things to say, but he has only taken in part of their message. For instance he describes lightness perception without mentioning the separate "on" and "off" system of the mammalian retina, which must surely be relevant to the perception of darkness as well as of lightness. He then goes on to say that the perception of lightness and colour appears to be "based upon information at the edges between regions of differing luminance or hue". That's fine of course, but how is this information extracted from the image and how is it represented in the brain? He talks of the direct detection of relative difference or ratio of luminances, but then suggests that "there is no need to invoke lateral inhibition". This takes one's breath away, for he does not propose any alternative mechanism for the very operations he recognizes are necessary. I think he must fail to realize that, however intelligent or "thought-like" the mechanisms may be, they are ultimately physiological. Surely it is best to proceed by building on the physiological mechanisms we already know about, rather than arguing as if physiological and psychological processes are mutually exclusive alternatives. Neuro-

physiological explanations are almost always incomplete, but the strength of physiology is that it is a growing science!

For these reasons I fear that Rock's discussions of mechanism are best ignored by physiologists, and I think the same advice can be given to those who approach the problem from the standpoint of image-processing and artificial intelligence. They will have been grappling with the problem of extracting and representing objects in images and will learn little from his reasoning about the phenomena he describes. But the book as a whole should not be ignored, for it gives valuable accounts of perceptual phenomena that are begging for further analysis in terms of neurophysiology and computer simulation. Rock's claim that perception is "shot through with intelligence" does not help much, but both perception and intelligence will be greatly illuminated if we can understand their neurophysiological and computational basis. □

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Drawn from life

Patricia Vinnicombe

The Rock Art of Africa.

By A.R. Willcox.

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£45, \$69.50.

THE African continent, extending almost 4,000 kilometres both north and south of the Equator, boasts a singularly varied ecology that in turn supports a bewildering diversity of peoples, cultures and belief systems. For millennia the transmission of cultural values from one generation to the next has depended not upon the written word, but upon oral communication reinforced with music, dance, ritual practices and visual representations. It is with one aspect of the latter — paintings and engravings made on rocks — that the book under review is concerned.

The re-discovery and interpretation of African rock art sites, originally painted or graven by Stone Age hunter-gatherers and later by Neolithic pastoralists and Iron Age agriculturalists, has excited the curiosity and imagination of many of the subsequent colonists of the continent. All of them have added their own perspectives as to the age, origin and meaning of the art, resulting in a profusion of data of varying calibre written in many languages and often hidden in obscure journals.

It is against this background that Alex Willcox has marshalled the information for his book. Now in retirement from a career in quantity surveying, his writing has progressed systematically from the

particular to the general. His first book was an area study, *Rock Paintings of the Drakensberg* (Max Parrish, London; 1956), followed by a more general *The Rock Art of South Africa* (Wageningen Press, Johannesburg; 1963), and now this compendium covering all of Africa. It is the most systematic and comprehensive amalgamation of data yet presented on the subject. Two previous attempts, *African Rock Art* by Berchard Brentjes (Dent, 1969), and *Rock Art of Africa* by Carson I.A. Ritchie (A.S. Barnes, Cranbury, New Jersey; 1979), were far less successful.

Each of the chapters devoted to a specific region is accompanied by maps, copious line drawings and black-and-white photographs of the predominant art styles, all conveniently juxtaposed to the relevant text. The 67 colour photographs, on the other hand, are sometimes disappointing in quality, and have been crammed onto 24 pages. Even more unfortunately, they have been omitted from the table of contents.

Although Willcox could not be expected to discuss in detail *all* the relevant literature, some omissions are surprising, and viewpoints which do not coincide with his own are somewhat cuttingly and not altogether fairly dismissed. Not everyone will agree with his interpretations, particularly on cultural diffusion and the relationship between the art zones, on the chronological correlation of the art styles, the ethnic identification of the artists and the underlying reasons for the art, but a well-referenced text at least refers readers to the models he eschews. Willcox describes his own model as an Aunt Sally for other archaeologists to shy at (p. 253), and shy they will.

Most contentious of his views is the

persuasion, strongly expressed in his first book of almost three decades ago, that the motivation behind the art is essentially the pleasure derived from its execution. Indeed, although Willcox himself refers to a wide range of ethnographic practices connected with rock art, which are summarized and added to by Desmond Clark in an excellent foreword, he is curiously dismissive of this evidence in his final evaluation of the reasons why the art exists. The use of rock art as territorial and ownership marks, in rain-making rituals and in initiation, marriage and burial ceremonies, has been documented from all over Africa. Examples range from the Marghi of northern Nigeria to the Cuissis of Angola, the Oromo of the Harar plateau in Ethiopia to the Guanches of the Canary Islands, the Namia of southern Tanzania to the Bemba, the Butwa and Nyau secret societies of Zaire, Zambia, Zimbabwe and Malawi. Yet when it comes to southern Africa, Willcox is curiously reticent about the considerable amount of ethnographic evidence adduced by Lewis-Williams and others in linking San belief systems to the rock paintings. Whilst Willcox accepts symbolism as a possible component of the non-representational art which he ascribes to the later pastoral peoples, he dismisses the possibility of symbolism in the figurative art of the hunter-gatherers (p. 241). The now classic Levi-Straussian quote that animals are not only *good to eat* but also *good to think* is believed by Willcox to be wrong on both counts. He suggests instead that animals were painted because they were *good to see*. Whilst it is of course true that animals do have a special beauty, it is also undeniable that factors in addition to beauty and pleasure in a task well done were involved in their depiction.

At the start of the book, Willcox claims that the primary purpose of the study of rock art is as a branch of archaeology (p. 9), and here, perhaps, lies the limitation of his approach. As emphasized by Desmond Clark in the foreword, the archaeologist needs to elicit the help of anthropologists, ethnographers, linguists and psychologists in seeking to use the evidence of still-existing peoples the better to understand their prehistoric forebears. Willcox himself observes that the study of art reveals aspects of man's nature not deducible from his material culture (p. 7).

Some idiosyncratic views apart, Alex Willcox's encyclopaedic publication will provide an indispensable source book for professionals and the interested public alike, and will stimulate a deeper awareness of the beauty as well as the scientific and communicative potential of this fascinating body of African art. □

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