592a. Broom, D.M. 2006. Review of Gregory N.G. 2004 Physiology and Behaviour of Animal Suffering. Blackwell: Oxford. *Lab. Anim.*, 40, 214.

Neville Gregory is an expert on pain and injury and it his account of this subject area that makes his book valuable. The book has a somewhat awkward title, in that it refers to behaviour of suffering, and a questionable definition of suffering: "suffering is an unpleasant state of mind that disrupts the quality of life". The quality of life can be bad so the effect of suffering on it is not properly called disruption. In my view suffering is one or more unpleasant feelings that are prolonged or severe. The interesting question of which kinds of animals have the capacity to suffer is considered in Chapter 1. Some work on invertebrate learning and pain perception is summarised but the most interesting animals, the cephalopods and complex crustaceans, spiders and insects, are not discussed except for a brief mention of crayfish learning. Chapters 2 to 5 on stress, anxiety, depression, aggression and related topics are introduced but in a rather superficial way. The discussion of stress is limited to aspects of the HPA and sympathetic systems but with no mention of the wide ranging adrenal cortex activity that is nothing to do with stress, or of stress without adrenal involvement. The limited discussion of emotion includes the statement on page 45: "Emotions and instinctive behaviour are coordinated by the limbic system in the brain." The term 'instinctive' is now used little by those who study behaviour, because of its misleading connotations, and many would query the statement.

It is in Chapters 6 and 9 that the first information that is otherwise difficult to find is presented. The discussion of possible negative effects of exercise in endurance horses, racehorses and racing greyhounds includes original material whilst valuable ideas about starvation are presented in Chapter 9. The effects of cold and heat, including those of burns, are also discussed. The two substantial chapters 10 and 11, 26 and 51 pages respectively, on animal welfare aspects of pain and trauma are detailed and well-explained. After an account of pain pathways, transmitters and behavioural responses, there is explanation of headache, neuromas, neuropathic pain, hyperalgesia, inflammatory, post-operative, ischaemic, muscular, cardiac and parturition pain. The chapter on trauma focuses first on causes of injury and the range of farm operations such as castration, beak-trimming and mulesing. There are then authoritative accounts of gunshot injuries, hunting, whaling, trapping, rodeos, electric shock and beating. Further short chapters on sickness, gut pain, poisoning, respiratory problems and euthanasia follow. These are also useful but, given Neville Gregory's considerable expertise on poisoning and the efficacy of stunning assessment methods, I was disappointed in the brevity of explanation of these topics.

All of those interested in animal welfare will find this book to be a valuable source of information on any effects on animals that involve injury, pain or malaise. In general, it covers physiology well and behaviour in a much simpler way. There is useful information for veterinary surgeons, laboratory researchers and all of those who nurse or otherwise care for animals that are in pain.

Donald M. Broom
Centre for Animal Welfare and Anthrozoology,
Department of Veterinary Medicine,
University of Cambridge.