

the English translation of this classic to Hertha Sollas, 'wife' of William Johnson Sollas — William did have two wives (not simultaneously), but Hertha was one of his two daughters. She was one of a talented group of ladies who studied science in Cambridge around 1900 but whose gender denied them any of the university's degrees.

The vast majority of publishers' blurbs are not to be taken seriously, but I think there may be some truth in the claim that this book "will change the way you view the world — permanently". This is a work that I admire and recommend. My palaeontological colleague of 1968, although long in retirement, remains scientifically active. I will certainly be telling him how much I enjoyed my tour of Earth's crude and stitched mosaic in Fortey's excellent company. ■

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FLIP NICKLIN/MINDEN

On the scent of a mystery: could the sperm whale's giant nose be used for sound production?

Whales with a nose for culture

Sperm Whales: Social Evolution in the Ocean

by Hal Whitehead

University of Chicago Press: 2003. 456 pp. \$80, £56 (hbk); \$30, £21 (pbk)

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More than thirty years have passed since Alfred Berzin wrote his seminal monograph *The Sperm Whale* (Israel Program for Scientific Translations, 1972). This book was based mainly on anatomical data obtained from whaling. Now, in *Sperm Whales*, Hal Whitehead enthusiastically reviews what we have learned since then about the social behaviour of these giants, owners of the planet's largest nose and brain.

Early accounts of sperm-whale behaviour came from whalers in the nineteenth century. During the revival of sperm whaling in the 1950s, several biologists, including Berzin, made a range of anatomical studies. The whales' diet was studied by analysing stomach contents, and their breeding behaviour was inferred from sexual dimorphism and the anatomy of the reproductive organs. For practical reasons, there seemed to be no other way of studying this large, deep-diving, offshore whale.

In the early 1980s, this view changed dramatically when Whitehead and Jonathan Gordon, both then at the University of Cambridge, UK, led the *Tulip* expedition to Sri Lanka and showed that whaling was not the only way to study this species. Population data could be gathered using photo-identification and acoustic techniques, and long-term behavioural studies gave intriguing

insights into the social lives of sperm whales.

Whitehead's book is a fascinating account of what has been learned during two decades of non-lethal research inspired by the *Tulip* expedition. The core of sperm-whale society is now known to consist of female groups living in warm waters. When males grow up, they split from these groups and migrate towards polar waters to feed. As adults, they return to the tropics to rove among the female groups. By contrast, the females form decade-long bonds with other whales within their group. These bonds are not immediately obvious to a casual observer but have been revealed through long-term field studies.

An important part of the book deals with the animal's nose. This huge fat-container, plumbed with fire-hose-sized nasal passages and air sacs, is surrounded by a muscle layer so thick that it is possible for the whale to lift a truck with a frown, and it is innervated with nature's thickest nerve. Whitehead dismisses several of the existing theories as to its function, such as a buoyancy control mechanism or a battering ram. Instead, he favours recent acoustic work showing that the whale uses its nose for sound production, thereby associating the largest nose on the planet with the loudest sounds produced in the animal kingdom.

Sound is fundamental to the lives of sperm whales. The book summarizes the results from several studies of their acoustic repertoire. The whales use knocking sounds both for communication and to find food in the abyssal darkness. The animals use their communication sounds, called codas, to maintain contact with one another. Sympatric groups of sperm whales have different coda repertoires, and these, along with other behavioural differences, seem to be

culturally transmitted between generations.

Whitehead's research group at Dalhousie University in Nova Scotia is spearheading work on cultural transmission and the social evolution of this species. However, some of the conclusions drawn from their studies seem premature, considering the limited amount of data so far available. The book does not discuss the serious scepticism expressed by some scientists about these conclusions (see *Behav. Brain Sci.* **24**, 309–382; 2001).

These few, small criticisms aside, the book is a well-written, comprehensive and much-needed sperm-whale monograph, and includes a detailed bibliography covering all aspects of current research. Whitehead's survey also reveals that many aspects of this species' behaviour remain unknown. Unlike the whalers of the 1800s, today's scientists approach the animals in a peaceful manner to find out how they are related and where and how they catch their prey. The rapid developments in genetic sampling methods and data logging mean that these techniques also can be applied to the whales. Instead of using harpoons, today's scientists use darts to obtain skin samples, and attach suction-cups linked to instruments for sampling the animals' acoustic and diving behaviour.

Whitehead's book will serve as an important source of inspiration and information for whale scientists. The book is also entertaining for the general reader, and is suitable educational material for students of marine sciences. ■

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