

Physiological Aspects of Humane Killing in Animals



David Adams

Seminar at the
Animal Welfare
Science Centre

Wednesday 22nd
October 2008

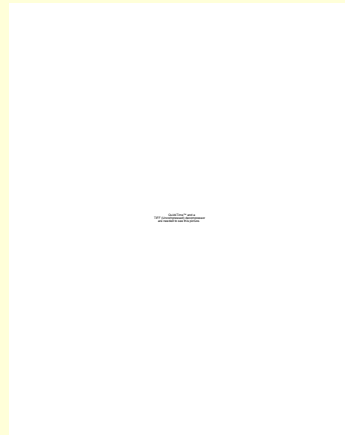
DPI, Attwood, Victoria

Pathophysiology application of knowledge of normal structure and function to an understanding of disease and injury

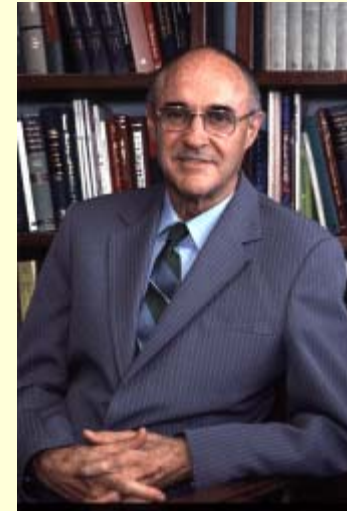
Sir William Osler



Chris Pallis 1923-2005
a.k.a. 'Maurice Brinton'



Arthur Guyton 1919-2003



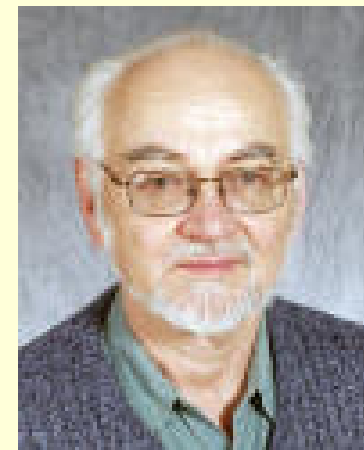
Eric Kandel
Nobel Prize 2000



Bruce McEwen



Jaak Panksepp



Cardiocentric consciousness

Aristotle, 384-322

BCE

Galen, 129 -216

Ibn Sina

(Avicenna), 980-

1037

Ibn Rushd

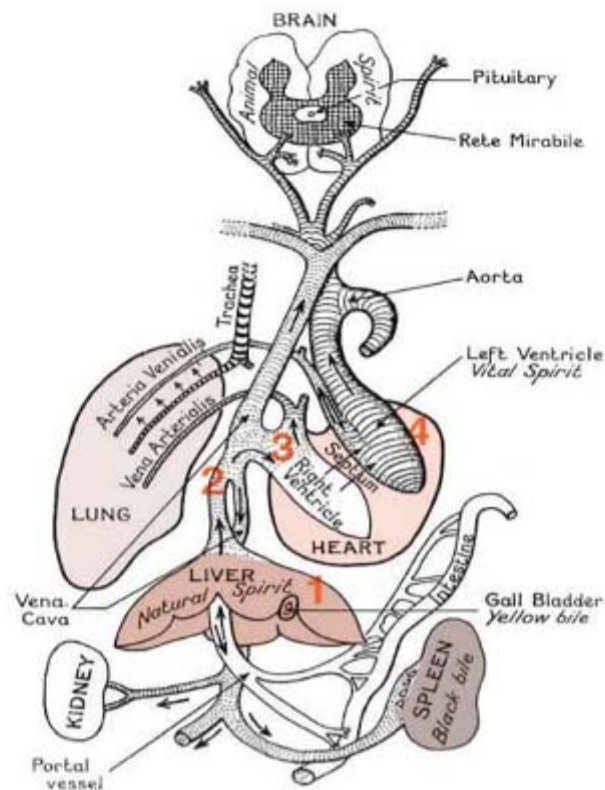
(Averöess), 1126

- 1198



Galen's depiction of the animal, natural and vital spirits

Slide 3



Prominent people



Galvani (1737-1798)



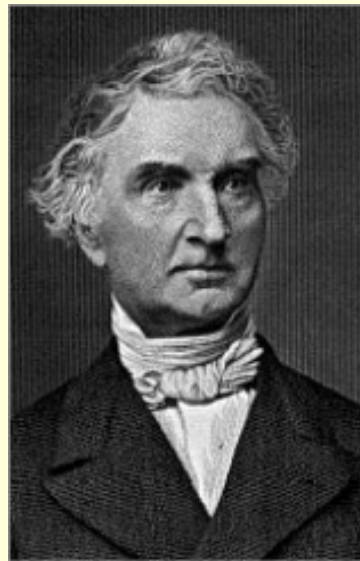
Lavoisier (1743-1794)



Descartes
(1596-1650)

