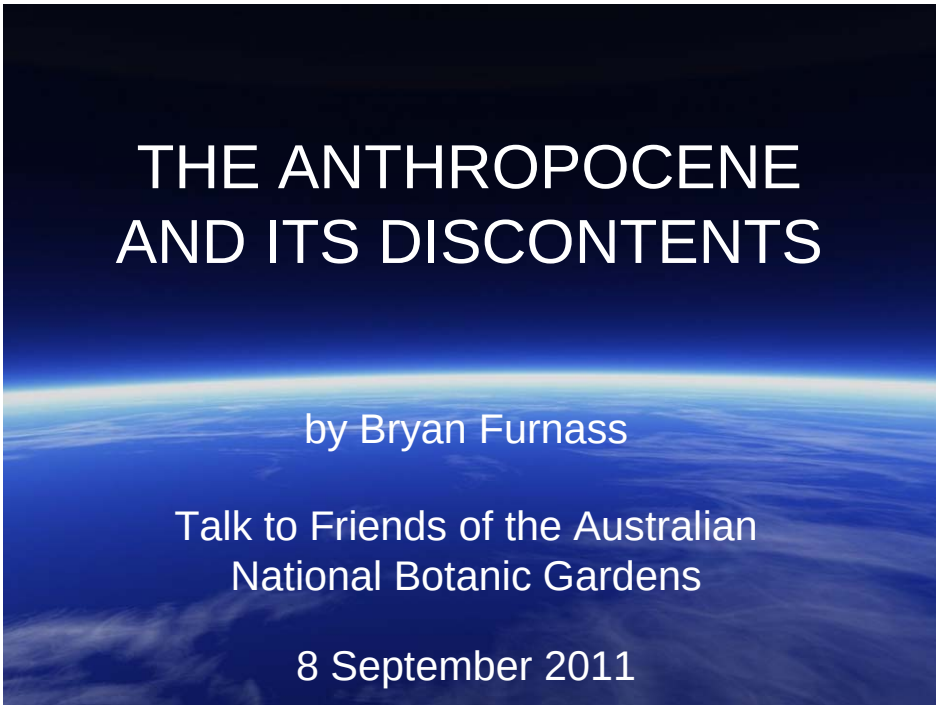

“Now is the winter of our discontent /made glorious summer” (Richard 111)

I note that most of the previous talks to the Friends of the ANBG understandably involved descriptions of varieties of Australian plants and their habitats, since the Gardens are uniquely devoted to the display of indigenous species. I love Australian shrubs, which now occupy most of our previous lawn space at home, together with the birds they attract. I also enjoy some of the luxuries of the Anthropocene, such as putting my feet up before a gas fire, driving a car, switching on a light or using my computer, all of which depend on ancient solar energy captured by chlorophyll and stored over hundreds of millions of years in algae-derived oil and swamp plant-derived coal, which form the basis of our industrial civilization.

Today I propose to take a broad bio-historical view of the role of algal and plant life in the evolution of the plants and animals of the biosphere and their marvellous biodiversity through successive geological eras. Geologists officially refer to the present inter-glacial period as the Holocene, although the impact of human activity on the biosphere since the onset of the industrial transition around two centuries ago has led some scientists to suggest that we have created a new era – the Anthropocene.

To put things into perspective, the Horsehead Nebula in the constellation of Orion (**Fig 1)** is 1300 light years away, which seems far off when compared with our own star which is eight light minutes away, and its nearest neighbour Alpha centauri, four light years away, but is quite close in cosmic terms. The red in this photograph is the

Figure 1

spectrum of hydrogen, which comprises 95% of atoms in the universe, and the nebulous blue cloud is a flush of electrons. Since our bodies are entirely composed of atoms derived from the Big Bang, we can properly be called children of the universe. The humbling news is that the Earth is a satellite of a modestly sized star located in the periphery of the Milky Way galaxy, in which there are over 140 billion stars, there being over 100 billion other galaxies in the observable universe. Unfortunately in the Anthropocene era inhabitants of most cities cannot see the night sky because of pollution, depriving them of a sense of awe about the universe, which can be a reminder of their own material insignificance.

We still have much to learn from the ancient Greeks in regard to plants and health. The goddess Panakeia, from whom our word panacea is derived, was daughter of Athena, goddess of wisdom. She advocated the prescribing of selected plants and herbs in the treatment of established disease. Her sister Hygeia, from whom our word hygiene is derived, together with the so-called father of medicine, Hippocrates, in his tract *Airs Waters and Places*, maintained that Athenians would remain healthy if they lived sensibly, following the laws of nature. Temples of healing were constructed which were set in beautiful gardens, including running water and fountains, which were said to contribute to the healing process, very different from the environment of most modern hospitals. In today's world, there is much anecdotal evidence that visits to national parks and gardens and to wild places promote physical, mental and perhaps spiritual health through exercise and contact with plants and animals in their natural habitat.

Hygeia has achieved considerable success during the Anthropocene, since life expectancy in industrialized nations has doubled, to above eighty years. This has mainly been due to the provision of clean water supplies and improved nutrition, aided by Panacea with immunization and the influence of a powerful pharmaceutical industry with a bewildering array of therapeutic drugs. On the other hand there is now a pandemic of the so-called metabolic syndrome of obesity, Type 2 diabetes and associated cardiovascular diseases, which are mainly preventable, but account for 45% of admissions to Australian hospitals, placing an increasing burden on so-called health care (which is really disease care). It is ironic that while one sixth of the world's population suffer from the effects of over-nutrition, a similar proportion suffer from under-nutrition, bordering on starvation, as is currently the case in East Africa. Reducing inequalities in health and in resource availability, together with switching health policies and finances from treatment towards prevention of disease and the promotion of wellbeing is one of the great moral challenges of our time, which will tend to undermine the present craze for illusory electronic and drug-generated sources of entertainment.

In his *Nichomachean Ethics* Aristotle **(Fig 2)** championed the value of virtue, stating that what humans value most is happiness, attainable not so much through the acquisition of wealth and possessions as through making a contribution to society and adopting ethical behaviour. While Aristotle's wisdom is still revered, his scientific knowledge was astray in maintaining that man was the centre of the universe, and that the sun rotated around the earth, a theory which was consistent with *Genesis* and the teachings of the Catholic Church.

Aristotle (384-322BC)

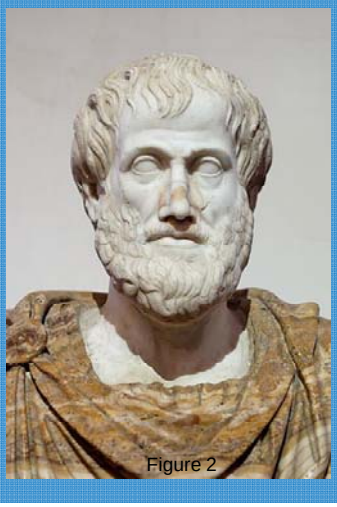

Figure 2

Two millennia later, as a result of his astronomical observations with his telescope Galileo (1564-1642) supported the findings of Copernicus (1453-1543) by proving that the earth rotates round the sun, thereby challenging the anthropocentric and geocentric dogma. For this heresy he was hauled before the Roman Inquisition **(Fig 3)**. It took the Vatican more than three centuries to forgive him for telling the truth. Another challenger to the orthodox view of creation in *Genesis* was Charles Darwin **(Fig 4)**, whose observations showed that all living organisms, including humans, evolved from simpler life forms, a further erosion of the anthropocentric viewpoint. Darwin's scientific approach was not popular with the Anglican Church of the time and is still antithetic to the so-called religious right in the southern United States.

Galileo facing his inquisitors

Figure 3

Charles Darwin (1809-82)

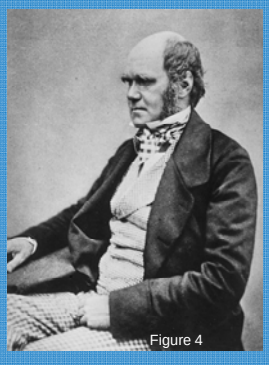

Figure 4

But most thinking people, including indigenous folk, regard themselves as part of the web of life, and creatures of the biosphere, entirely dependent on other plant and animal life forms for their survival **(Fig 5)**. It has been estimated that there are over 8.7 million species (excluding bacteria) on the planet. Three quarters of these – most of which are insects (important for the fertilization of flowering plants) - are on land; only a quarter of species have been found in oceans, although 70% of the earth's surface is water. There are possibly millions more species yet to be discovered.

