New Vertebrate Remains from the Late Cambrian?

Vertebrates have two skeletons: the internal or endoskeleton, and the external or exoskeleton (or dermoskeleton). Evolutionists had thought that the exoskeleton appeared later in the supposed evolutionary history of vertebrates, but now they may have to totally rewrite that history.

Late last year it was reported that small broken plates thought to belong to an early armoured fish had been recovered from a 510 million-year-old limestone in the Georgina Basin of western Queensland, Australia, thus confirming extension of the vertebrate fossil record back to the Late Cambrian.[1] These tiny fragments are thought to represent a new type of phosphatic skeleton showing a three-layered structure that indicates vertebrate affinity, but have several unique features not known in other vertebrates.

A sketch illustrating the features found in these dermal fragments, that represent the remnant of the exoskeleton of what is believed to be one of the first vertebrates, is shown as Figure 1. The upper surface is ornamented with equi-dimensional tubercles (small, rounded knob-like structures), the margins of which are interrupted by some of the evenly-spaced pores opening through that external surface. These tiny, evenly-spaced pores are suggestive of some form of pore-canal system, the pore openings being generally expanded to a funnel shape. The fragments studied vary in thickness, with some showing three distinct tissue layers, the assumed complete condition. The tubercles are superimposed on the spongy bone of the outer layer, which is translucent superficial tissue continuous over the whole external surface and is hypermineralised relative to the middle and basal layers. It is finely laminated, with each lamina ending at the pore openings, where this layering can be seen clearly. These features imply sequential epithelial secretion of an enamel-like tissue. The granular texture of the middle layer contrasts with the compact tissue of the surface and basal layers. The basal layer is rarely preserved, but shows crescentric elevations and adjacent depressions, similarly spaced to the external tubercles, each with a distinct foramen (small opening) and ramifying grooves.

The general organisation of the three distinct tissue types, with tubercles and a pore-canal system, is quite different from fossil arthropod cuticle, which is multi-layered, with a finely foliated principal layer accounting for 85 per cent or more of cuticle thickness. Thus Young *et al.*, the discoverers of these fragments, interpret this new three-layered skeleton as 'early' vertebrate dermal armour, which is unique in lacking dentine tissue, the tubercles instead being formed from elevations of the superficial (enamel-like) layer.

This new discovery impinges on a long-standing debate amongst evolutionists concerning the initial condition of the vertebrate exoskeleton. By suggesting that these fragments belong to one of the 'earliest' vertebrates, Young *et al.* have cast doubt on the theory that the 'primitive' vertebrate exoskeleton was made up of minute, independent scales, and have indicated instead that it may have consisted of relatively large plates.[2] Thus, these new fragments have been hailed as showing that some kind of enamel-like tissue, produced by a superficial layer of the skin, may be one of the first exoskeletal hard tissues to have appeared in vertebrate evolution. Indeed, this new Australian specimen, which is claimed to be slightly older than the earliest-known undisputed vertebrate remains, supposedly may tell us that the vertebrate exoskeleton first developed in the form of large, mineralised units that were pervaded by canals for a sensory system.

However, there must be a word of caution amidst the euphoria. There may yet be a few surprises in store for the palaeontologists if and when the owner of this debris turns up as a complete specimen. Daring to venture into describing and interpreting this kind of 'early' fragmentary fossil material, which looks 'fishy' in some respects but whose microscopic structure is sometimes at odds with the currently accepted structure of the vertebrate

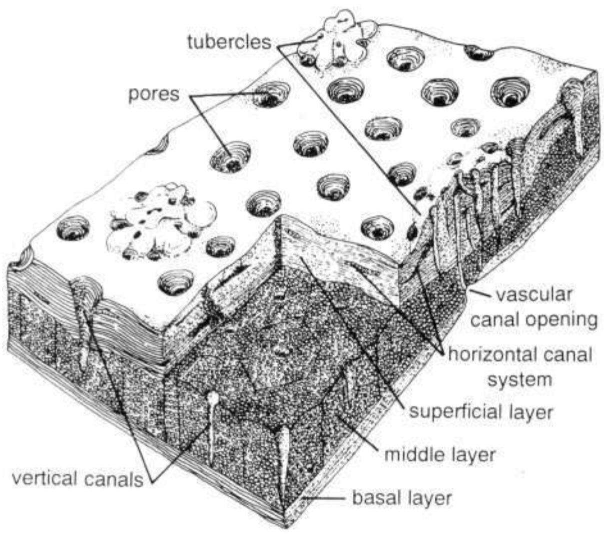

***Figure 1.** A Late Cambrian vertebrate fragment from western Queensland, Australia. This block diagram summarises the three-layered structure of the dermal armour with its pore canal and vascular system (after Young et al.).*

exoskeleton, is a risky task indeed. Some of these remains could conceivably turn out to belong to the shell or carapace of some unknown invertebrate animal. But, says Janvier,