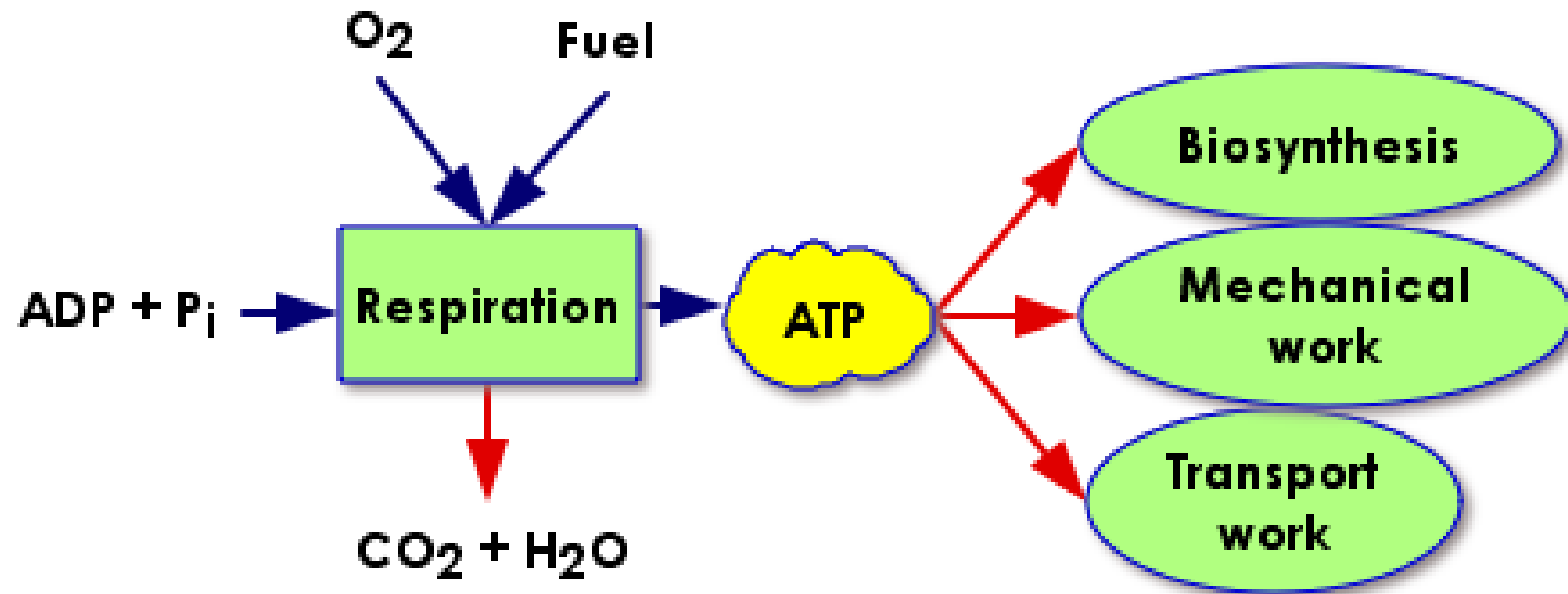


Carnot (1796-1832)

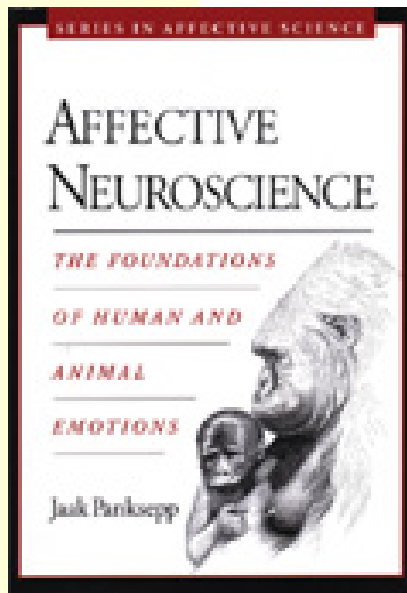
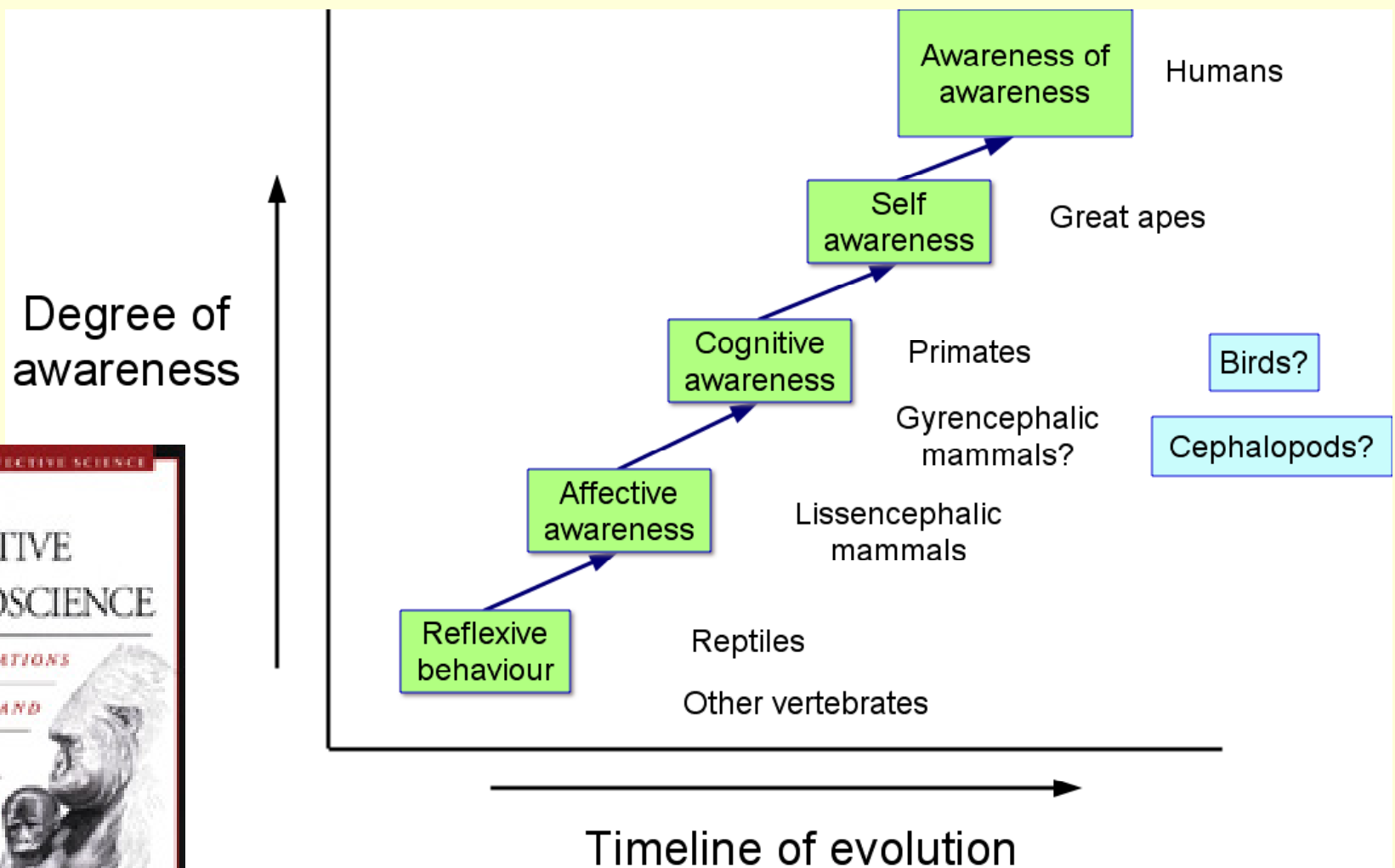


