Mineral evolution: what's next? Geobiology or biogeology?

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Although Charles Darwin considered himself a geologist, he is revered today as the pillar of modern biology. But that soon may change if his evolutionary ideas will be applied to minerals too. There is now a trend towards the blurring of the frontiers of the earth and life sciences, a push for integration. Within the evolutionary paradigm, geology represents the supreme argument, an archive of life's changes (from goo-to-you) over billions of years. But recent research is pushing the idea that minerals also evolved,[1] actually co-evolved with life as Robert Hazen says in an interview.[2,3] Thus the grand rug of Darwinian evolution is extended to cover mineralogy and implicitly geology. A closer analysis of this new idea and the way it is being pushed, portrays all the ingredients of a political agenda that seeks the ever increasing integration that the secular academic establishment forces upon scientists, a form of academic communism.

What is being said?

The contention is that throughout the history of the earth, minerals have changed. This change is equated to 'evolution' (which in fact means 'change over time'), although not a Darwinian concept of evolution because 'minerals do not mutate'.[2] Mineral species are always the same; they do not change over time.[2] Yet, as the dynamic earth changed in time, new minerals were formed and, because at some point life significantly changed the conditions on Earth, life has also influenced the mineral kingdom. The main example provided by Hazen[2] is that of life producing a 'toxic gas'—oxygen—which allowed the formation of oxidic minerals that did not exist before, such as azurite—$Cu_3(CO_3)_2(OH)_2$. Of the approximately 4,300 known mineral species, Hazen claims that two thirds are 'life-mediated'.[2]

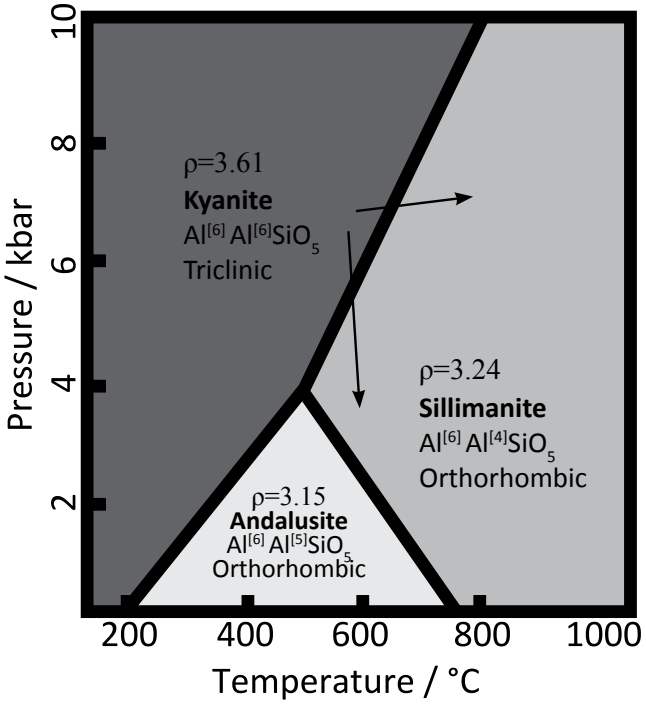
This seems to close the circle because some speculations,[4] presented as facts by philosopher Michael Ruse in Ben Stein's film *Expelled: No Intelligence Allowed*, were made that life may have evolved on crystal surfaces where certain chemicals tend to accumulate and maybe the regular structure of crystals caused the first polymers to form.[5,6]

So, to conclude: life was born on crystal surfaces and after it reached a certain bio-mass, life influenced crystals and minerals in their evolution. Can it get better for evolutionists? Yes, since they now see this new approach as a valuable addition to exobiology, the search for extraterrestrial life. All that is required is to look into the rocks on other planets to find life!

How is it being said?

The language used in the articles covering this new topic sounds like an evolutionary Esperanto: mineral *evolution*, *co-evolution*, *niches* and such like. Hazen clearly states in his interview[2]: 'You cannot be a geologist without thinking of biology and you cannot be a biologist without thinking of geology.' The motivation here seems obvious: we need to reinforce both biology and geology by integrating them into one, larger and more defendable body. Such a motivation undoubtedly reveals that both evolutionary biology and evolutionary geology feel threatened!

Above all, this is yet another media trick as Hazen indirectly admits when he states that, this is a story and 'people like stories'.[2] In other words, the dry language of crystallography and mineralogy has no appeal to the great public, but by turning it into yet another, familiar-sounding, evolution story, minerals become alive! One cannot help but wonder whether mineralogists are seeking to increase their research funds through this type of hype.



Phase diagram for the Al_2SiO_5 polymorphs. Kyanite will react to form sillimanite with increasing temperature or with decreasing pressure (as the arrows show). The light triangular field at the bottom is the stability field for andalusite.

