

Mortgaging the future of Chinese paleontology

Xiaoming Wang¹

Curator of Vertebrate Paleontology, Natural History Museum of Los Angeles County, Los Angeles, CA 90007, and Nanjing University, Nanjing 210093, China

Chinese fossil forgery in the last decade highlights some troubling trends in Chinese vertebrate paleontology (1–4). While fossil forgeries unflinchingly stoke public fascination in a field capable of producing the infamous Piltdown man hoax, the widespread damages that forgery causes are often not sufficiently recognized. Amid the renaissance of Chinese paleontology evidenced by stunning discoveries of inconceivable riches of fossils (5), paleontologic science is treading a path never experienced elsewhere: Commercialization of fossils and all that goes with a quasi-free market of fossil trade that has simultaneously become the boom and bane of Chinese vertebrate paleontology.

The coupling of several factors enables a spectacular boom in the commercial markets of vertebrate fossils: a long history of “dragon bone” collecting for traditional Chinese medicines, an explosive growth in funding for vertebrate paleontology in China, and a remarkable—if often ill-conceived—building spree of Chinese museums that actively participate in fossil trade. The financial incentive for polishing-up or augmenting an “imperfect” fossil may be irresistible for a farmer of modest means. Eyewitness reports suggest that there are now farmhouses that specialize in faking fossils, with shelves of spare fossil parts at standby for the right components. By their nature, statistics about artificial enhancements of fossils are difficult to come by [some estimate as high as 80% of specimens on display in some Chinese museums (see ref. 3)], but researchers in routine contact with traded fossils can attest to the pervasiveness of fossil faking, which is becoming increasingly sophisticated.

By Chinese law, vertebrate fossils are considered state property and are strictly protected for their scientific value (6). In practice, however, lack of enforcement and corruption enable a thriving fossil market that is highly profitable both domestically and internationally. The scale of illicit quarrying in Chinese fossiliferous sites is unprecedented, resulting in extraordinary discoveries of rare fossils that would not

otherwise be found in surface samplings by field paleontologists. While the rest of the paleontologic world still proceeds with its “stone-age” pace of discoveries made by paleontologists scouring surface exposures, Chinese vertebrate paleontology has leapfrogged ahead with the participation of a vast labor force, but in the process risking the future of Chinese paleontology by hollowing out the mountains without regard for collecting common kinds of data and specimens for careful interpretation of ancient environments. The focus of these relatively untrained excavators is almost invariably on the rare and well-preserved few specimens. Although paleontologists happily describe the new blockbuster finds, it is at the expense of common findings that are just as valuable scientifically and vital for future interpretation.

Within the Chinese paleontologic community, there is a wide range of opinions regarding the commercialization of vertebrate fossils. Some view it as a seemingly inexhaustible stream of new discoveries. Others are less sanguine and bemoan the irretrievable loss of provenience data and contextual information associated with commercially traded fossils, even for those few that end up in legitimate museums or institutions.

This massively commercialized Chinese paleontology has several consequences. The most public manifestation is the emergence of a large treasure trove of fossils, which catapult onto the world stage a generation of young Chinese paleontologists, who are now leading authorities in their fields. While such a development is certainly welcome, often lost in the euphoria is an urgent discussion on how to mitigate the devastating effects of the commercial fossil trade: wanton destruction of fossil sites, fossil fakery, loss of contextual information, and the mortgaging of the Chinese paleontologic future.

Some of my colleagues outside China are reluctant to speak out about this problem as it could jeopardize their relationships with Chinese colleagues. As such, strong leadership is required from the Chinese paleontological community to reduce the scope



Much of the posterior part of the skull and zygomatic arches is either faked or simply crude plaster in this “new cheetah.” The color of the matrix also suggests that the specimen may have been collected from localities that are several million years older than estimated in the original publication (2), highlighting the peril of using commercially traded specimens. Image courtesy of Xiaoming Wang.

of this problem. Although the illicit fossil trade likely cannot be shutdown completely, it behooves us to stay aware of the problem and work toward resolving it for the future benefit of paleontology.

1 Mazák JH (2012) Retraction for Christiansen and Mazák, A primitive Late Pliocene cheetah, and evolution of the cheetah lineage. *Proc Natl Acad Sci USA* 109(37):15072.

2 Christiansen P, Mazák JH (2009) A primitive Late Pliocene cheetah, and evolution of the cheetah lineage. *Proc Natl Acad Sci USA* 106(2):512–515.

3 Stone R (2010) Altering the past: China’s faked fossils problem. *Science* 330(6012):1740–1741.

4 Zhou Z, Clarke JA, Zhang F (2002) *Archaeoraptor’s* better half. *Nature* 420(6913):285.

5 Stone R (2012) Dinosaur kingpin opens fossil bonanza to science. *Science* 337(6097):900–901.

6 Stone R (2010) China clamps down on illegal fossil trading. *Science* 329(5998):1453.

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¹E-mail: xwang@nhm.org.