Liebig (1803-1873)

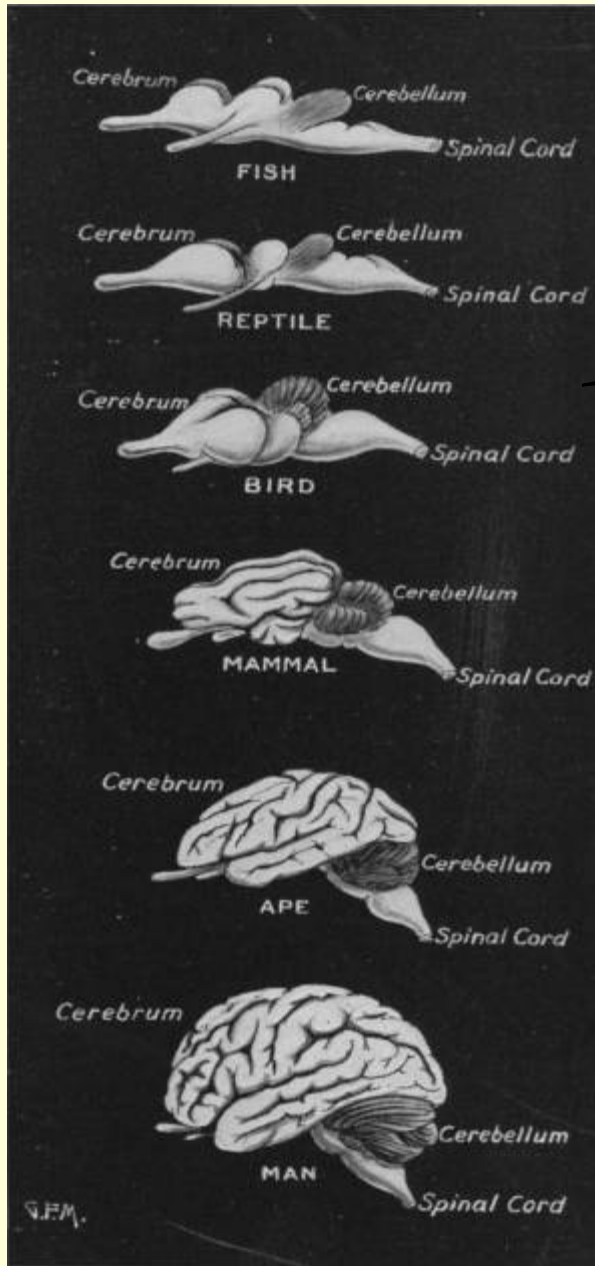
Oxidative phosphorylation



Emergence of Affective Consciousness in Evolution - deference to Jaak Panksepp



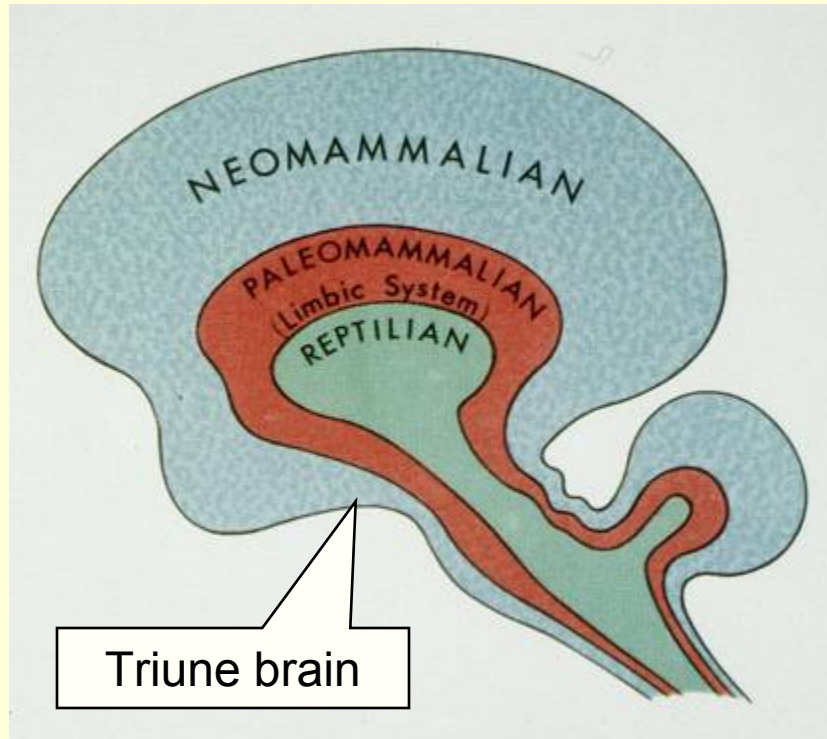
CNS Evolution



Evolution of the brain

from
THE
OUTLINE OF SCIENCE
A PLAIN STORY SIMPLY TOLD
EDITED BY

J. ARTHUR THOMSON
1922



Slide 7

Consciousness - selective attention



QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

