

THE ROLE OF DOCOSAHEXAENOIC AND ARACHIDONIC ACIDS AS DETERMINANTS OF EVOLUTION AND HOMINID BRAIN DEVELOPMENT

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ABSTRACT

Lipids played a major, as yet unrecognised, role as determinants in evolution. Life originated 3 billion years ago during which time there was ample opportunity for DNA modification. Yet there was little change in the life forms for the first 2.5 billion years. It was not until about 600 million years ago when the oxygen tension rose to a point where air breathing life forms became thermodynamically possible, that a major change is seen in the fossil record. The sudden appearance of the 32 phyla in the “Cambrian Explosion” was also associated with the appearance of intracellular detail and cell differentiation provided by cell membranes in which the lipids were structural essentials. Thus not just oxygen but also the lipids, with their complexity enhanced by oxidative metabolism, were drivers in the Cambrian explosion. Docosahexaenoic acid (DHA) provided the basic membrane backbone of the new photoreceptors that converted photons into electricity laying the foundation for the evolution of the nervous system and the brain. However the brain also uses arachidonic acid. The injection of the omega 6 through the appearance of omega 6 rich protected seeds in the Cretaceous period, would have played a critical role in the advance of brain evolution. This symbiosis between land and marine food chains, most likely created the condition that finally led to the cerebral expansion in human evolution. Lipids are still modifying the present evolutionary phase of our species with their contribution to a changing panorama of non communicable disease and mental ill health. The contemporary lipid malnutrition is most likely contributing to the rise in brain disorders which have been rising sharply. In the the UK the cost of mental ill health has risen to £77 Billion and is greater than heart disease and cancer combined. In the European Union the cost of brain disorders have overtaken the cost of all other burdens of ill health at €386 billion for the 25 member states at 2004 prices,. This issue is being transmitted world wide. It is the greatest health challenge facing mankind today. The most likely cause is the loss of brain specific lipids and trace elements from the collapse of fisheries. It will be suggested that the solution lies in agriculturalising the oceans.