BOOKS & ARTS

Old bones unearth a new passion

Palaeontology in China has been invigorated by highly organized efforts to dig up bones for use in traditional Chinese medicine, explains **Xu Xing**.

The People's Peking Man: Popular Science and Human Identity in Twentieth-Century China
by Sigrid Schmalzer
University of Chicago Press: 2008.
368 pp. $85

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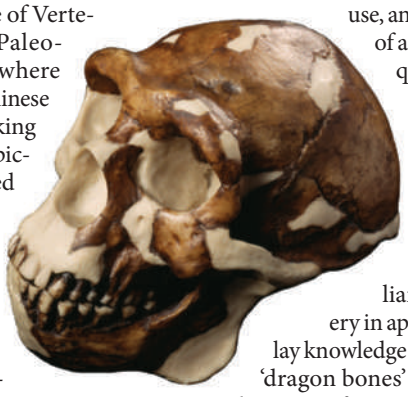
China's rich availability of early human remains has inspired its citizens to get involved in fossil hunting.

Participation in scientific discovery is generally restricted to academic elites, and the specialized character of many scientific fields can make them seem impenetrable to the public. However, many non-specialists find evolutionary science attractive because of the appeal of basic questions that ask who we are and where we came from. Evolutionary science also enjoys a broad social impact because of its tendency to become intertwined with religion, politics and culture. This is especially true in China, which, in spite of rapid progress, still lags behind western countries in most scientific disciplines. However, palaeontology and palaeoanthropology have emerged as exceptions because China's rich fossil resources both contribute to scientific advances in these fields and stimulate wide public interest in them.

The connections between palaeoanthropological discoveries, the public understanding of science in twentieth-century China, and broader issues of cultural transformation and national identity are the main themes of *The People's Peking Man*, a highly original book by US historian Sigrid Schmalzer. Schmalzer spent a year visiting the Institute of Vertebrate Paleontology and Paleoanthropology in Beijing, where many leading students of Chinese fossil hominids, such as Peking Man (skull reconstruction pictured, right), have been based over the years. In preparing her book, Schmalzer interviewed many active and retired Chinese scientists, as well as amateur enthusiasts and even the son of Pei Wenzhong, the palaeoanthropologist who in 1929 discovered the first skullcap of Peking Man.



P. GOETGHELUCK/SPL

Schmalzer focuses on social and intellectual history, and does not dwell on either the strictly scientific impact of the Peking Man fossils — now known to be of the early human species *Homo erectus* — or the frequently recounted story of their discovery. However, Schmalzer does an excellent job of putting the finds in their proper historical and cultural context. For example, she emphasizes that non-specialists play a significant part in fossil discovery in China because many of them have long experience of collecting bones for medicinal use, and may know the fossil sites of a given area better than any qualified researcher.

The discovery of the legendary Peking Man fossils was greatly facilitated by this unique tradition, as Schmalzer explains. Early scientific visitors found mammalian fossils awaiting discovery in apothecary shops, and it was lay knowledge of where to find abundant 'dragon bones' that led scientists to the limestone fissure that eventually produced the Peking Man skullcaps. Although the practice of digging for bones to sell in apothecary shops is not as common today, commercial digging has increased in China owing to the expanding market for fossils as collector's items. Although such operations create their share of problems for the science of palaeontology, they have brought large numbers of people into the search for fossils and have therefore resulted in the discovery of more specimens. Some significant recent advances in Chinese palaeontology could not have taken place without this commercial digging.

The contributions of non-specialists to science in China are not restricted to field activity, and the various forms of public participation in science represent one of Schmalzer's main interests. The state has long been interested in popularizing science for various purposes, including the eradication of superstition and its replacement with the principles of what it calls rational socialism. Chinese citizens, particularly in Mao Zedong's era, benefited from a good system of popular-science education and, in some cases, even had the opportunity to get directly involved in scientific activities. This emphasis on science dissemination and mass participation in science continues to have a considerable effect on modern Chinese society. One result is that technology and agriculture are better developed in China than the basic sciences, partly because the former are more easily understood and accessible to the general public. However, government efforts to bring science to the Chinese masses sometimes crossed over

into counterproductive attacks on scientific 'elitism', particularly during the Cultural Revolution of the late 1960s and early 1970s.

