Jiahu hundreds of kilometers north of Tianluoshan and Kuahuqiao, and others hundreds of kilometers upriver at Pengtoushan, Diaotonghuan, and Xianrendong showed how widespread rice production appeared to be in the period from about 9000 to 6000 years ago.

We are well aware now that these are the people who brought us rice, one of the top grain crops in the world today. They also provide us with the first evidence for the use of water chestnut, foxnut, hog

plum, peaches, and pigs among others. So a significant part of the cuisine associated with this part of China was being developed in the households of the Kuahuqiao and Hemudu people. These households and their surroundings were their laboratories. The debris left in the mud is the stuff of their experiments, not that they knew that they were experimenting. I use that word to describe the process more in hindsight. They were not scientists in our sense of the word. Yet they had an intimacy with their world and a depth of knowledge of that same world that we can only superficially understand because we can't observe their lives unfolding in their time and place. We can only interpret their lives from the evidence that we, as archaeologists, are able to uncover.

Fortunately, a tradition of archaeological botany and zoology developed in Zhejiang Province out of the necessity for archaeologists to interpret what the Hemudu world was like. They weren't the only people in the world at the time setting out on a path to farming so this study will help us understand what was happening elsewhere too. Early farming is, for me at least, the most fascinating issue in archaeology because, to some extent, it makes no sense. Farmers work harder and have poorer health than their non-farming predecessors. Their predecessors weren't starving yet early farmers decided to focus their attention on a set of plants and animals that would evolve to force us to depend on them to such an extent that, without them, our modern societies would collapse. They were solving some type of problem by making the choices that they made. We think that they were reducing some type of risk and they probably thought that they were developing a more secure existence by cultivating resources rather than going out and finding them (something, by the way, they had no trouble doing before). Studies such as this one by Pan Yan are crucial to bringing us to a better understanding of how this happened, and by doing so, help us understand who we are, as human beings, today.

I first met Pan Yan over ten years ago when she came to study with me at the University of Toronto. Her plan was to learn more about archaeobotany and early agriculture from an anthropological perspective and my lab seemed to be a good place for her to begin. Although her writing had barely begun, she had ideas, ideas formulated when she was doing field work at Kuahuqiao and Tianluoshan, two sites that have come to be recognized as extremely significant archaeological sites in the Lower Yangtze valley. Her ideas needed considerable honing, but they would develop over the early years we worked together at the Mississauga campus of the University of Toronto. What struck me was her enthusiasm for new ideas and her ability to critically evaluate her own preconceptions. It became a reciprocal learning process, a process where I seemed to be learning as much as she was. I was learning about the archaeology of the Lower Yangzi while she was developing her theoretical perspectives. This book is the results of those discussions and subsequent thinking after she returned to China and marks the culmination of her deliberations on the early human ecology of the region.

Pan Yan was trained at Fudan University, one of the finest schools in China. In the mid-2000s she was entering the doctoral program there and felt that she needed a change because her intellectual development had not yet taken her beyond Fudan. So she applied for a fellowship to work with me. When she arrived at my lab I didn't know what to make of her. She was a whirlwind who bombarded me with questions at every turn. Above all wanted to read, and then read more. Nearly every day for two years she would drop by my office with a question that would lead to more questions, then I'd give her a reading list to help her answer her own question, leaving me wondering how I was going to complete my own agenda. After all, I was Chair of my department and had a growing list of my own obligations.

Pan Yan also arrived with what appeared to be conclusions formed while immersed in the context of her research at two sites, Tianluoshan and Kuahuqiao. I encouraged her to start fresh and to think critically about what she had been doing and what she intended to accomplish. Her reading list and travels exposed her to North American archaeology, an archaeology that is far more explicitly steeped in theory than archaeology in China is, or at least was. Archaeology in China had matured rather independently although there were some diverse external influences in the late 19th and early 20th centuries. For the most part, archaeology has been generally accepted as a branch of history that moved forward with confidence derived from a shared, well understood agenda. Site reports and articles tended to be highly descriptive, with good reason. There is so much to describe. As Pan Yan points out, the descriptions tell us who these people were and what their technology was like but provides little insight on why and how people flourished and innovated here at the time they did.

The data coming from these sites, as I already pointed out, has established the Lower Yangzi Basin as a crucial area for understanding not only the evolution of local agriculture but for understanding the origins of agriculture in general. Site reports, individual studies of specific classes of remains, and a lively literature debating the meaning of rice recovered here are all bringing international attention to the region. The periods before and after the Hemudu and Kuahuqiao Cultures are not trifling either. The earlier Shangshan culture, only discovered about ten years ago, is establishing that rice production and probably other resource production has deep roots in the area. Subsequent to the Hemudu Culture is the Liangzhu Culture, potentially the earliest complex, politically centralized (to some significant degree) society supported by agriculture and without metal-working in China. This is a special region. Pan Yan's work sets out to examine

why it became so special. She does this in a creative way.