Fig. 6 is a simplified diagram of the evolution of the biosphere. The first fossil forms were derived from blue-green algae 3.7 billion years ago, still visible as stromatolites in Shark Bay, Western Australia **(Fig 7)**. At that time the earth's atmosphere consisted mostly of water vapour, methane, carbon dioxide and nitrogen, with no oxygen. Over hundreds of millions of years, chlorophyll, using the sun's energy and cellular electron transport systems combined carbon dioxide with water to synthesise glucose and subsequent complex carbohydrates, releasing oxygen and co-incidentally ozone, which provided essential protection of growing plants from excessive ultra-violet radiation. These dramatic transformations ultimately led to the evolution of a profuse diversity of

multicellular plant and animal forms, flowering plants appearing around 150 million years ago.

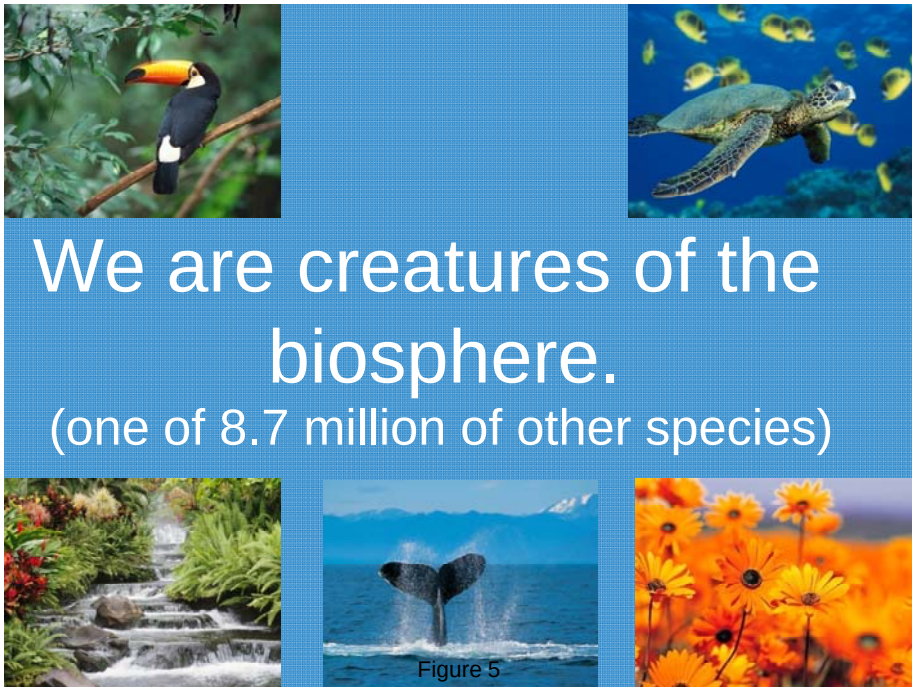

Figure 5

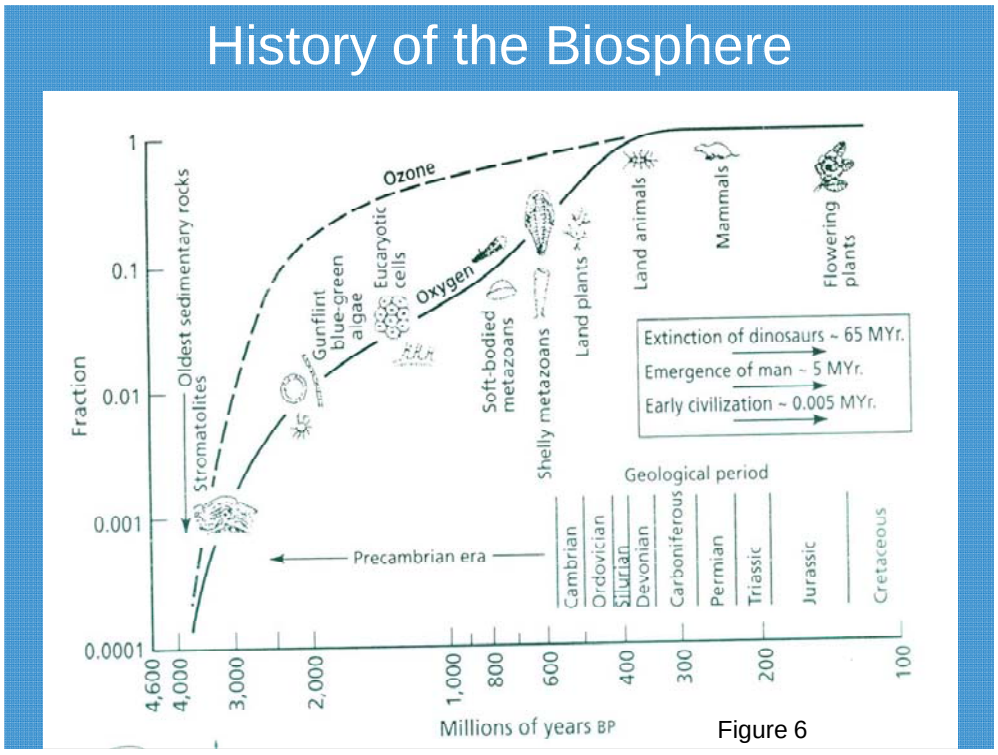

Figure 6

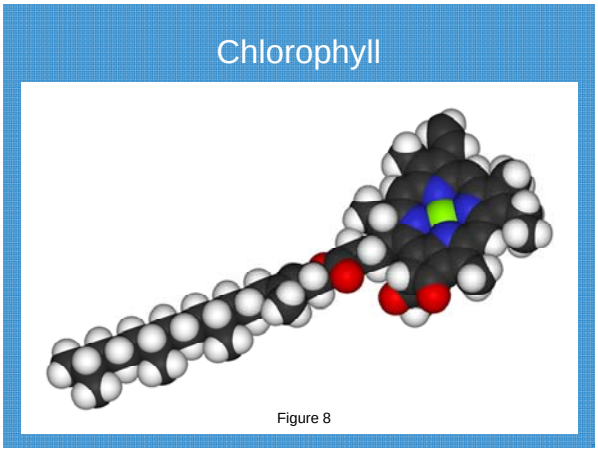

Fig 8 is a diagrammatic representation of chlorophyll, which together with RNA and DNA, is the most important complex molecule on earth. Chlorophyll has a central magnesium atom surrounded by nitrogen, with a cluster of oxygen atoms and a 'tail' of carbon and hydrogen. Chlorophyll, which produces oxygen, interestingly has a similarly shaped molecule to haemoglobin, which has a central iron atom and transports oxygen through vertebrate vascular systems. **Fig 9** shows chlorophyll in all its glory, in a native forest. Only about 10% of Australian pristine forests remain, yet they continue to be systematically destroyed for commercial reasons. Not only the trees are destroyed, but whole non-renewable ecosystems and soils. The beautiful rainbow lorakeet in **Fig 10** is but one example of the creatures to be found in Australian national parks. To my mind, conversion of these magnificent old growth forests into wood chips and pulp to manufacture glossy magazines should be regarded as a crime against the biosphere, alongside oil drilling in deep oceans and the Arctic, 'fracking' for coal seam gas, gold mines, slaughter of cetaceans and warfare, all of which are examples of the triumph of short-term economic profits over ecological sustainability in the Anthropocene.

Humans are fairly new kids on the block, early hominids appearing around three million years ago in the Olduvai Gorge in East Africa. *Homo sapiens* (so-called) evolved about 200,000 years ago.