As a scientific discipline with profound implications for the origin and diversification of humans, palaeoanthropology has inevitably contributed to shaping human identity. In this regard, Schmalzer makes a strong case for the key role of palaeoanthropology in the intellectual history of modern China. Her book draws on a wide range of academic and popular sources to show how scientific ideas about human evolution have influenced political and ideological currents in Chinese society, and how ideology has influenced — most scientists would probably say distorted — the scientific interpretations in return.

The People's Peking Man is not a primer on the fossil record of Chinese hominids or the latest interpretations of human evolution. In one or two places, Schmalzer even seems to flirt with postmodernist scepticism about the empirical validity of science, asserting that "the boundary between science and non-science is blurry, contested and constructed". However, Schmalzer's book finds a great deal to say about issues as diverse as the historical significance of Chinese fossil humans, the search for yetis (called *yeren*, or 'wild people' in China), changing concepts of human identity, and the conflict between top-down science dissemination and bottom-up mass participation in Chinese science. She also explores other diverse issues that include the connections among science, politics, religion and culture, and the relationship between professional scientists and the general public. Schmalzer presents all these topics in a lively, accessible and thought-provoking way. ■

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Thinking outside the box

Supersizing the Mind: Embodiment, Action, and Cognitive Extension
by Andy Clark
Oxford University Press: 2008. 320 pp. $35

In *Supersizing the Mind*, philosopher Andy Clark makes the compelling argument that the mind extends beyond the body to include the tools, symbols and other artefacts we deploy to engage the world. According to Clark and other proponents of the 'extended mind' hypothesis, the laptop on which I am writing this review is coupled to my brain and has become part of my mind. Manipulating sentences on the screen can prompt new insights and new ways of conveying ideas, a reiterative cognitive process that would be difficult to achieve without such a tool. The same argument applies to my BlackBerry, to the white board in my office, and even to the conversations I might have with my colleagues. Cognition, Clark argues, is not 'brain-bound' but a dynamic interaction between the neural circuits inside our skulls, our bodies and the objects and events in the outside world.

For researchers who study the control of movement, this idea has resonance. Perhaps it is for this reason that Clark begins by explaining how the production of fluid movements, such as walking or running, is a joint product of control systems in the brain and the dynamics of the limbs — the elasticity, viscosity and mass of the muscles, the connection of tendons to the joints, and the physical contact between the limbs and the environment. Clark uses this familiar example as an entry point to the more contentious idea that cognitive activity similarly extends beyond the brain, skull and body to the external world.

The book develops the seminal ideas set out in a 1998 paper, 'The Extended Mind', co-authored by Clark and fellow philosopher David Chalmers. Over the past ten years, that paper has emerged as the key reference among philosophers, neuroscientists and psychologists who are interested in embodied cognition. The paper has naturally engendered criticism, particularly from those who see the mind and cognitive activity as brain-bound. In *Supersizing the Mind,* for which Chalmers has written a thoughtful and challenging foreword, Clark deals directly with many of these critiques, and in doing so, strengthens the major tenets of the extended mind hypothesis while offering a more nuanced discussion of the implications of this idea.

Clark explores in detail the consequences of embodied and extended cognition for our conscious perception of the world. He acknowledges that the "intimacy of brain, body, world, and action" must have implications for our perceptual experience, but ultimately rejects the idea of enactive perception championed by philosopher Alva Noë, in which our experience is seen as nothing more than the sensorimotor routines that we use to interact with the world. For Clark, perception is shaped by the way in which we explore this world. But at the same time, he argues, our conscious experience of objects and events is not bound to the details of the sensorimotor routines that mediate that exploration. These routines, he suggests, are controlled by encapsulated systems with operating characteristics that are not privy to conscious, or even unconscious, scrutiny and whose activity is removed from the information they convey. In rejecting Noë's sensorimotor model, Clark argues that conscious perception does not depend on a "common sensorimotor currency" but arises from a subtle interplay between brain, body and environment, "replete with special-purpose streaming and with multiple, quasi-independent forms of internal, and external, representation and processing".

Supersizing the Mind is a treat to read. It is brimming with remarkable ideas, novel insights and amusing language. But it also challenges those of us who study cognitive processes. If Clark is right, and I think he is, then simply studying what goes on in the brain will tell us only part of what happens as cognitive activity unfolds. To capture the richness of thought, we have to step outside the box and embrace the world beyond the skull. ■

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Does the mind extend past the brain and body to our external interactions?

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