rapid that there is no measurable rise in nitrite concentrations in the stomach following ingestion of nitrate.[4] This means that carcinogenic nitrosamines are ***not*** formed from nitrite in the stomach.

Acidified nitrite and NO have been shown to have strong anti-microbial activity on a wide range of micro-organisms, including pathogens such as *Salmonella* and *Yersinia*, common causes of gastro-intestinal disease following the consumption of contaminated food ('food poisoning').

Statistics on food poisoning show that there has been a substantial increase in reported cases of food poisoning in Britain, for example, since 1987, about the time that maximum nitrite and nitrate levels allowed in food and water began to be reduced in earnest.[2] The reduction in the allowable levels of nitrite has undoubtedly made it more difficult to control microbes that cause food poisoning and has probably contributed to the increase in reported cases of food poisoning. The food scare of the 1980s has almost certainly indirectly resulted in the deaths of people from severe food poisoning.

NO also has vasodilatory properties (reducing blood pressure) and is involved in controlling platelet activity,[3] and so could be a (positive) factor in the heart disease story. Many functions of NO in cell signalling are being discovered.

Far from being poisons, nitrates and nitrites are part of normal mammalian physiology. Nitrites are generated by microbes in symbiotic relationship with us, and are converted to gaseous oxides of nitrogen that have a sterilizing effect in our stomachs. The system is therefore a non-immunological line of defence against invasion by microbes. It seems like a nice example of highly integrated (intelligent) design that involves symbiosis between microbes and mammals. McKnight *et al.*, conclude from their review of the subject, that 'dietary nitrate may have an important therapeutic role to play'.[3]

Some of the most important bacteria responsible for this symbiosis involving nitrates are forms of *Staphylococcus*. This may be relevant to the origins of pathogenesis in microbes. Many human pathogens are very similar to free-living or saprophytic (feeding on dead organic matter) forms that do not cause disease. Here is a case. *S. aureus* is probably the major cause of infections in hospitals, but *S. sciuri* and *S. intermedius* help us ward off gastro-intestinal infections! Another example is *E. coli*. Normally an abundant harmless resident of our bowels, *E. coli*'s presence helps us by suppressing harmful microbes, as well as synthesising vitamins. However, the O157:H7 strain has caused deaths from food poisoning. There are many other examples of bacteria that have harmless forms and pathogenic forms. It is quite possible that pathogenic forms arose by degenerative changes to the harmless forms.

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New radiohalo find challenges primordial granite claim

Tas Walker

Although radiohalos are tiny, they have generated a big debate about Genesis, geology and granite. Radiohalos were first brought such prominence when Robert Gentry, the world's leading researcher on halos, claimed they were evidence of an instantaneous, supernatural creation of granite.[1] They were launched into international distinction when Gentry testified to this claim at the Arkansas Creation Trial in 1982.[2] And they are still the cause of controversy with books, articles and web pages devoted to the pros and cons of Gentry's original arguments.[3–6]

Now a new find of polonium radiohalos major implications for the interpretation of their origin.[7]

Radiohalos are concentric, discoloured circles observed under the microscope in translucent minerals such as biotite, muscovite, fluorite and diamond (Figure 1).[2,8] It is generally accepted that they were formed by the alpha decay of radioactive isotopes (Figure 2). The emitted alpha particles damage the mineral, especially at the end of their path when they finally run out of energy and grab electrons from nearby atoms. They leave a spherical, discoloured region, which in section appears circular. Radiohalos can be erased when the host mineral is heated, even at temperatures as low as 250°C.[9]

Radiohalo types

Gentry describes four types of radiohalos, each with a different number of concentric rings (Figure 2).[10] They have been related to the ^{238}U decay series (Table 1) in which eight of the isotopes in the series liberate alpha particles when they decay. Each of the four types of radiohalos has been linked to a specific parent isotope in the series. The single-ringed halo corresponds to ^{210}Po, the two-ringed halo to ^{214}Po, the three-ringed halo to ^{218}Po, and the eight-ringed halo to ^{238}U. A few of the decay steps have similar energy and produce rings close together. These may not be easily distinguished.

Each alpha particle has a characteristic energy that determines the distance it will travel—hence the spherical shape. Thus, the diameter of each ring can be related to the decay of a specific parent isotope depending on the host mineral.[11] The shorter the half-life, the greater the decay energy, hence the larger the halo.

Although the uranium isotope has a very long half-life of 4.5 billion years, all the polonium isotopes have short half-lives, ranging from 138.4 days for ^{210}Po, to 164 microseconds for ^{214}Po.

Polonium halos have been found abundantly in granites, and minerals from some 22 localities have so far been reported to contain polonium radiohalos.[3] Because polonium isotopes have very short half-lives, it has been argued that 'granites with Po halos, regardless of their "geological age" are primordial rocks', created supernaturally and instantaneously during the Creation week. Indeed it has been contended that such granites cannot be duplicated by natural processes.[12]

This conclusion has been disputed because of the geological relationships of the rocks in which polonium halos have been found.[3–5] For example, some samples containing radiohalos were from dikes cross-cutting host rocks which thus must be older.[4] Rather than primordial, it has been suggested that the parent material of the radiohalo was part of a conventional uranium or thorium decay series segregated by some geological process.

Stone Mountain granite halos

This *TJ* reports that abundant radiohalos have been found in biotite flakes from granite from Stone Mountain, USA.[7] The significance of this find is that the Stone Mountain granite has been interpreted to have formed not

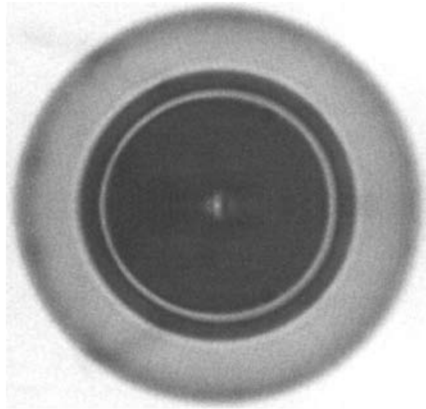

***Figure 1**. A ^{218}Po radiohalo (from Gen-*

during Creation Week, but during the Flood.