Consciousness - Unity

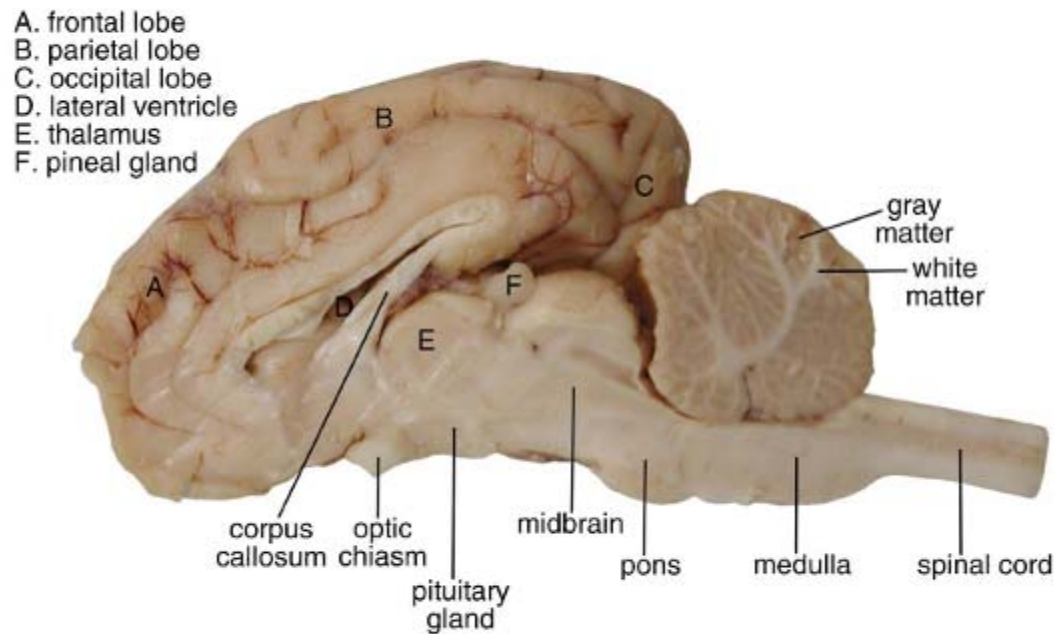


Consciousness: Intentionality



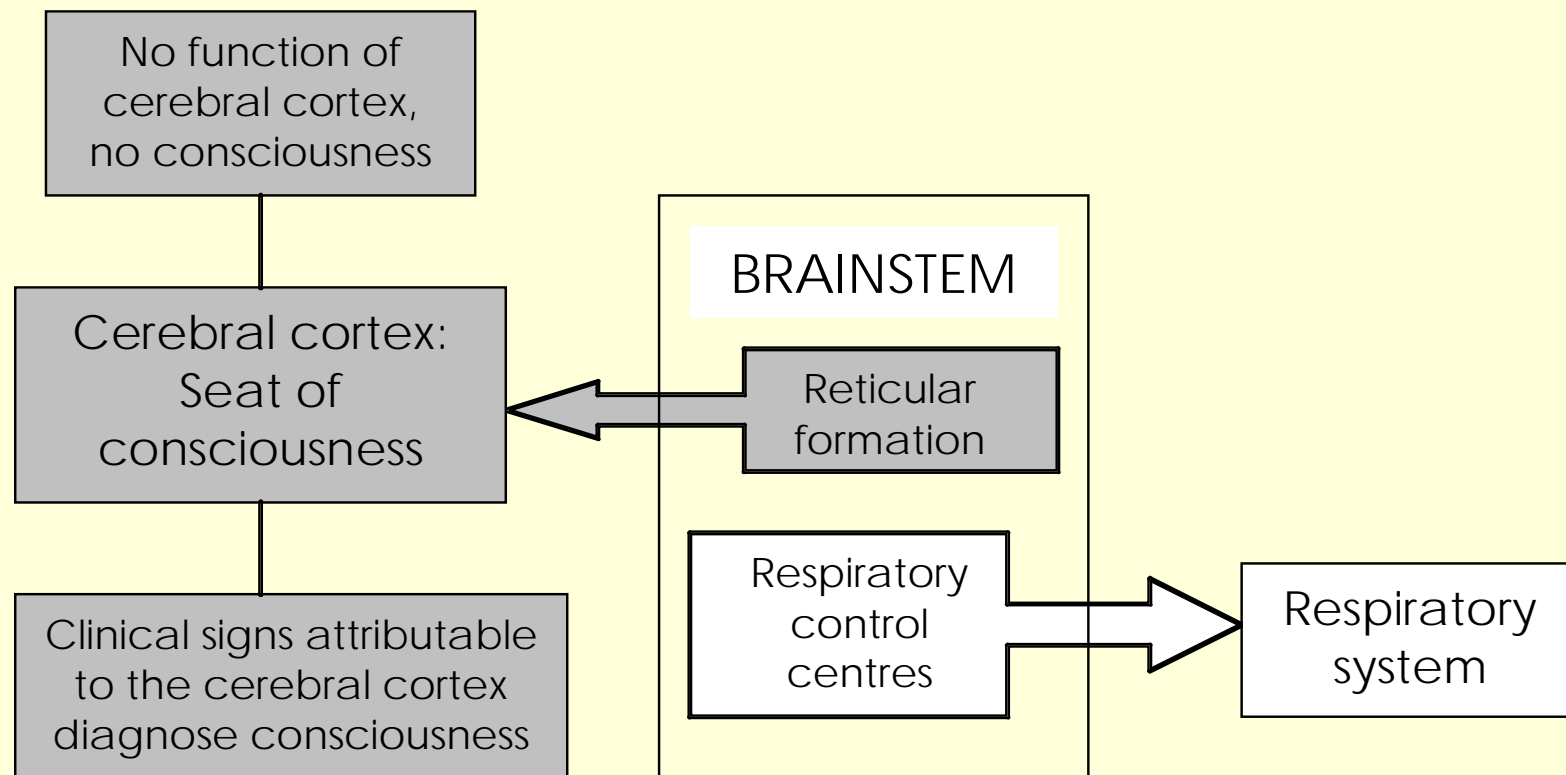
Consciousness and unconsciousness

- Aspect 1: The waking or aware state
- Aspect 2: The content of consciousness



Cerebral cortex
and brainstem

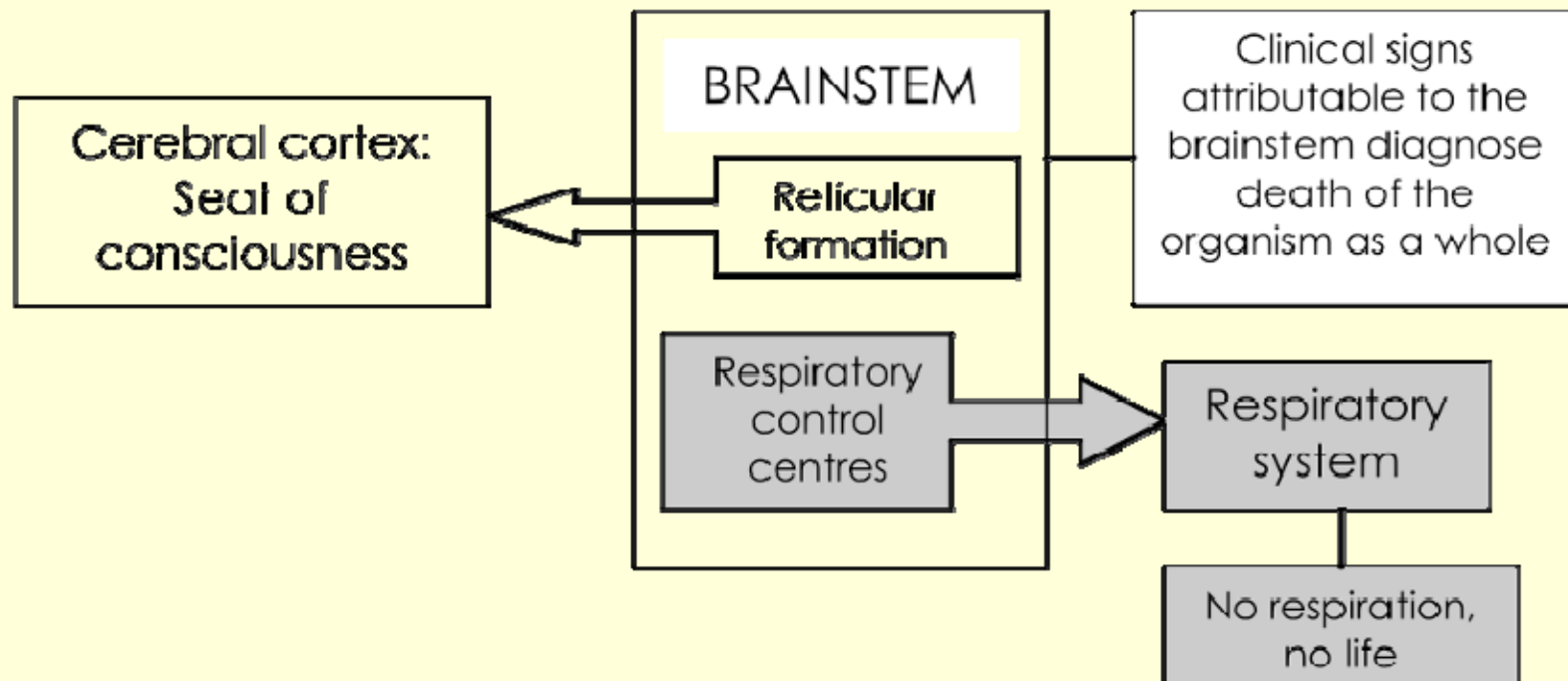
Interaction between the different parts of the brain involved in consciousness.



