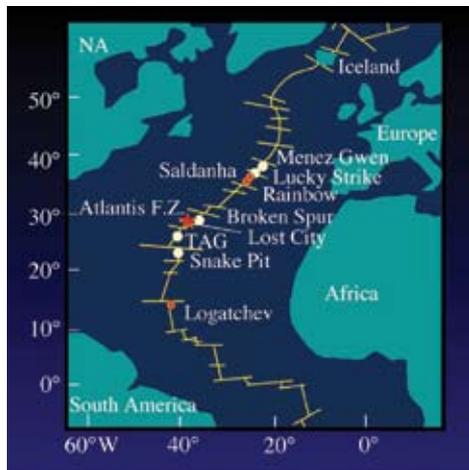


Courtesy of University of Washington

Generalized diagram showing the various "layers" of rock that make up the oceanic crust. At the Atlantis Massif, gabbroic rocks have been uplifted close to the seafloor, allowing sampling in a region of the crust normally beyond reach. Right: the Lost City hydrothermal field is located near the top of the mountain (red star).



MORE EVIDENCE FOR DEEP HOT BIOSPHERE REVEALED AT ATLANTIS MASSIF

Scientists sampling for organisms beneath the Atlantis Massif, a huge uplift of the oceanic crust in the central Atlantic Ocean west of the Mid-Atlantic Ridge, reported the discovery of bacteria in the gabbroic layer overlaying the mantle, where average temperatures were slightly above the boiling point of seawater.

The majority of organisms found by the international team seemed to be hydrocarbon metabolizers capable of feeding off of methane and toluene, although nitrogen fixers and sulfate and metal reducers were also found. The hydrocarbon metabolizers were genetically very similar to bacteria found in oil reservoirs and other hydrocarbon-rich areas. In fact, several were almost identical with cultured species from these sources.

In the Deep Hot Biosphere hypothesis, advanced by astrophysicist Thomas Gold and others, life begins below the planetary surface, among organisms capable of metabolizing hydrocarbons, sulfates, and other available chemicals, and only later evolved systems, such as photosynthesis, for survival on the surface. Gold also believed that liquid hydrocarbons originate from the action of bacteria and Archaea on methane welling up from deep in the Earth's mantle. Astrophysical evidence had convinced Gold that conventional theories of geology had to be reworked to take account of the Earth having formed by aggregation of already cooled proto-planetary material.

At the Atlantis Massif, the ordinarily deep crustal layers have been thrust up to only 70 meters from the sea floor, and in many places the mantle has been exposed. The samples harvested after drilling to depths of 4,564 feet showed that bacterial species were widespread but sparse in the sampled layer. Unlike the microflora of the basalt regions of the ocean crust, the gabbroic layer had no Archaea.

The spectacular thermal vent was discovered in 2000 on a cliff of the Atlantis Massif, by a National Oceanic and Atmospheric Administration (NOAA) expedition. The hot mineral waters supported a complex ecosystem of Bacteria and Archaea of novel types, and the expedition called it "the Lost City of the Atlantis Massif." The existence of hydrocarbon metabolizers within deep crustal layers suggested to the researchers that it is in such subsurface regions of Mars that we should be looking for life.

Both aerobic and anaerobic bacteria were found in the samples. The genetic similarities with several surface hydrocarbon metabolizers suggests that the organisms have not been long isolated from each other, and that within disparate hydrocarbon-dominated environments, certain bacterial taxa are generalists, able to survive and to potentially degrade hydrocarbons in a myriad environments, including deep subsurface igneous rocks, such as those analyzed in this study. This is in contrast to earlier sampling in basaltic ocean crust, which found novel bacteria and Archaea specialized for endolithic life.

The report of the discovery appears in the online journal *PLoS ONE*, (www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0015399).

CHINA PLANS FUSION-FISSION HYBRID REACTOR

Speaking at the annual meeting of Fusion Power Associates, Chinese plasma physics expert Yuanxi Wan explained that even with the breeder reactors that China is building, China will not have enough uranium to fuel its ambitious nuclear power program 50 years into the future. Therefore, fusion scientists have proposed to design and develop a Fusion-Driven Hybrid Multi-Functional Reactor, which would use the neutrons produced by the fusion reaction to breed new fuel for fission reactors at the same time that it produced energy, Academician Wan told the meeting in Washington, D.C. on Dec. 1. The hybrid reactor could also be of benefit to the "back end" of the nuclear fuel cycle, by transmuting what cannot be reused, from spent fuel. If the

Chinese government approves the project, the scientists hope to begin development in five years. Wan represents the Institute of Plasma Physics in Hefei, China.

The fusion-fission hybrid concept dates back to the 1950s, and was explored in the U.S.A., before the turn to green fascism shut down most advanced nuclear and fusion research. The principle of the hybrid is to use the excess neutrons produced by a fusion reaction, to set off a fission reaction in a surrounding blanket of fissionable uranium. Unlike a conventional fission reactor, the fusion-fission hybrid consumes almost all the uranium fuel, without the need for enrichment or reprocessing. In an ordinary fission reactor only the U-235 isotope, which might make up about 5 percent of the uranium in the fuel, undergoes fission to provide power. The remainder of the uranium, in the form of the U-238 isotope, is wasted unless it is bred into new fissionable fuel by irradiation with neutrons. Other forms of breeder reactors can also accomplish this.