A Brief History of *Homo sapiens*

Lifestyle	Time (years)	Generations
Hunter-Gatherers *	> 200,000	> 8,000
Agriculture (Holocene) **	> 10,000	> 400
Cities ***	> 5,000	> 200
Industry (fossil fuels) **** (Anthropocene)	250	10
Information Technology *****	50	2
Sustainability ??? ******	25	1

Figure 11

Figure 12

Fig 11 indicates the time scale of human change from hunter-gatherers, where we spent 99% of our evolutionary history, to agricultural settlements in the Fertile Valley between the Tigris and Euphrates rivers10,000 years ago at the beginning of the present interglacial era, referred to by geologists as the Holocene. **Fig 12** is a photograph of traditional hunter-gatherers with their 'best friends' in East Africa

Hunter-gatherers killed off mega fauna in Australia and elsewhere and practiced fire-stick farming, but had a relatively minor impact on the biosphere compared to subsequent events.

The agricultural transition involved the clearing of vast tracts of forests for growing food, housing and boat construction and the manufacture of pottery and metals. In his dialogue *Critias,* Plato (428-347 BC) described the denuded landscape around Athens, resulting from human activity, as being "like the skeleton of a sick man, all the flesh and soft earth being melted away". On a positive note, globally, human settlements and agriculture, with increased food security and protection from predatory animals, enabled the development of culture, languages and literature and the flourishing of architecture, arts and science during the Renaissance.

A major change in culture emerged in the late 18th century with the harnessing of fossil energy to drive machinery for manufacturing and transport, generally known as the industrial revolution, offering the prospect of liberation from unrelenting manual labour. A crucial influence on this was the invention of the steam engine by James Watt, a Scottish engineer **(Figs 13 and 14)**, which through the incorporation of a steam condenser greatly improved the efficiency of harnessing fossil fuel energy. One of my

ancestors, Samuel Crompton, made a significant contribution to this revolution through his invention of a cotton- spinning mule and the establishment of the Lancashire cotton industry. There was much social resistance initially to machines taking over jobs. The widespread use of coal for manufacturing and domestic heating over the ensuing two centuries led to much local air pollution, with impenetrable choking fogs in my home city of Manchester and later, when I was a house physician, in the great London smog of 1952, when 4000 people died over one weekend from respiratory failure.

James Watt (1736-1819)

Figure 13

Steam Engine (1784)

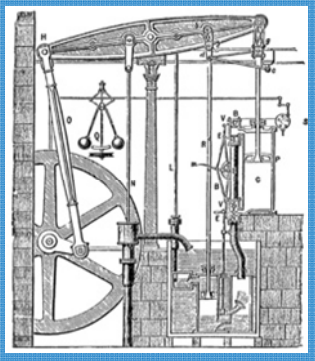

Figure 14

The Anthropocene coincided with an exponential sevenfold increase in population from its base level of about one billion to its present level of 7 billion people **(Fig 15)**, with a parallel rise in fossil fuel combustion **(Fig 16)**. In 1861 John Tyndale measured the effect of different gases on ambient temperature, finding that water vapour was the most powerful in trapping heat, followed by methane and 'carbonic acid' (carbon dioxide). Better known is the Swedish scientist Svant Arrhenius **(Fig 17)**, who also identified these so-called greenhouse gases and their influence on trapping heat. Although water vapour is a more powerful greenhouse gas than carbon dioxide, its effects are evanescent and local. Methane is also a more powerful greenhouse gas than carbon dioxide, but it is oxidized within months to CO_2, which remains in the atmosphere for centuries. Arrhenius prophetically calculated that if the accumulation of carbon dioxide continued at its present rate, global temperature would rise by between 4 and 5 degrees C by the end of the 21st century. Arrhenius was distinguished in other fields of science and was on the foundation board for the allocation of Nobel prizes.

Human Population Growth

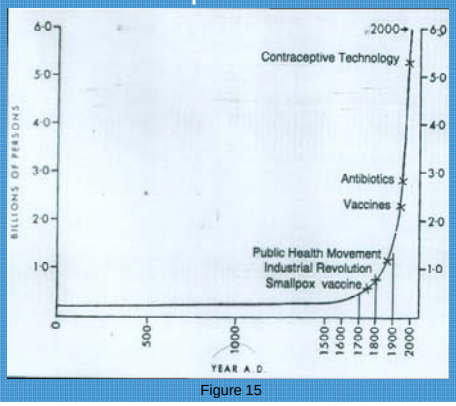

Figure 15

Fossil Energy Use

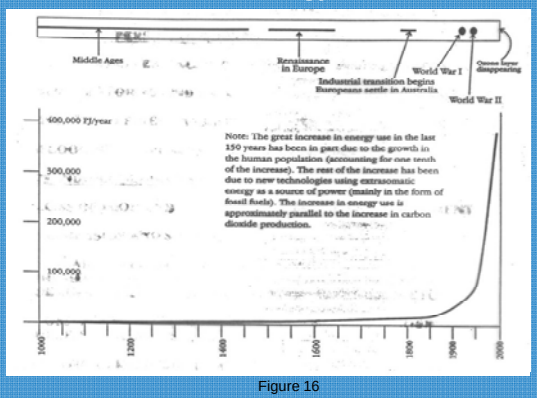

Figure 16

Another pioneer in atmospheric science was Dutchman Paul Crutzen **(Fig 18)** who won the 1995 Nobel Prize in chemistry for his discovery of a hole in the ozone layer, caused by atmospheric nitrogen oxides and the widespread use of aerosols containing chlorofluorocarbons (CFCs). In a rare example of international co-operation, the banning of CFC use in refrigeration and spray cans led to a diminution of the size of the hole in the ozone layer. It was after a climate conference in 2000 that Crutzen and some of his colleagues, dismayed by the adverse impacts of human activity on the biosphere, suggested that the industrial era, currently included in the Holocene, be re-named the Anthropocene. The Geological Society is examining this proposal on an official basis. Crutzen also maintained that release of nitrous oxide emissions in the production of biofuels contributes more to global warming than fossil fuels.

Svant Arrhenius (1896)

Figure 17

Paul Crutzen (2000)
Naming the anthropocene

Figure 18

Some of the “achievements” of the Anthropocene are outlined in **Fig 19.** A vocal minority of individuals and politicians, well funded by the fossil fuel industry, claim that the violent weather patterns of the past two decades are part of a natural cycle, and that human activity has played little part. As a physician trained in evidence-based medicine I maintain that the scientific evidence from climate and environmental scientists that

Homo sapiens is exerting an adverse, and in some cases irreversible, impact on our habitat and health is compelling, and needs immediate action.

“ACHIEVEMENTS” OF THE ANTHROPOCENE

- **SPECIES EXTINCTION : 30,000 PA**
- **POLLUTION pa:10bt CO2, 121mt N,10mt P**
- **? GLOBAL TEMP. RISE 4-5 DEG BY 2100**
- **DESTRUCTION OF SOIL, WATER, ENERGY**
- **PEAK FISH: 2004; PEAK OIL: 2006**
- **OCEANIC “DEAD ZONES” >400**
- **ARMS EXPENDITURE $1.6 Tn pa**
- **?? HUMAN POPULATION TO 9 Bn BY 2100**
- **?? WAITING FOR THE FOUR HORSEMEN**

Figure 19

Water vapour, oxides of nitrogen and methane are powerful but evanescent greenhouse gases, but since carbon dioxide remains in the atmosphere for centuries it is the most useful marker of atmospheric pollution. **Fig 20** shows the exponential rise in atmospheric CO_2 and methane over the past two centuries. CO_2 concentration has increased by 30% since the onset of the Anthropocene, from 280ppm to 393 ppm. What is disturbing is the feedback release of methane and CO_2 from carbon sinks in melting ice and tundra, also leading to a reduced albedo effect, and from acidifying oceans as a result of global warming, threatening runaway heating effects. The curve of increasing global temperature shows a parallel change **(Fig 21)**, and the melting Arctic ice cap, where temperature rise is greatest, supports this. Polar scientists from the US National Snow and Ice Data Center report that Arctic sea ice is now melting and thinning at a much faster rate than previously – even faster than the IPCC estimates **(Fig 22)** – rendering the famed Northwest Passage open to sea traffic. 2010 was the hottest year on record, globally and locally, top temperatures ranging from Russia (44C), Niger (48C), Sudan (49C), Saudi Arabia and Iraq (52C), and Pakistan (54C).