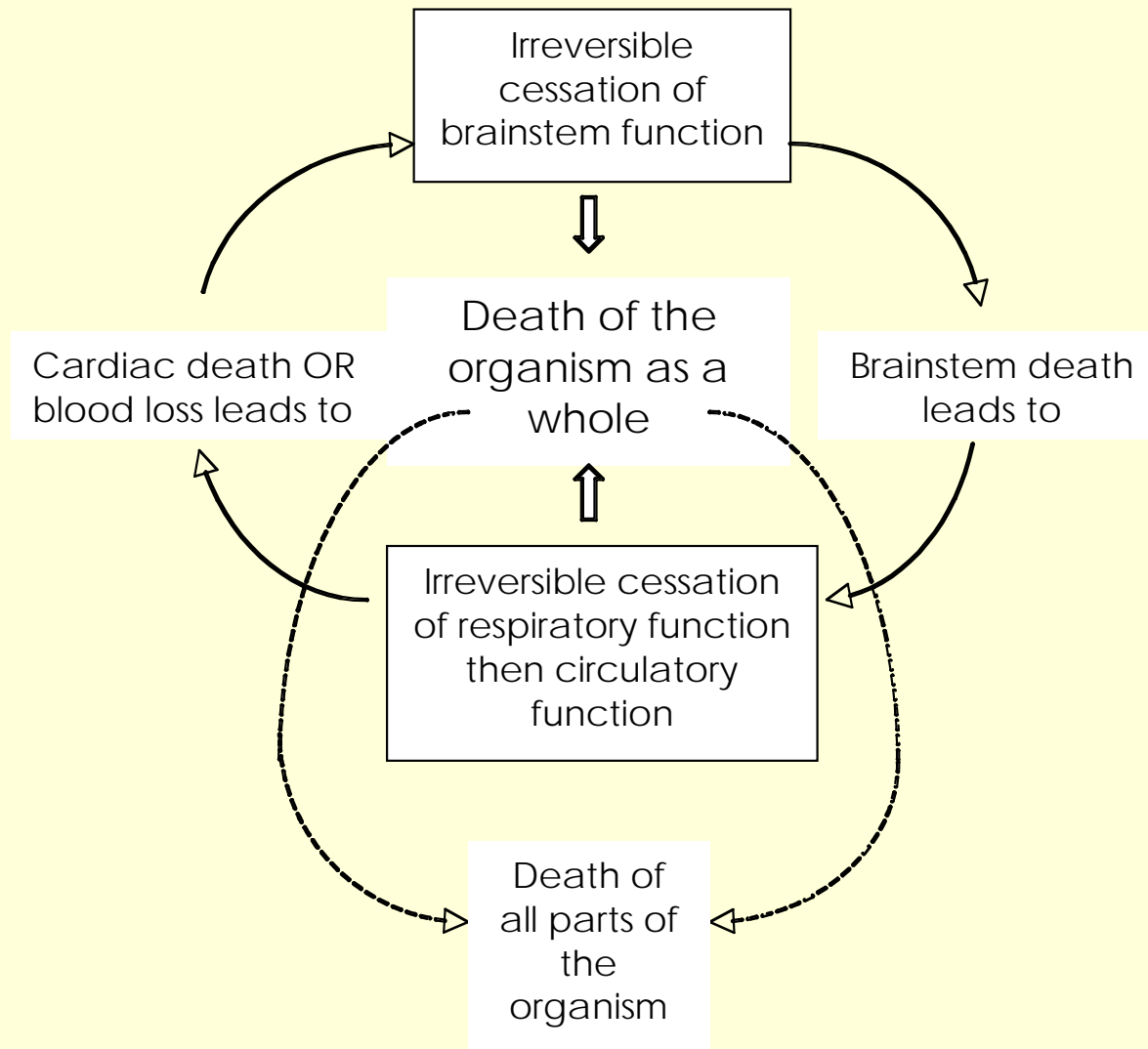
Death

- As opposed to pain and distress, death itself, or the state of being dead is no longer harmful to the animal, which at that point has no physical existence (World Association of Zoos and Aquaria)
- Death refers to the ending of an animal as an integrated