BOOKS & ARTS

# The ultimate Romantic adventure

**Napoleon's invasion of the Middle East enhanced rather than diminished the world's intellectual heritage.**

**Mirage: Napoleon's Scientists and the Unveiling of Egypt**
By Nina Burleigh
Harper: 2007, 304 pp, $25.95

**Andrew Robinson**

The unexpected invasion and occupation of Egypt in 1798–1801 by Napoleon Bonaparte's army, accompanied by 151 French scientists, scholars and artists, is a rich and shimmering subject. It was, as Nina Burleigh puts it, "the ultimate Romantic adventure".

For more than three years, the French roamed the Nile valley and its surrounding desert, investigating every accessible detail of its archaeology and natural history — from pyramids and hieroglyphs, to crocodiles and scarab beetles. The wonders of ancient Egypt were revealed to Europe in the expedition's monumental publication, *Description de l'Égypte* (1809–28). Perhaps the most important discovery of all, in 1799, was the Rosetta Stone, which eventually allowed the pharaohs and their subjects to speak to the modern world.

Much has been written about this adventure from disparate angles. The historian of science Charles Coulston Gillispie chronicled its progress in a section of his magisterial *Science and Polity in France: The Revolutionary and Napoleonic Years* (2004). The British Museum Egyptologist Richard Parkinson discussed its significance to archaeology in *Cracking Codes: The Rosetta Stone and Decipherment* (1999). The literary critic Edward Said, in his influential *Orientalism* (1978), indicted Napoleon and his expedition for making scholarship subservient to imperialism.

Yet there has been no general account of the expedition's scientific and cultural aspects in English (Yves Laissus's colourful French book, *L'Égypte, une Aventure Savante* (1798–1801) has yet to be translated). This is the gap that Burleigh, an American journalist and author, aims to fill with *Mirage: Napoleon's Scientists and the Unveiling of Egypt*.

The challenge is formidable. A grasp of French, British and Middle Eastern history is essential; almost as important is an understanding of the sciences in 1800. Although disciplines were nowhere near as distinct as they are today, the expedition boasted specialists such as Joseph Fourier, Pierre Berthollet, Jules Savigny and Vivant Denon, in fields from mathematics and chemistry to natural history and art.

G. DAGLI ORTI/MUSÉE DU LOUVRE PARIS/THE ART ARCHIVE

More than 150 French scientists and artists catalogued the Nile valley's archaeology and natural history.

Indeed, one of the excitements of the expedition, as Burleigh points out, was its salon atmosphere. Among the experts relaxing in the palaces and gardens of Cairo, commandeered from the defeated Mamelukes, "architects debated with naturalists about animals and ancient structures, physicians and astronomers debated with the geographers about the meaning of the hieroglyphic script, the age of the ancient culture. These conversations among learned men manifested the highest ideals of the Enlightenment."

Also challenging is to weave a clear and accurate narrative out of the fascinating but messy interactions of politics, scholarship and the military. Napoleon revered Newton and knowledge for knowledge's sake. But once he deserted Egypt in 1799 to grab power in Paris, relations between scientists and soldiers became tense and at times murderous. When the French general finally capitulated to the British in 1801, he wrote caustically to his opposite military number: "Several among our collection-makers wish to follow their seeds, minerals, birds, butterflies, or reptiles wherever you choose to ship their crates. I do not know if they wish to have themselves stuffed for the purpose, but I can assure you that if the idea should appeal to them, I shall not prevent them."

Burleigh structures her book chronologically, more or less, yet tries simultaneously to focus on one field of endeavour per chapter. So we get: 'The Inventor' (Nicolas Conté, inventor of the graphite pencil), or 'The Zoologist' (Geoffroy Saint-Hilaire, whose work influenced Darwin's theory of evolution), or 'The Stone'. The result is a somewhat confusing narrative in which, say, Napoleon's successor is first assassinated by a Muslim fanatic and then appears to oversee the despatch of field expeditions up the Nile. Although the individuals and their relationships come to life, and the descriptions of Egypt are vivid, these do not compensate for the lack of a coherent story.

Of the science, there is remarkably little; and some of that is misleading or wrong. A mere sentence is devoted to Gaspard Monge's theory of the mirage, despite the book's title. Devised from Napoleon's desperate desert march from Alexandria to fight the Battle of the Pyramids, in which soldiers were tormented by 'water' shimmering on the horizon, Monge's theory correctly accounts for mirages as the refraction of light by layers of air of differing density. Burleigh writes of "light and heat bouncing off the Earth's surface that created a mirror effect".