Stone Mountain is located about 30 km east of Atlanta, Georgia and some 200 km south of the southern end of the Appalachian Mountains. Grant describes Stone Mountain as an isolated granitic monolith rising some 238 m above the surrounding countryside.[13,14] The granite intrudes both concordantly and discordantly into the country rock, which is composed primarily of biotite-plagioclase gneiss. The country rock was regionally metamorphosed to above the sillimanite isograde. At the granite contact, there is some evidence of contact metamorphism. Contact and structural data indicate that the granitic intrusion was late metamorphic and linked with the regional deformation associated with the uplift of the Southern Appalachians. The granite contains abundant xenoliths of the country rock.

McQueen places the orogony that built the Appalachians at 'Phase III' of the Flood, which starts as the floodwaters began to decrease. In other words the beginning of Recessive stage of the Flood.[15,16] Froede also ties the regional deformation to the Flood, linking the source magma for Stone Mountain with a 'Flood generated orogenic event'.[17]

The halos were well-defined circles consisting of a single ring 19.2 μm in diameter. No radiohalos had more than one ring. The radiocenters of these halos were so tiny as to be virtually impossible to see. The observed ring diameter corresponds to the alpha-decay of ^{210}Po.[11]

It could be argued that the presence of a single ring does not necessarily mean ^{210}Po was the original parent isotope, because all four types of radiohalos (Figure 2) have the ^{210}Po ring.

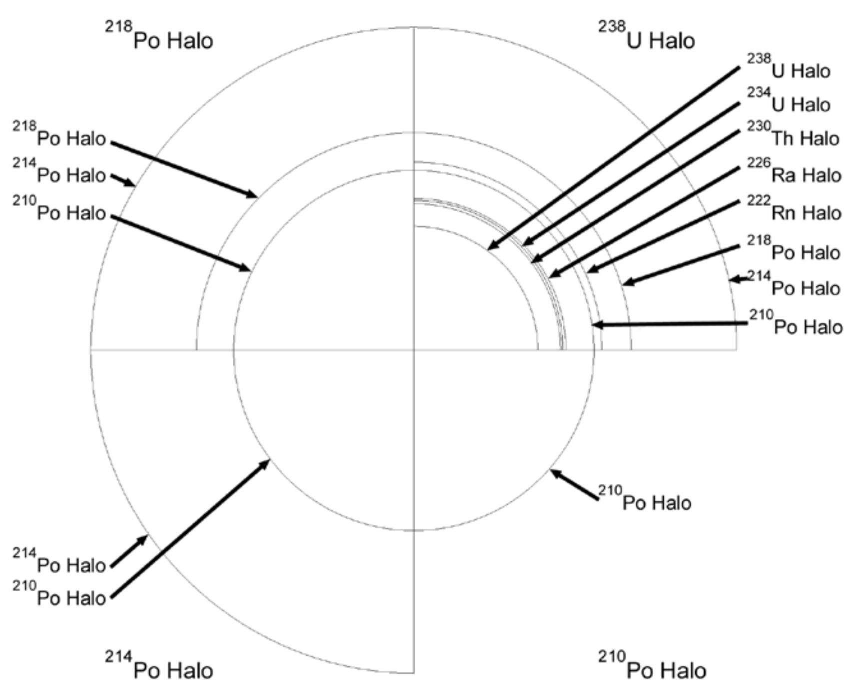

***Figure 2.** The four types of radiohalos (from Gentry).[19]*

Isotope	Decay	Half Life	Energy (MeV)
^{238}U	Alpha	4.5 billion years	4.19
^{234}Th	Beta	24.1 days	
^{234}Pa	Beta	1 minute	
234U	Alpha	0.245 million years	4.77
^{230}Th	Alpha	76,000 years	4.68
^{226}Ra	Alpha	1,600 years	4.78

Table 1. *The ^{238}U decay series (summarized from Gentry and CCNR).*[2,20]

The ^{210}Po rings are very faint, and some other isotopes may have been present, decaying and producing alpha particles. There may not have been sufficient radioactive material to produce a ring dark enough to be seen.

However, if there were other alpha decays occurring, these could not have been lower energy decays than the ^{210}Po, otherwise smaller diameter rings would have been produced adding to the discoloration inside the ^{210}Po ring. Such rings would have been more prominent and clearly visible as darker rings. Such smaller rings cannot be seen, thus ^{238}U could not have been the original parent material.

On the other hand, some higher energy alpha decays may have occurred, producing rings larger and fainter than the ^{210}Po ring. There may simply have been insufficient radioactive material to produce larger, visible rings. Thus ^{214}Po and ^{218}Po cannot be definitely eliminated as possible parent material.

No matter which of the polonium isotopes comprised the original parent material, the decay half-life in all cases is very short and raises the question of how the ring could have formed in such a quick time period.

Significant find

The field evidence points to Stone Mountain being formed during the Recessive stage of the Flood toward the end of a major mountain building episode. This orogeny metamorphosed the Flood-deposited country rock, and uplifted the Southern Appalachians. If this interpretation is correct, the granite was not formed during the Creation Week and the polonium halos cannot be primordial. Nevertheless, the polonium halos show clearly that the parent radioactive material was incorporated into the host rock by very rapid geologic processes.

This new report of polonium halos in Stone Mountain granite is most significant for models of granite formation, and for classification of rocks within the Creation and Flood framework.

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