> *'it is a risk worth taking in order to increase the probability of finding a clue to the still unresolved problem of the early evolution of the vertebrate skeleton.'*[3]

That's not the only problem for the evolutionary palaeontologists to solve. Accompanying Janvier's comments is a diagram showing the distribution of the major groups of living and fossil vertebrates through time, purporting to indicate the evolutionary lineages leading to today's vertebrates from an unknown common ancestor. Solid parallel lines for all the major groups signify the actual distribution. So how are all these major groups related on the evolutionary 'tree'? By dashed lines that mark inferred distribution and relationships *'according to one of the current theories'*, with a few question marks at joins! Is there any evidence shown of any of these inferred evolutionary links between the major groups? None, the links are still missing, as is the unknown common ancestor that is supposed to bridge the gap between invertebrates and vertebrates. It's time evolutionists were honest with the data — within major groups there has only ever been reproduction 'after their kind'. Furthermore, such tiny dermal fragments with their intricate structures once again display the Creator's handiwork and the wisdom of His many and varied designs to accomplish the same purpose — body housing and protection for the creatures He made.

REFERENCES

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Greenland Ice Cores Indicate Massive Ice Age Volcanism

Two ice cores about 3 km deep were drilled to the bottom of the Greenland Ice Sheet near Summit (see Figure 1). From the ice cores, many variables, such as oxygen isotopes, physical stratigraphy, and various ions, have been measured. A recent analysis of the sulphate ($S0_4^{2-}$) ion has shown that massive volcanism occurred during the ice age part of the ice sheet.[1]

The Greenland Ice Sheet formed during post-Flood times. It is probably impossible to develop an ice sheet during a global Flood, or that a pre-Flood ice sheet could survive such a cataclysm. Most of the Flood mechanisms proposed by creationists would generate copious amounts of heat, not cold. Thus, many creationists consider that there is a 'heat problem' with the Flood.

Based on oxygen isotope ratios, the top 1,500 m of the two cores are considered the Holocene, the last 10,000 years in the standard uniformitarian time-scale. The lower 1,500 m represent a 240,000 year period before the Holocene.[2] In the creationist paradigm, the pre-Holocene part of the core would have formed during the ice age and the Holocene part after the ice age.[3]

The $S0_4^{2-}$ ion, deposited on top of the ice sheet, represents three sources:

(1) $CaS0_4$ from continental sources,
(2) $S0_4^{2-}$ from the sea, and
(3) H_2S0_4 (sulphuric acid) from volcanism.

Sulphuric acid is formed in the atmosphere, mainly the stratosphere, due to explosive volcanism and the fire fountains from some basaltic eruptions.[4] The H_2S0_4 is mostly responsible for reflecting the sunlight back to space and cooling the lower atmosphere. For instance, the 1815 eruption of Tambora in Indonesia caused the 'year without a summer' in 1816 in at least New England and Europe.[5] Previous analyses of the volcanic signal in the ice cores had relied on acidity calculations, produced by measuring the down-core electrical conductivity.[6] However, this method crudely reproduces the volcanic input because of the presence of other acids that are poorly correlated to volcanism.

The volcanic SO_4^{-2} ion was separated from the other ionic inputs by the method of empirical orthogonal functions.[7] The empirical eigenvectors for the volcanic signal were matched with the better resolved volcanic signal of the past 2,000 years.[89] In estimating the magnitude of the eruptions from the

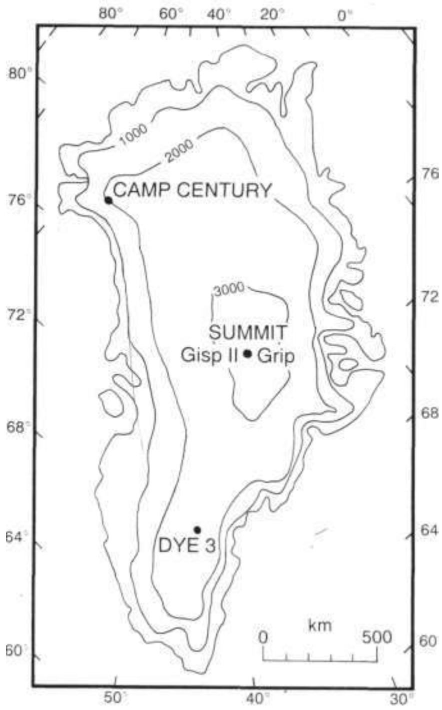

Figure 1. *Location of the Summit ice cores **GRIP** and **GISP2** in central Greenland.*