whole and not to the death of every single cell in all tissues of an animal

Role of the brainstem in sustaining respiration as the ultimate vital function in the transition from life to death



The unitary process of death

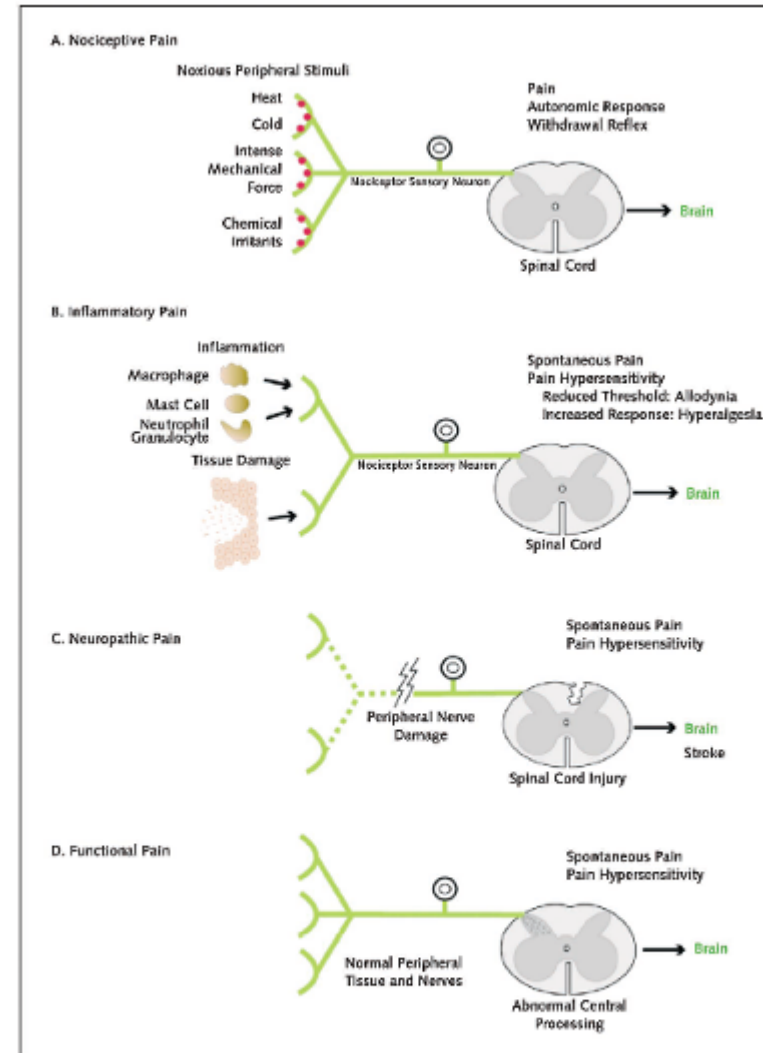
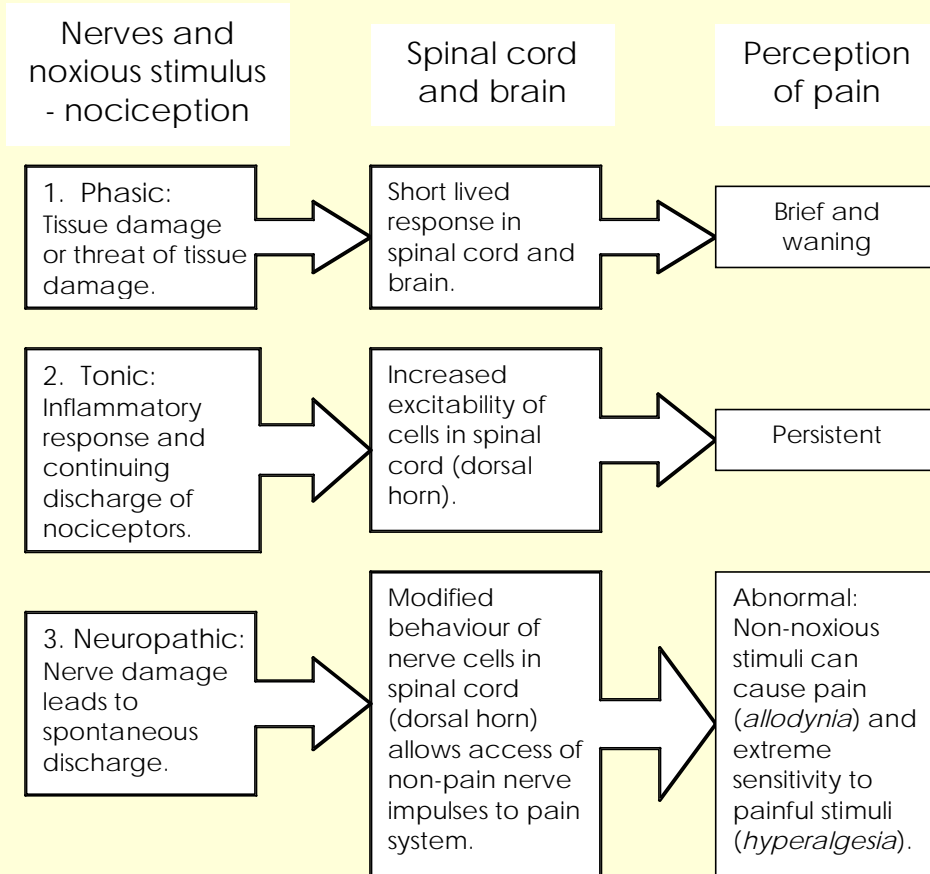


