

about primate sexuality, but not more than many will find of interest. That the book has a foreword by the director of the Kinsey Institute is hardly surprising.

Alan Dixon has drawn together an impressive body of literature in this landmark volume. The book takes a comparative perspective, seeking a seamless review from prosimians through humans, and viewing this taxonomic diversity from a Darwinian and phylogenetic perspective. Moreover, although Dixon indicates that the book's focus was intended to be behavioural, it also devotes much attention to the morphological and hormonal aspects of the behaviour considered. As a result, Dixon's treatment is unusually inclusive across levels of analysis and activity. His reach is impressive, and he has sought to distil and review more than 2,000 sources from a diverse literature.

The book succeeds admirably, although its success is more modest and uneven than its reach. This is perhaps inevitable, given the fact that it is a first edition and has such ambitious goals. Coverage and quality of analysis too often reflect not just the state of the field but also the author's direct or close exposure — geographically, taxonomically and topically. For many topics, Dixon points out disagreements and competing theories and conclusions in the literature, invaluable for those who otherwise would not even know a debate exists. When he takes a stand on a particular point, however, the basis for that stand is too often not obvious or compelling. This is especially unfortunate in situations where many in the field would disagree with Dixon's reading of the weight of the theory or data.

The book is enriched with many comparative tables, most taken directly or almost directly from other publications. There are also a large number of illustrations and data figures from the literature, often redrawn by the author, which tellingly bring to life particular points and examples in the text. Some tables and figures are less successful and valuable than others, sometimes frustrating the author's comparative goals. Future editions, and surely the book will warrant these, will benefit greatly if comparative tables taken from the literature are edited to remove redundancies and resolve contradictions, and if new tables are produced to show the current state of knowledge.

Primate Sexuality is an essential starting point in this field, and a must for every primatologist's library. Its shortcomings should only provide an impetus for the next edition, which will be necessary if for no other reason than the current rapid developments in the field. ■

Jeanne Altmann is in the Department of Ecology and Evolutionary Biology, Princeton University, Princeton, New Jersey 08544, and the Department of Conservation Biology, Chicago Zoological Society/Brookfield Zoo, Brookfield, Illinois 60513, USA.

Science in culture



Constable's paradoxical rainbow

Why the artist John Constable allowed himself poetic licence when painting rainbows.

John E. Thornes

John Constable's powers of observation and thirst for meteorological knowledge enabled him to paint more realistic skies than any other English artist (see *John Constable's Skies*, University of Birmingham Press, 1999). Constable believed that "painting is a science, and should be pursued as an enquiry into the laws of nature. Why then may not landscape painting be considered as a branch of natural philosophy, of which pictures are but the experiments?" This Baconian view was certainly applied to the clouds and weather in his paintings, but, as we shall see, not to all of his rainbows.

Constable's paintings of rainbows are almost as well known as his paintings of clouds, but whereas clouds are present in some form almost every day in England, rainbows are seen much less frequently and are therefore more mysterious. Constable painted rainbows that were meteorologically accurate, but also used them for artistic effect in situations in which they could never occur in nature, such as in *Salisbury Cathedral from the Meadows* (1831) (see above). Although Constable knew that a rainbow cannot be seen once the Sun is higher in the sky than 42 degrees and that the Sun must be directly behind the observer of a rainbow, it plainly is not so in this view of the cathedral. This enigma is difficult to explain. Why should Constable be such a perfectionist about the weather in his paintings, his dutiful wind and clouds and harmonic daylight, and yet be content to introduce a meteorologically impossible rainbow?

Constable wrote to his friend John Fisher in 1821: "The sky is the source of light in nature — and governs everything ... Their difficulty [clouds] in painting both as to composition and Execution is very great, because with all their

Constable's Salisbury Cathedral from the Meadows (1831).

brilliance and consequence they ought not to come forward or be hardly thought about in a picture — any more than extreme distances are — But these remarks do not apply to phenomenon — or what the painters call accidental Effect of Sky because they always attract particularly."

Thus the rainbow, and other optical effects such as crepuscular rays, were given a special exemption by Constable, and although a rainbow cannot 'come forward' in a picture, Constable makes it clear that if he introduces such an effect he wants it to be attractive and 'thought about'.

If one looks at the shadow of the fence-post in the bottom left-hand corner of the picture, the geography and the illumination of the cathedral suggest that the Sun has reached an angle just north of west, which, in mid-August, would be between 6 and 7 p.m. At that time, the height of the Sun in the sky is about 15 degrees, which means the rainbow should have a height of about 27 degrees, significantly smaller than observed. The rainbow is not the bow the artist would see but one that would be seen from the meadow on the right. It is not in the plane of the picture but comes out of the picture at a shallow angle. The lighting suggests that the Sun is to the right of the picture and not, as it should be, behind the observer. It would appear that Constable was quite happy to use an amount of poetic licence for his "accidental Effect of Sky".

Contrast Constable's *London from Hampstead Heath with a Double Rainbow* — painted a few months after *Salisbury Cathedral from the Meadows* was exhibited at the Royal Academy — which showed that he was fully aware of the colour reversal and the size of the secondary bow. ■
John E. Thornes is in the School of Geography, University of Birmingham, Edgbaston, Birmingham B15 2TT, UK.