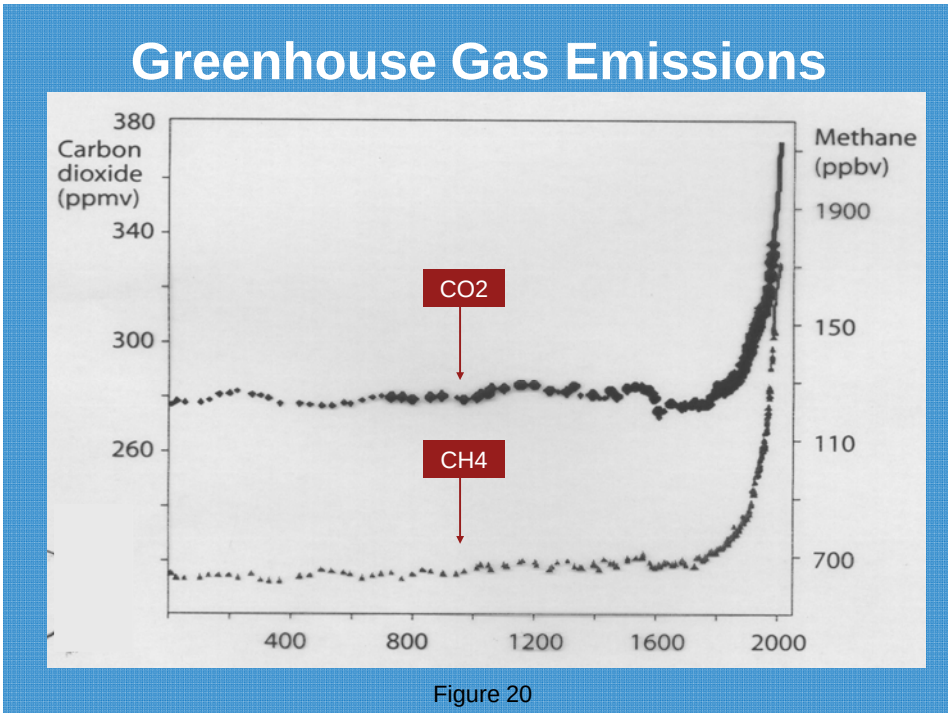

Figure 20

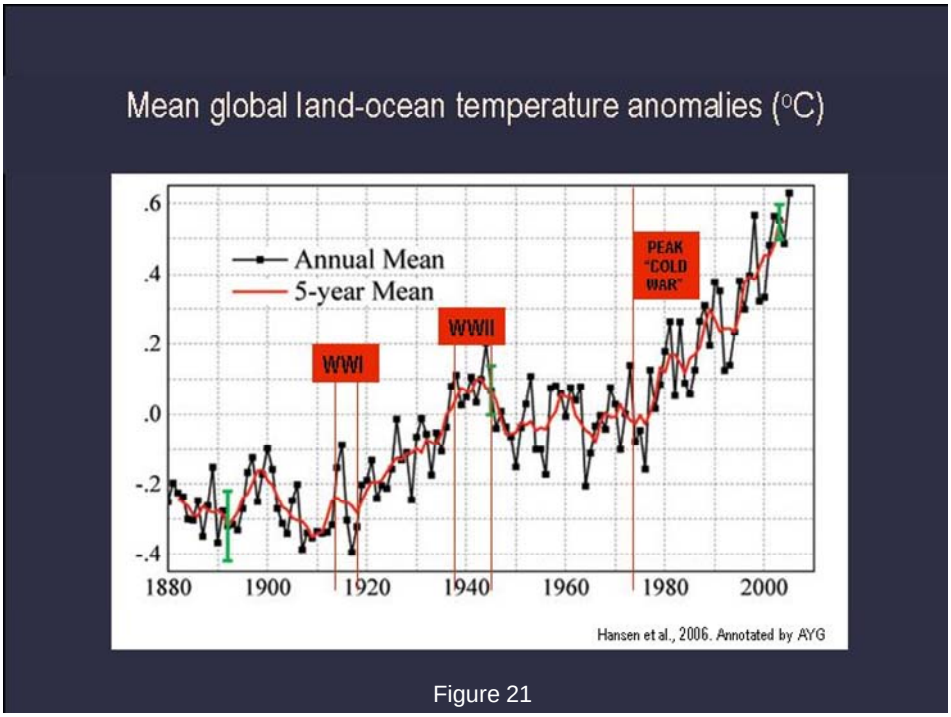

Figure 21

The universe is slowly running down, a process known as entropy, or increasing disorder, as when a drop of ink added to water becomes dispersed. In the home-made diagram in **Fig 23**, photons from the sun, emanating from the energy released from fusion of hydrogen into helium in its interior, take 100 million years to reach the sun's

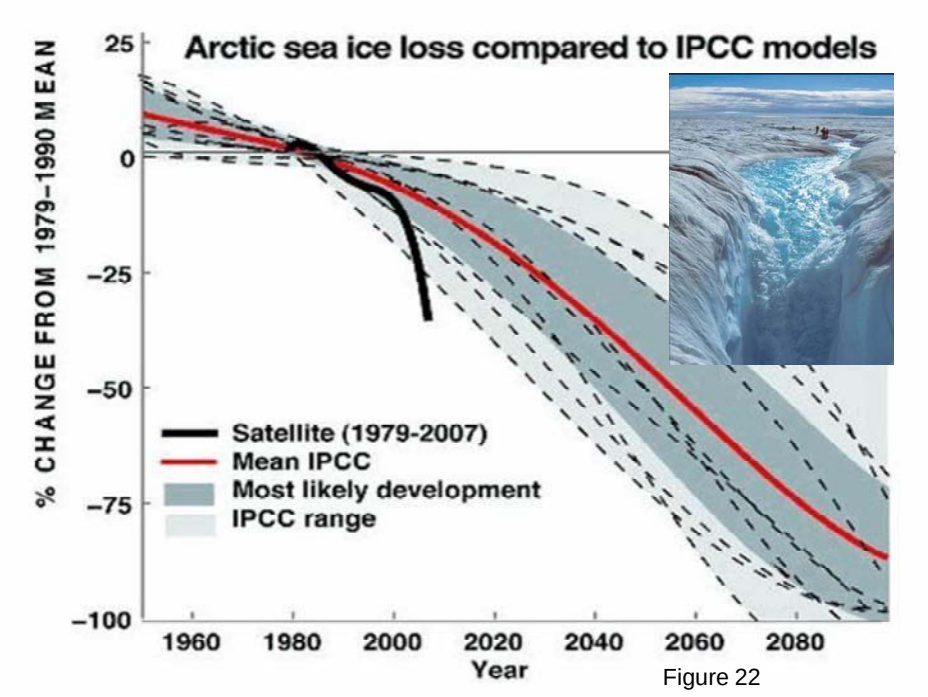

Figure 22

surface, and then eight minutes to reach the earth. On striking a plant leaf, photons lift the hydrogen electrons of its water molecules into an ‘excited’ state and wider orbit. The electrons are then captured by the cellular electron transport system, and used by chlorophyll to synthesise glucose from water and carbon dioxide, releasing oxygen, as in the following equation: $6CO_2+6H*_2O=C_6H*_{12}O_6+6O_2$. (Respiration and combustion is this equation in reverse).

Nobel laureate Albert Szent-Gyorgi, founder of the science of submolecular biology, declared “What drives life is a little electric current, kept up by the sunshine. All the complexities of intermediary metabolism are but a lacework around this basic fact”. Synthesised glucose is then changed into complex carbohydrates to build plant structures, and when the plant dies it rots, giving off CO_2, or under conditions of a swamp over hundreds of millions of years converted to brown and eventually black coal. When we burn coal, oil or natural gas, releasing CO_2 and other pollutants, we are literally combusting ‘bottled sunshine’ or solar capital.