Pain

- Pain is an unpleasant sensory and emotional experience associated with potential or actual tissue damage. It may elicit protective actions, result in learned avoidance and distress and may modify species-specific traits of behaviour, including social behaviour



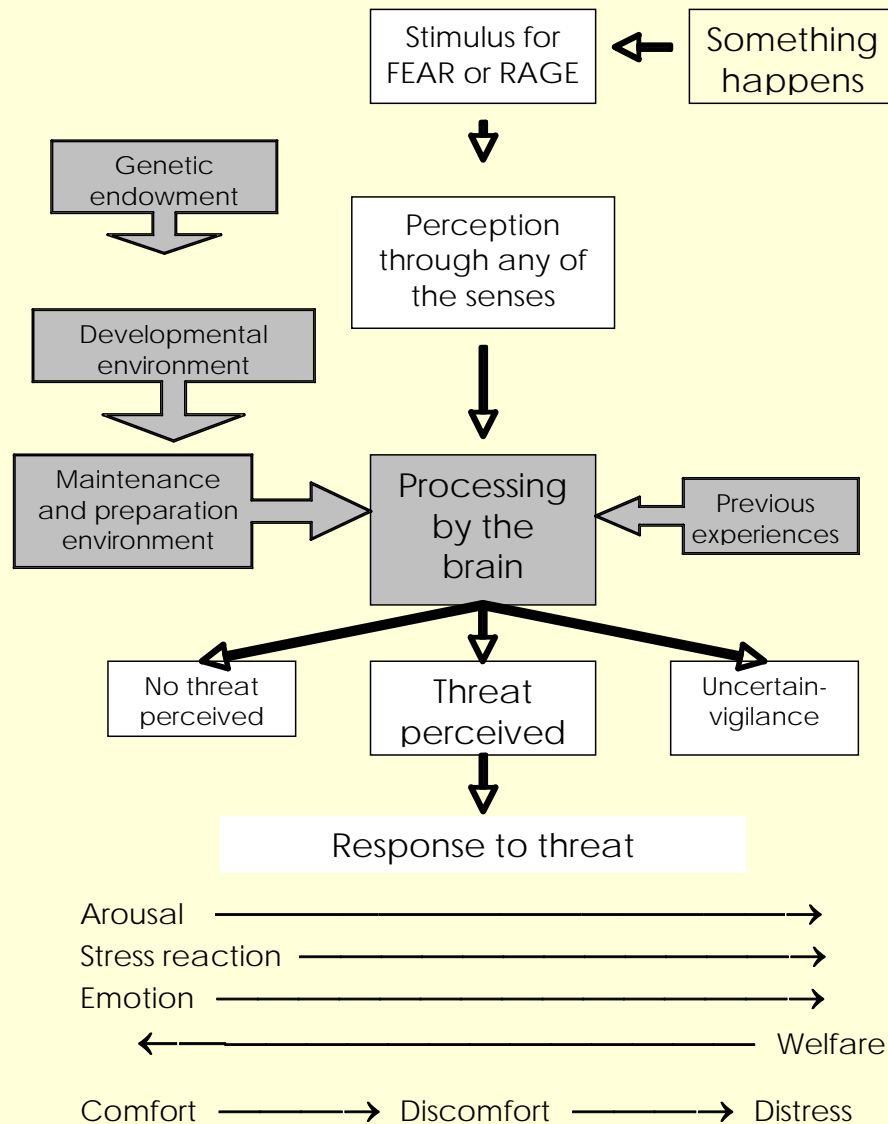
Classification of Pain

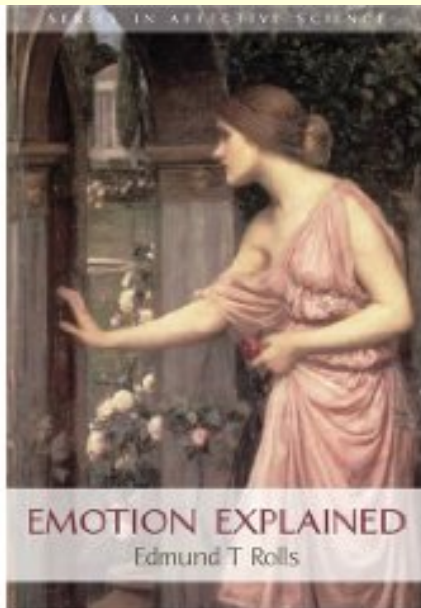


Emotions

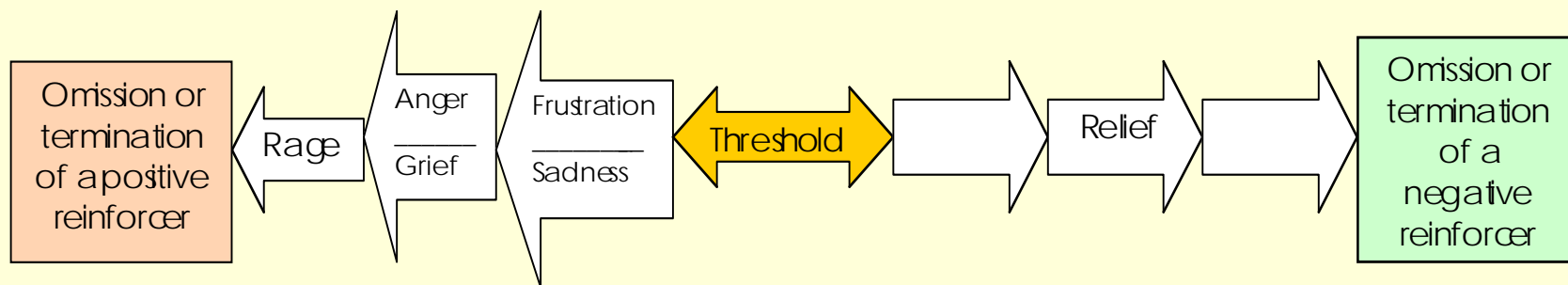
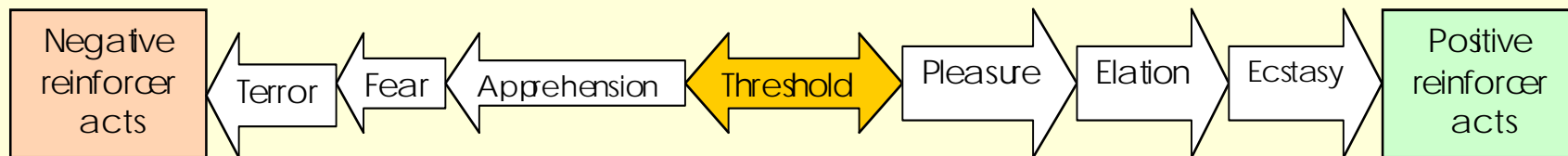
- Fear, anxiety, rage and anger will have physiological aspects and will be expressed in behaviour.
- Emotions depend upon the structure and function of the body. Emotions arise from the processing of external stimuli by the brain.
- Emotions are accompanied by bodily responses such as arousal in the nervous system and changes in the cardiovascular system.