What is not being said

Technically, there is hardly anything new in all this hype. That minerals have changed over time is something well-understood because petrology, the study of the rocks, is built on the idea of chemical changes over time. Although riddled with contradictions, the Great Oxidation Event (GOE)[7] was always seen as the source of the first oxidic minerals, even if carbonate rocks, which contain oxygen, exist that are claimed to be older than the GOE.[7] However, no-one thought to link it to life within an evolutionary scenario.

Hazen and his team avoid taking the evolutionary analogy further, although the ingredients are there! When claiming mineral species do not change over time, he is only telling half of the story. There are minerals known as *structural polymorphs,* an example of which is the andalusite-silimanite series.[8] Although there are several different minerals in this series, they are all formed from the same three chemical elements: Al, Si and O in the empirical formula Al_2SiO_5. Temperature and pressure control the structural layout of these chemical elements thus determining the mineral species: distene or kyanite ($Al_2[SiO_4]O$), andalusite ($Al_2[SiO_4]O$) and sillimanite ($Al[AlSiO_5]$] (figure 1). This should have been proudly added by Hazen to his evolutionary analogies as a case of *homology*.

Hazen is actually wrong when affirming that mineral species don't change: minerals actually do change over time if they are exposed to different physical and chemical conditions. Muscovite—a mica—($K_2Al_4[Al_2Si_6](OH, F)_4$) in the presence of CO_2-rich water loses K and F and transforms into kaolinite ($Al_4[SiO_{10}](OH)_8$). Darwin initially called this idea 'transformism'. But by adding oxygen to an existing mineral and forming a new mineral, what actually changes? One mineral into another! In a process known as 'dolomitization', the addition of magnesium to calcite ($CaCO_3$) changes it into dolomite ($CaMg(CO_3)_2$). According to Hazen's evolutionary analogy, this should be defined as *mineral evolution* by *mutation*; it also exhibits *natural selection* since the minerals have 'adapted' to new chemical conditions!

How could Hazen miss this? Maybe he didn't and just skillfully avoided taking the analogy too far for it should be obvious that this is not what Darwin meant by 'evolution'! Darwinian evolution proceeds by mutations from within and not by adding pre-existing information from outside! Darwin's diversification of taxa is explained by the repeated splitting of one taxon into two or more taxa, not by merging two or more taxa into one. By leaving things at the shallowest level possible, Hazen & Co. hope to blaze the trail toward integration into either 'geobiology' or 'biogeology'!

Is this a new challenge to young-earth creation models?

Not really. If there is a challenge, it's mostly a methodological one. 'Integration' seems to be the battle cry of the evolutionary establishment but the shallowness of this new idea provides excellent grounds for creationists to dismantle it and by consequence further expose the fallacies of Darwinian evolution. As for the deeper meaning of all this, we have yet another proof of God's integrated creation, all parts of it working together, from minerals to humans: 'For the invisible things of Him from the creation of the world are clearly seen, being understood by the things that are made…' (Romans 1:20).

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Panderichthys—a fish with fingers?

Shaun Doyle

Once more, fish-to-tetrapod evolution is *paraded around*,[1–2] this time with a study suggesting the replacement of *Tiktaalik*, the icon of fish–tetrapod evolution, with the 90–130-cm-long *Panderichthys rhombolepis*. However, *Panderichthys* isn't exactly new; it was actually named in 1941.[3] And it's supposedly older too: 385 million years (Ma) old in comparison to *Tiktaalik*, which is supposedly 380 Ma old. However, a recent study has suggested that *Panderichthys*' fin may be *closer* to tetrapods in morphology than *Tiktaalik,*[4] although evolutionary theory would predict that tetrapod characteristics would be more recent.

Fishing for fingers

Boisvert *et al.* have based their analysis on the pectoral fin of one particular *Panderichthys* fossil, which they reconstructed from a CT scan study of the fossil, which they then used to reconstruct a 3D image of the fossil fin. *Panderichthys* was found to have multiple 'digits' at the end of the bony part of the pectoral fin similar to *Tiktaalik's*, which Boisvert *et al.* made out to be homologous with digits on tetrapod limbs (figure 1). Aside from the general biological[5] and theological[6] problems with excluding common design, *Panderichthys* is still unequivocally a *fish* with *fins*.

The small distal bones found between *Panderichthys* and *Tiktaalik* are nothing in comparison to the changes that need to be made between either of them and a limb, as one of the co-authors of the *Nature* paper, Per Ahlberg, has admitted before:

> 'Although these small distal bones bear some resemblance to tetrapod digits in terms of their function and range of movement, they