The egg timer in Fig 22, traced round an egg spoon, shows that the arrow of time and gravity transfers sand from a low entropy state to a high entropy state. On the right side of the diagram, Humpty Dumpty (traced round one of our neighbour’s pullet eggs) perches precariously on a wall. If he falls and breaks, the second law of thermodynamics prevents him from being restored, as in the nursery rhyme “Humpty Dumpty sat on a wall/ Humpty Dumpty had a great fall/ All the king’s horses and all the

king's men/Couldn't put Humpty together again". The high entropy state of sand in the bottom of the egg timer can be restored to a low entropy state by applying external energy, such as turning it upside down by hand. The second equation at the bottom of Fig 25 refers to the global impact of the Anthropocene: Environmental impact=population x resource use, with many local per capita inequalities in resource use.

Entropy and Biology

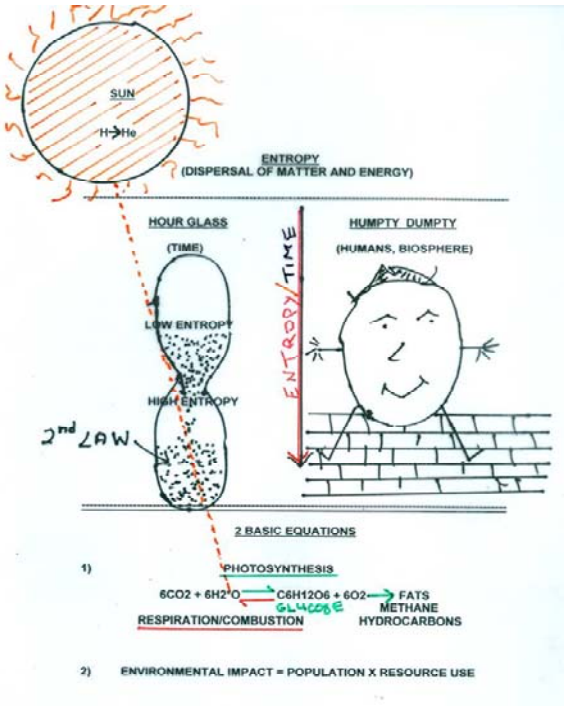

Figure 23

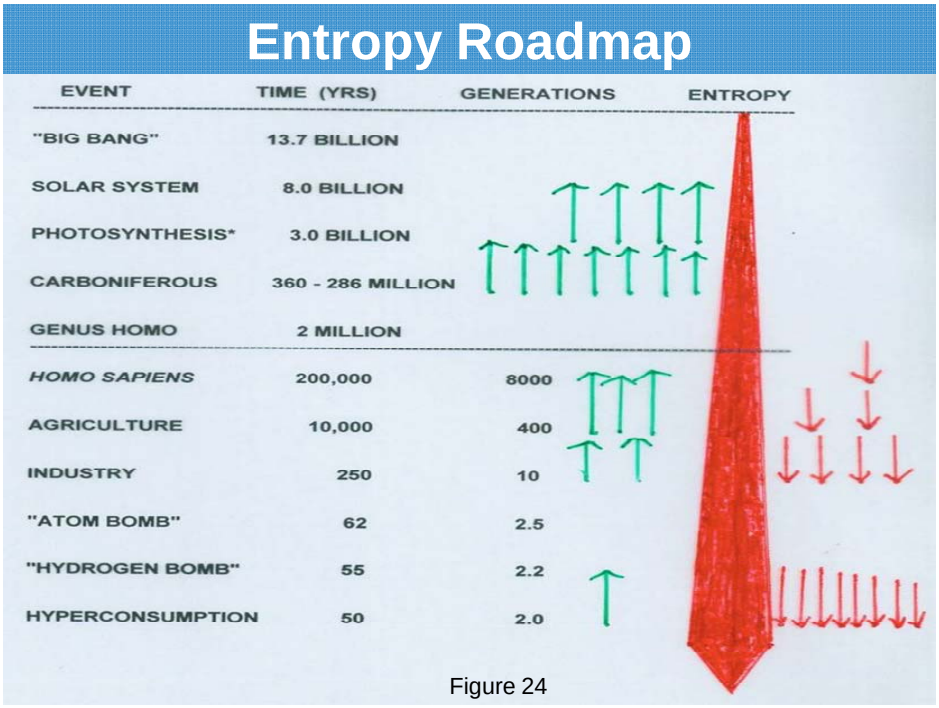

Figure 24

Fig 24 is a rather fanciful description of the entropic pathway, from the Big Bang onwards, and how humans, through fossil fuel burning and reduction of carbon sinks in oceans, ice sheets, soil and plants, have accelerated disorder in this little corner of the universe. The large red tie-shaped pointer indicates the inexorable universal increase in entropy with time, locally accelerated by human activity, initially with the development of agriculture, and particularly since the industrial revolution over the past two centuries, indicated by small red downwards-pointing arrows. The upwards-pointing green arrows refer to the slowing of the local entropic increase by photosynthesis.

A pessimistic view of the Anthropocene is portrayed graphically as the Olduvai theory of civilization in **Fig 25**, based on availability of oil supplies. According to this diagram the steep upward curve starts in 1935 when about 37% of oil supplies have been used, and ends in 2025 when only 37% of available oil is left, with ‘Peak oil’ occurring in 2006. The theory is not entirely fanciful, and if true would make the Anthropocene era the shortest civilization in human history. Several international conferences held in an attempt to mitigate climate change through reducing carbon emissions have foundered by failure of nations to take adequate concerted action to reduce emissions, justifiably by developing nations, particularly China, India and Brazil, who wish to catch up with the high living standards flaunted by the western world.

In 2007, the Bali climate conference recommended that global greenhouse gas emissions should peak in 10-15 years and decline by “well above half” of the 2000 level

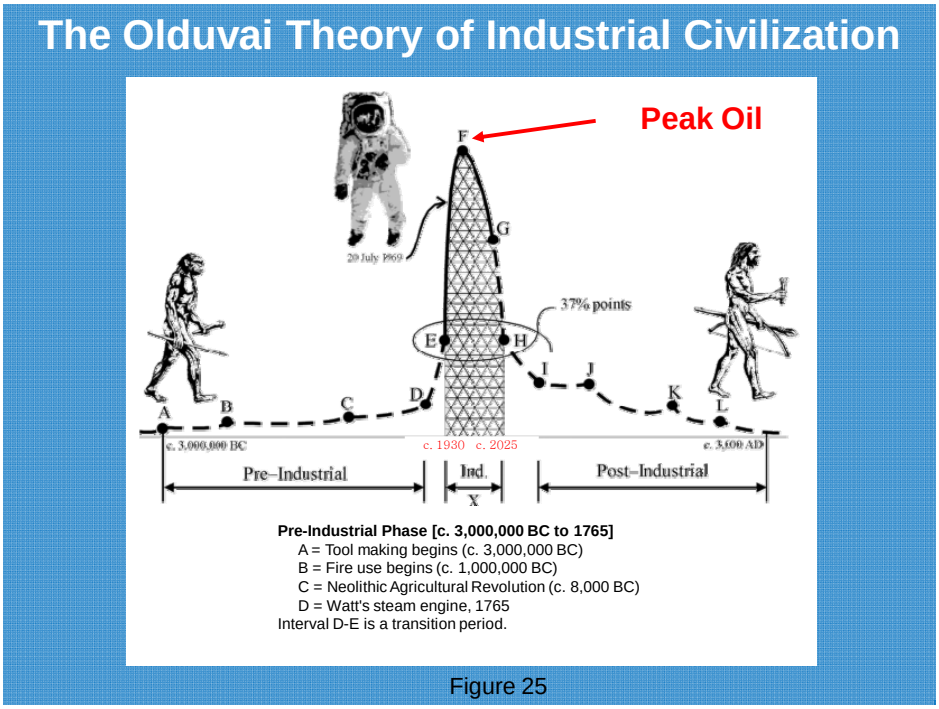

Figure 25

by 2050 for developing countries and, for developed countries, to achieve emission levels 20-40% below 1990 levels by 2020. The United States strongly opposed these numbers, at times supported by Japan, Canada, Australia and Russia. The resulting watered down conference mandate was for “deep cuts in global emissions, with regard to IPCC’s Fourth Annual Report”. The cartoon in **Fig 26** following the Bali climate conference compares the subsequent political inaction with the fate of the Titanic, which ignored signals of icebergs ahead – another example of the triumph of conference chatter and fossil-fuelled growth over political, economic and social action, continued at the 2010 Copenhagen climate conference.