- The expressed behaviours associated with emotion include facial expressions and sound-based communication like bleating in sheep and mooing in cattle.

Conceptual diagram of the processing of fear or rage-related stimuli in animals and the consequent response

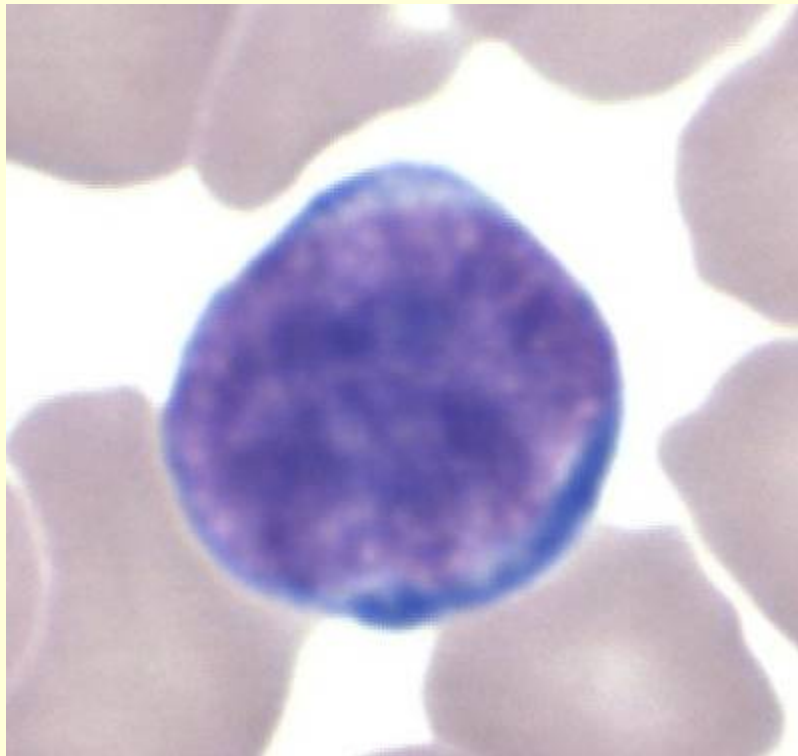




Emotion: Rewards and Punishers



Sickness behaviour - emotion, motivational state?



- Mediated by substances produced by the immune system
- What is the state of current knowledge?
- How can sickness behaviour be managed during euthanasia?

Expression of Emotion

Slide 22



“Soft eyes, relaxed muzzle”*



QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

*From “Off leash Dog Play: A Complete Guide to Safety and Fun” - Robin Bennett and Susan Briggs, 2008

Acknowledgements

Dr Allan Sheridan

Animal Welfare Unit

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Forestry

The Animal Welfare Science Centre