The discussion of the Rosetta Stone is most unsatisfactory. It puts the hieroglyphs at the bottom, instead of at the top, of the stone. And it neglects several theories of phonetic elements in the hieroglyphs put forward before Jean-François Champollion's (by no means single-handed) phonetic deciphering of 1822. There is no mention, for example, of the phoneticism known to the medieval Arabs that Okasha el-Daly revealed in *Egyptology: The Missing Millennium* (2005). Elsewhere Burleigh states that

Humphry Davy, rather than Benjamin Thompson, disproved the caloric theory of heat, and she seems unaware that William Thomson and Lord Kelvin are the same scientist.

In 2004, the Bibliotheca Alexandrina, the new library of the city where Napoleon landed, digitized and made available online and on CD the multi-volume *Description de l'Égypte*, originally issued by the French government. Meanwhile an empire-builder of the twenty-first century was wrecking the archaeological sites and museums of another great Middle Eastern civilization.

Napoleon, for all his ruthlessness in Egypt, increased, rather than diminished, the world's intellectual heritage. The book that this extraordinary scientific adventure deserves has yet to be written. ■

Andrew Robinson is a visiting fellow of Wolfson College, Cambridge. His recent books include *The Last Man Who Knew Everything* and *The Story of Measurement* (Thames & Hudson).

# Size matters, sometimes

**Body Size: The Structure and Function of Aquatic Ecosystems**
edited by A. Hildrew, D. Raffaelli and R. Edmonds-Brown
Cambridge University Press: 2007. 356 pp. £35, $65

**Steven Murawski**

Shakespeare had it right when he had Pericles say, "Master, I marvel how the fishes live in the sea. Why, as men do a-land; the great ones eat up the little ones." Individual body sizes of organisms in aquatic ecosystems vary by a stunning 20 orders of magnitude — from free-living bacterial forms at $10^{-12}$ grams up to 180 tonnes for the blue whale, the largest animal ever to inhabit the planet. The distribution of animals of different sizes in a community dictates the structure and functioning of their ecosystem. For example, larger animals are much rarer than smaller ones, but they may still control the abundance of smaller plants and animals owing to factors such as their high rate of consumption and longer average lifespan.

On land, very large life forms, such as trees, can be found at the base of the food chain. Tiny organisms such as phytoplankton in the aquatic domain dominate primary production, where large predators prey on plants and animals that are a tenth to a thousandth of their own body size. Suspension feeding by straining particles suspended in the water (the aquatic equivalent of spider-web tactics) is commonplace. Parasitism, where predators are smaller than their prey, is comparatively infrequent.

*Body Size: The Structure and Function of Aquatic Ecosystems* focuses on size relationships between different components of aquatic ecosystems. Using this approach to interpret complex patterns provides the tools to help understand the consequences of human activity. For example, fisheries select the largest fish — with the result that top predators are harvested first. What are the implications of intensive and selective fishing for the stability and productivity of the aquatic ecosystem? One is that the increasing scarcity of larger fish may be associated with a concomitant rise in abundance of the smaller ones that are their usual prey.

Size-structured models help us interpret cascading impacts on other communities — for example, declines in zooplankton mean less grazing on phytoplankton, whose populations may therefore increase — and on a variety of other complex feedbacks in ecosystems. An important aspect explored in *Body Size* is the potential effect on nitrogen-cycling of removing larger organisms because they excrete more than smaller ones.

In the summary chapter — 'Body size in aquatic ecology: Important, but not the whole story' — the editors provide a frank assessment of where theory and observations regarding metabolic concepts in ecology align, and where they have yet to do so. For example, several chapters question whether the relationship between body size and metabolic rate is fixed, and meta-analyses of field data point to some intriguing variations. Mid-water organisms on average have higher rates of metabolism than those of equivalent size in bottom-dwelling systems, perhaps because of their perpetual movement for predator avoidance. Freshwater invertebrate communities mostly support the fixed relationship, but those from a particular stream type that is replete with nutrients from woody debris, do not. We cannot yet say whether these anomalies are exceptions that prove the rule, or the result of one-off measurements or of an oversimplistic model of relationships governing disparate aquatic ecosystems.

Research on body size as an organizing principle in aquatic ecosystems, explored in this fine book, involves useful groupings of subsets of species and ecosystem types. The volume's worth is found in the series of chapters that are thematically organized around developing sub-areas of body size that allow more elaborate interpretation than a single unifying metabolic theory. This approach may need to be broadened if it is to be used to provide a systematic interpretation of the full variety of patterns observed in nature. ■

Steven A. Murawski is director of scientific programs and chief science adviser at National Marine Fisheries Service, NOAA, Silver Spring, Maryland 20910, USA.

M. USHIODA/IMAGEQUESTMARINE.COM

**Little and large: cleaner fish set to work on a green sea turtle, in decline because of fisheries' bycatch.**