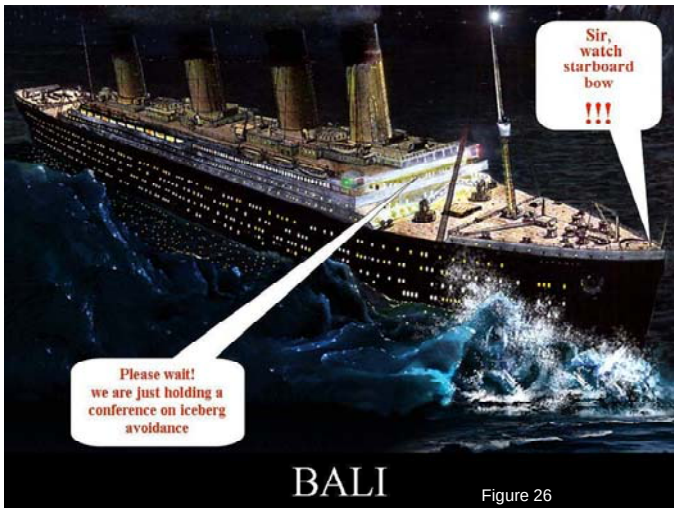

Figure 26

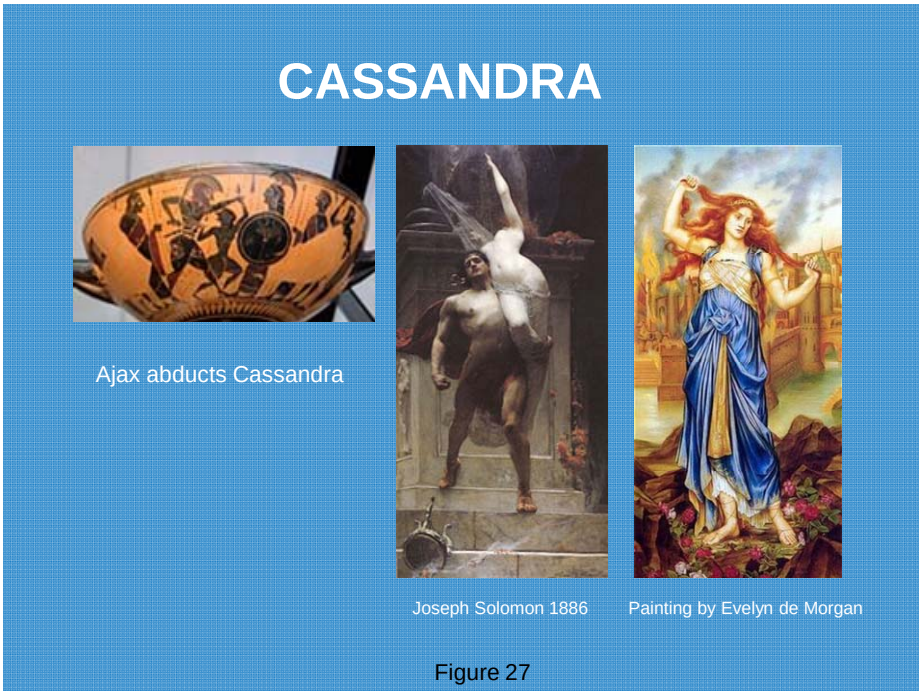

Figure 27

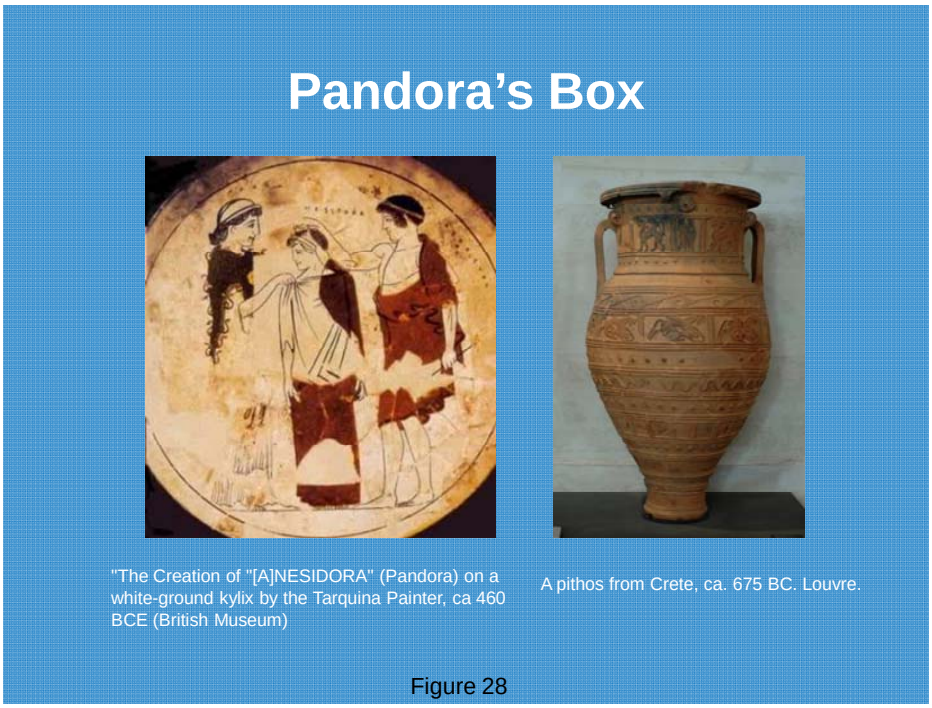

Figure 28

Several myths of ancient Greece have applications to dilemmas of the modern world. Cassandra, daughter of Priam, the king of Troy, was favoured by Apollo, who gave her the gift of prophecy. When she failed to return his love, he decreed that while she would always tell the truth, nobody would believe her. This dissonance must resonate with

modern climate scientists and their frustration with people who, despite scientific evidence, deny that global warming is occurring. **Fig 27** shows Cassandra being abducted by Ajax following the sacking of Troy, the right hand painting depicting her tearing her hair because her prophecy of the Greek victory was ignored. The Trojan horse can be seen in the distance in front of the flames to the lower left of Cassandra.

Another Greek legend is pertinent to the Anthropocene and its discontents, namely the story of Pandora **(Fig 28)**. According to Hesiod, Pandora (meaning 'all-gifted') was the first mortal female, created by Zeus to punish Prometheus who had stolen fire from the gods to give to humankind and initiate civilisation. Zeus (who was not enamoured of humans, to put it mildly) presented Pandora with a box, or jar, containing all the evils which beset the human species. When Pandora removed the lid, all the evils flew out and have continued to afflict the world ever since. Only Hope remained in the box. (The moral of this story is "always look a gift horse in the mouth", as was the case with the Trojan Horse). The misogynistic approach of Greek mythology is analogous to the Adam and Eve myth in *Genesis*, in which Eve is blamed for succumbing to the temptation of the serpent to present an apple from the Tree of Knowledge to Adam.