Fast forward to the present. Her innovative approach came into focus when we pursued ecological issues, particularly human ecology. It's a great way to integrate human behaviour and the plant and animal data from these well-preserved sites. As a result, this book is the first explicitly human ecology-based study situated in a broadly articulated problem: how the first steps to rice-based agriculture were taken. Pan Yan wisely doesn't let the rice issue become central, although it remains an important part of her thinking. The best archaeological research these days uses multiple lines of evidence. Not only is her theoretical approach current but she integrates several crucial forms of evidence to derive and test her model, including genetics. Yes, in order to better understand rice Pan Yan undertook a postdoctoral program in genetics. Central to her thinking is to reject humans as passively receiving whatever their rich world had to offer. The evidence speaks to the ecologically creative role of people, and squarely places this monograph in the subfield of ecology called "niche construction." The concept has been late coming to archaeology, but it hasn't been entirely ignored. My own work and that of my doctoral supervisor and my fellow graduate students concerned anthropogenesis, or the impact of people on their surroundings. We always viewed this impact as interactive. Niche construction more explicitly acknowledges this interaction although I still have trouble seeing a clear difference. "Niche construction" is arguably more inclusive and signals a broader conceptualization of human-environmental interaction and acknowledges a sort of relativity. We could, if the circumstances called for it, select the perspective of rice, pigs, or oaks if necessary. In this case, Pan Yan focuses on people and how they modified their environment and adjusted not only to local habitats but the habitats as they were developing and changing them. The modifications go beyond preparing fields.

Pan Yan writes with an intimacy of the local archaeology that only a Zhejiang-raised scholar could. She was a member of the field teams that excavated several of the sites so she came to know the flora and fauna in the region over years of living and working there. This is an impressive work that will influence not only local thinking about Shangshan, Kuahuqiao, Hemudu and Majiabang, but about early agriculture in general. Hopefully it will also stimulate thinking about what we are doing to our planet today.

Abstract

The Lower Yangzi region is widely thought to be one of the independent centers of global agricultural origins, but no monograph systematically focused on this area in the Early-Middle Holocene has ever been published. By this book, I attempted to investigate agricultural origin in the Lower Yangzi region during 10000—6000 BP from the view of human ecology.

To solve key issues to research of global agricultural origins, the efforts of pursuing a comprehensive understanding of initial domestication in a boarder ecological context has been enhanced in past two decades. Particularly, Bruce Smith advocated that the process of domestication of plant and animal species should be studied in the context of human niche construction. It is conceptualized as “human-driven environmental modification that may lead to change in evolutionary direction and rate of human or other species impacted”. This general concept also provides the logical link between efforts to explore agricultural origins at two disconnected scales of analysis, regional-level and species-level.

Compared with the big picture of exploration of global agriculture origins, the scope of research in agricultural origin in the Lower Yangzi appears more limited. Since the discovery of Hemudu site in 1970s, *what*, *when*, and *where* have been the central concerns in most discussions of early domestication of rice. Little attention is paid to explaining *how* and *why* agriculture emerged. In general, the narrative of agricultural origin in this area has been monopolized by rice, while a lot more taxa and quantity of archaeobotatic records were

ignored. Furthermore, a variety of complex ecological processes of human-environment interaction need to be carefully interpreted. Stimulated by human niche construction theory, my book is aimed to demonstrate the pattern of human's behaviors by which the life cycles of plant species were intervened and the succession of ecosystem in the Lower Yangzi was changed and redirected during 10000—6000 BP.

Four archaeological cultures are involved: Shangshan, Kuahuqiao, Hemudu, and Majiabang. In order to discern human's role in changing environment and population of other species, three basic datasets, including palaeoenvironment, settlement, archaeobotany, are analyzed in detail. Palaeoenvironmental records consist of pollen, phytolith, microorganism fossils, and other geological analyses. On a regional scale, the study area was characterized by monsoonal climate and was largely influenced by rapid marine transgression during 9000—4000 BP. This process completely changed the eastern coastal line of mainland and the landscape of the Yangzi Delta. Not until 7000—6000 BP did the Taihu Plain and the Ningbo-Shaoxing Plain finally form and become stabilized. The unique water environment created ecotone and played a significant role in evolution of human subsistence and social development. A series of anthropogenesis such as burning, paddy field, tending, etc. are indicated by these records. Diversity and richness of the habitats was enhanced and regulated by human's activities so as to give people more flexibility, reliability, and sustainability to cope with issues of resource supply in their long-term occupation.

Settlement analysis looks into distribution and area of sites as well as archaeological features for understanding intensity of impact of human's occupation on local environment. Shangshan Culture is distributed along the upper reaches of the tributaries of Qiantang River. Kuahuqiao is located at the Xiang Lake while a few Shangshan sites have strata attributed to Kuahuqiao Culture. Hemudu and