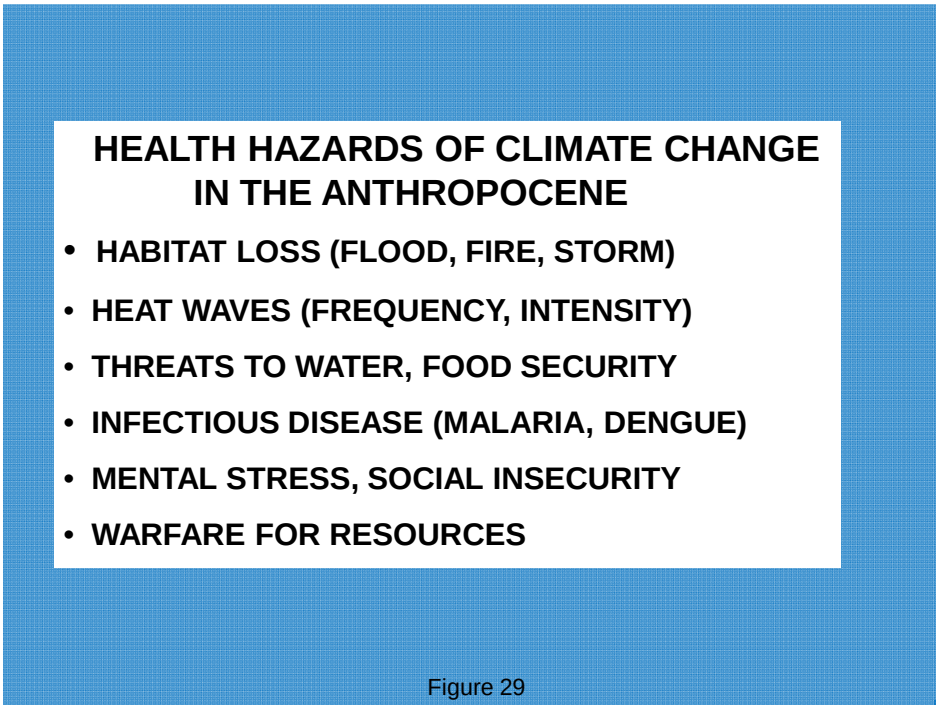

Figure 29

One of Pandora's demons is anthropogenic global heating and its effects on human health, which are summarized in **Fig 29**. Some of these effects are already becoming apparent, including deaths from habitat displacement, heat stroke and tropical diseases, spreading to wider latitudes and higher altitudes. Often underestimated are the

widespread impacts on mental and social health from natural disasters, recently summarized in a report of the Climate Institute.

Spes or "Hope"; engraving by Sebald Beham, German c1540

Figure 30

Alexander Pope's Essay on Man incorporates the phrase: "Hope springs eternal in the human breast" **(Fig 30**, with Spes looking symbolically towards the sun**)**. According to many scientists and some politicians, urgent and radical action is required if humans are to survive the damage we have inflicted on the biosphere during the Anthropocene , particularly over the past half century. A sustainable future requires a radical change of thinking and action, amounting to a new industrial transition which challenges our profligate consumerism.

A NEW INDUSTRIAL REVOLUTION

A TIPPING POINT FOR HOPE

From 19th century ancient, dirty, non-renewable solar capital

To 21st century clean renewable solar currency, for:

- Local: Building solar orientation, design and operation (insulation, solar hot water, photovoltaics)
- Central: Concentrated solar power (CSP: covering 0.5% of deserts with mirrors focused on turbines would meet all electricity needs); geothermal; wind; tide

Figure 31

A NEW INDUSTRIAL REVOLUTION

A TIPPING POINT FOR HOPE

- Transport: From road to rail, from air to wind-assisted ships; hybrid cars; biofuels from algae and crop wastes, not from food crops or palm oil from cleared forests; Solar or wind - generated H_2 in fuel cells
- Agriculture: Cease land clearing; move to organic agriculture for better water retention, less pesticides, herbicides; local food production to reduce transport costs
- Health: Equity of resources; healthy nutrition; more use of muscle power; adaptation to inevitable global warming

Figure 32

Some of the changes suggested in **Figs 31 and 32** are already being applied by individuals and community groups, although economists, vested interests and most politicians inhibit sustainable initiatives. There is great potential to mitigate the effects of climate change through increasing efficiency of energy use and household applications in sustainable technologies, such as solar orientation of houses, insulation, water tanks, photo-voltaic roof panels and evaporative coolers. Australia is well ahead in centralized solar technology, which comprise large collections of solar mirrors focused on turbines **(Fig 33)**, from which heat can be stored at 600C in salt, refuting the argument that solar power delivery can only be intermittant. The Climate Institute calculates that there is the potential to provide many thousands of jobs and economic growth in the solar, wind power and geothermal industries if the considerable lobbying influence of the fossil fuel industries can be overcome.

Mirrors can light up the World

Solar Plant in the Mojave Desert, California

Figure 33

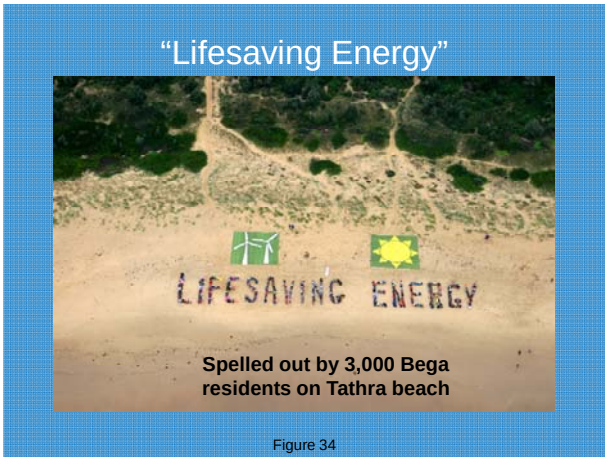

Figure 34

Figure 35

The people who are most at risk from the adverse effects of the Anthropocene are our children and grandchildren, which is why education in sustainability is so vital at the school level. An example of community education has been provided by Bega (NSW) orthopedic surgeon Matthew Nott, who organized a helicopter to photograph a group of 3000 residents (10% of the Bega population) to spell out "Lifesaving Energy" on Tathra Beach **(Fig 34)**. Matthew, who is himself a lifesaver, intends to ensure that all lifesaving buildings are mounted with photovoltaic panels on their roofs to harvest solar energy directly. Students from Narooma school were also persuaded to spell out the words "To our future" in Mandarin (perhaps a prophetic statement) on their playing field **(Fig 35)**. Another positive initiative has been studies in sustainability which have been integrated into all disciplines of study and introduced into the great majority of Canberra schools and some university courses. Preliminary investigation has indicated that some of the knowledge gained by pupils has been transferred upwards to parents – a sort of 'trickle-up' effect of ideas, in contrast to the bogus 'trickle- down' effect of wealth from the super rich to economically disadvantaged members of the community, which was predicted by British ex-prime minister Margaret Thatcher.

Conclusion

1) The adverse impacts of the Anthropocene on humans and their habitat may be summarized as the four P's **(Fig 36)**. All of these processes are currently driving human societies and their environments towards an unsustainable future. It may be that we have already passed the tipping point of no return, but the ecological and economic costs of taking collective action as a species now will be immeasurably less than continuing with 'business as usual'.

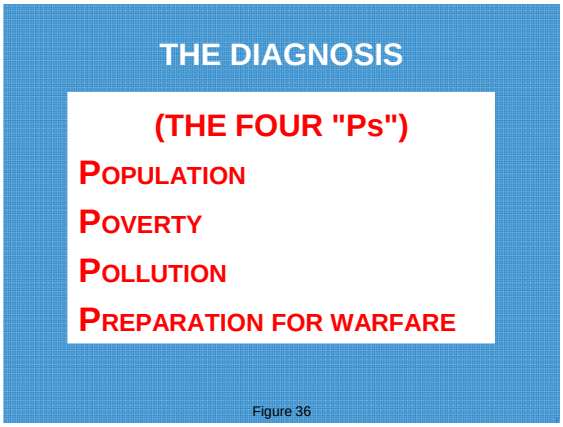

Figure 36

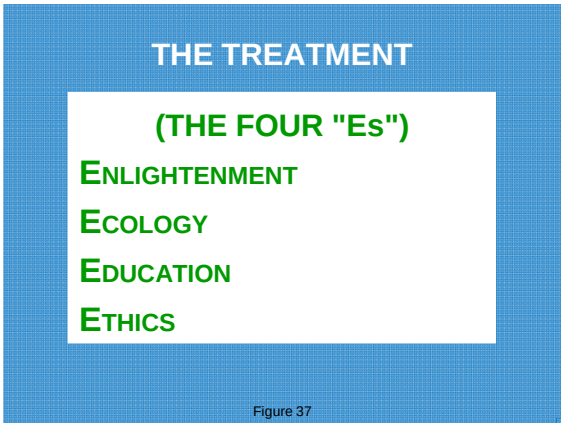

Figure 37

2) Efforts of mitigation will require developments summarised as the four E's **(Fig 37).** This will entail a massive cultural change within human societies , towards a post-Anthropocene adaptation no less pervasive than the agricultural and industrial transitions, entailing an emphasis on co-operation rather than competition with the natural world and each other, embodying an attitude crystallised by Albert Schweitzer as reverence for life. Since the dawn of human history, creative, religious and destructive impulses of humans have, with few exceptions, been dominated by males, with testosterone putting its stamp on urgency, violence and short-term vision. A sustainable and more enjoyable future will require greater involvement of women in power structures and decision making, from the community to political and corporate leadership and influence, together with a decline in militarism. Perhaps this new era could be named the Sustainocene, or a less clumsy word with similar meaning.

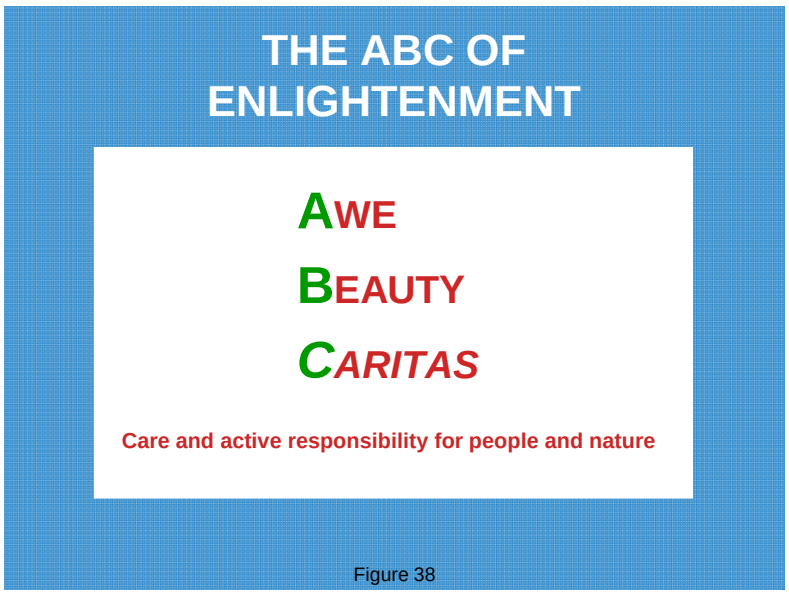

Figure 38

3) The ABC of the new ‘age of enlightenment’ **(Fig 38)** needs a less egocentric and anthropocentric and a more biocentric view of our place in nature. Our parochial western society will require a metamorphosis from the dominance of consumerism and ‘evermoreism’ to ‘enoughism’, and caritas (care with acted responsibility), entailing a more equitable distribution of rights and resources and a more disdainful attitude towards the ‘super rich’, as Aristotle implied.

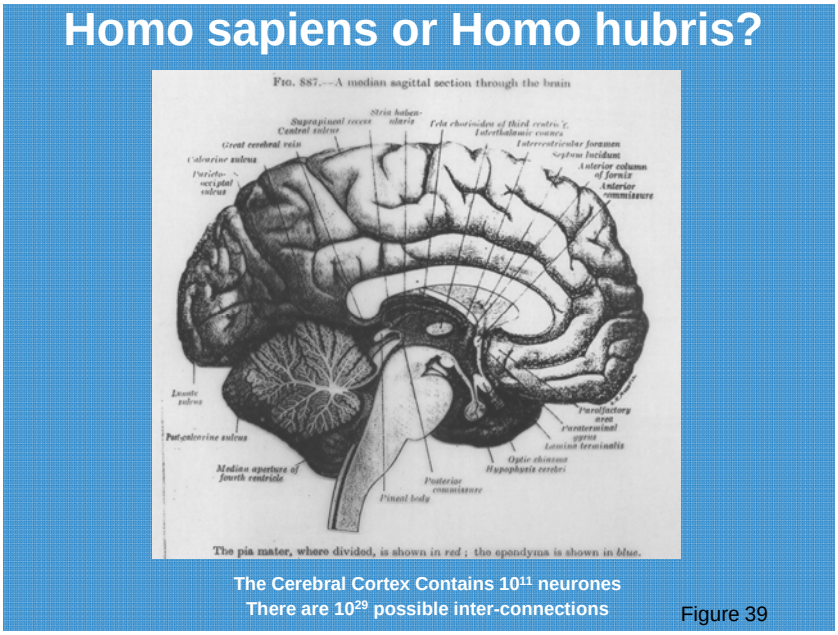

Figure 39

The agent of change at our disposal is the human cerebral cortex **(Fig 39)**, which is the most complex structure in the known universe, endowed with both consciousness (awareness) and conscience (inwit), plus choice, only a fraction of its capacity being used. The intellectual potential is already there. What is sadly lacking is the social and political will, which makes it difficult to be optimistic about our future as a species. If Hope is to be rescued from the bottom of Pandora’s box to thaw “the winter of our discontent” she will need the help of another four lettered companion, which should be acceptable to both religious and secular folk, namely Love.

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CV of Stanley "Bryan" Furnass AM

Personal details

Born in Manchester, UK, 16/09/1927. Married, with five children and seven grandchildren

Educational background

Manchester Grammar School (1938-1945)

Oxford University Medical School (1945-49) (Merton College)

Middlesex Hospital Medical School (1949-51)

Qualifications

BM , BCh, MA, DM (Oxon), FRCP (Lond), FRACP

Appointments

1952-3 House physician, Middlesex Hospital (general medicine, cardiology, neurology)

1953-55 National Service, RAMC (West Africa)

1955 House physician, London Chest Hospital

1955-56 Registrar in chest medicine, Worthing Group Hospitals, W Sussex

1957-58 Medical Registrar, Professorial Department of Medicine, Middlesex Hospital

1959 Research Assistant, Department of Medicine, Middlesex Hospital

1960-61 Physician to Goulburn Medical Clinic, NSW

1961-66 Consultant physician in private practice, Canberra

1966-91 Foundation Director, ANU Health Service

Publications

About 30 articles, 1959-2011

In various medical journals –Journal of Physiology; Medical Journal of Australia; Australasian Annals of Medicine; Australian Academy of Science; Sports Medicine Journal; Postgraduate Committee in Medicine, University of NSW; Proc Aust. and NZ Student Services Assocn; British Student Health association.

Books, conference proceedings and reports

Report on some aspects of drug consumption in Canada, The United Kingdom, Sweden, Denmark, The United States of America and Australia to Sir John Crawford, Vice Chancellor (1970); Changes in Non-Infectious Diseases Associated with the Processes of Civilisation, in The Impact of Civilisation on the Biology of Man (1970, Ed. SV Boyden); Changing Patterns of Health and Disease, in The Magic Bullet (1976, Ed M Diesendorf); Adaptation, Ancient and Modern, in Impact of the Environment and Lifestyle on Human health (1977, Ed with M Diesendorf); Metabolic Studies in Obesity (1978, DM Thesis); Health in the Tropics – a survival guide for travellers and field workers (1990,RSPacS); Survival, Health and Wellbeing into the Twenty First Century (1996, Convenor and Ed); Academy of Science Florey Centenary Symposium on Infectious Diseases (1998,Ed.); Bad Bugs – People and Infectious Diseases (2000, Ed); Good Grub –Food for Healthy People and a Healthy Planet (2002, Convenor and Ed of preceding internet conference); In Search of sustainability (2004, Co-convenor and Ed. of preceding internet conference, with Jenny Goldie and Bob Douglas); Making Canberra Sustainable (2005, Convenor and Ed., Manning Clark House); Entropy, climate change and health – how shall we adapt? (21 November 2007: Emeritus Faculty events); A case for easier deaths and natural burials (1 July 2009: Emeritus Faculty Events); Pandora's Box (October 2010: Independent Scholars of Australia Association); The Anthropocene and its Discontents (8 September 2011, Friends of the Australian National Gardens).

Letters and articles to Editors, 1961-2011

Sundry letters to The Lancet and Guardian Weekly; several articles and many letters to The Canberra Times

Professional Associations

Life Member, Nature and Society Forum; Life Member, Australia and new Zealand Student Services Association; Life Member, Manning Clark House; Member, Doctors for the Environment Australia; Member, Medical Association for the Prevention of War; Member, Strategic Council, The Climate Institute

Enduring Interests

Climate change; Sustainability, Gardening.