The fusion-fission hybrid system will be effective even if the fusion reaction is not working above energy breakeven, and thus provides a useful transition to full-scale fusion power. Recently revived programs at Lawrence Livermore National Laboratory and the University of Texas are exploring hybrid technology, using, respectively, laser and tokamak (magnetic confinement) systems for achieving fusion.

An interview with Academician Wan will appear in the Winter issue of *21st Century Science*.



Marsha Freeman

Academician Yuanxi Wan: We have to look 50 years ahead.

NAWAPA TAKES OFF WITH CONFERENCES AND EXPERT PARTICIPATION

The North American Water and Power Alliance project is getting off the ground with the enthusiastic participation of science and engineering experts across the country. *21st Century* readers are invited to view the many interviews with experts posted on the LaRouchePac website, along with the video coverage of the recent Los Angeles and Kennewick, Wash. regional conferences at www.larouchepac.com/nawapainterviews.

The revolutionary NAWAPA project would transform America and the global economy, Apart from delivering water from Alaska and Canada to water-starved regions of the American West and Mexico, NAWAPA will create new waterways from the Great Lakes to the Pacific and Arctic Oceans, unleash a renaissance of nuclear power and high-speed and maglev rail development, and quickly create 4 million new skilled jobs and job-training opportunities in the U.S.A. Physical economist Lyndon LaRouche has proposed NAWAPA as the leading edge of a global revival of industrial and agricultural potential that would also include major infrastructure development projects such as the Congo River/Lake Chad development project, the huge Eurasian Land-Bridge program, and a Bering Strait bridge/tunnel and Darien Gap development project that would eventually connect Eurasia to the tip of South America.

By organizing the experts who will lead the program and the citizens who will participate in it, even before it has been adopted by a backwards Congress and Administration, LaRouche Pac is making NAWAPA a reality that will pull American and the global economy out of an otherwise irreversible collapse. The interviews are diverse and broad-ranging. Among the many interviews are: Civil Engineer Elghi E. Segovia, discussing his extensive experience constructing dams and other water projects in the Himalayas and South America and what we can learn from this to implement NAWAPA; Civil Engineer Tom Taylor, discussing his experience working under permafrost conditions in Prudhoe Bay, Alaska; Rail Engineer Hal Cooper, talking about the proposed world land-bridge of high-speed rail and related infrastructure corridors; Joseph Montgomery, Senior Staff Geologist, Murrieta, Calif., discussing the geology of the NAWAPA project area and NAWAPA's potential to revolutionize geological sciences; and John Sparlin, U.S. Army Corps of Engineers (Ret.), reviewing the engineering considerations in approaching a project like NAWAPA.

Readers are welcome to join the NAWAPA discussions, by contacting the NAWAPA "Basement" team at basement@larouchepac.com.



EIRNS

LaRouche PAC leader Michael Steger (at podium) moderated the Dec. 4 NAWAPA conference in Pasadena, Calif. Steger called NAWAPA the antidote to the multi-decade cultural downshift that followed the death of President Franklin D. Roosevelt.



EIRNS

Nuclear expert Dewitt Moss, addressed the Tri-Cities NAWAPA conference in Kennewick, Wash., discussing nuclear power and its essential role for economic development.



NASA

Dr. Walter Haeussermann, second from left, in a 1961 meeting with Dr. Wernher von Braun and his management team. Inset is Haeussermann in 2008.



NASA

Peter Jenniskens, meteor astronomer at NASA Ames Research Center and the SETI Institute, and Mohammed Alameen, a student at the University of Khartoum, point to the first meteorite from asteroid 2008TC3 found, after two hours of searching, on Dec. 6, 2008. They use aluminum foil to prevent contamination. Inset: Closeup of a meteorite.

IN MEMORIAM: DR. WALTER HAEUSSERMANN (1914-2010)

Dr. Walter Haeussermann, one of the few remaining members of Wernher von Braun's rocket team, and a collaborator of the Schiller Institute, died in Huntsville, Alabama on Dec. 8, at the age of 96. He played a crucial role in the development of the world's first guided missile, the German wartime V-2, and in the Apollo program that took Americans to the Moon.

Soon after earning his doctor in electrical engineering in 1939, Dr. Haeussermann was drafted in to the German Army, where he worked on the guidance and control of the A-4 rocket. After the war, he came to the United States under Operation Paperclip with the von Braun team, and he established and led the Astrionics Laboratory at NASA's Marshall Space Flight Center. The rocket team was confident that its Saturn V rocket could safely launch astronauts into space, but Dr. Haeussermann's guidance and control lab had to make sure the rocket would land on the Moon precisely where planned.

While most of the rocket team concentrated their contributions in science and engineering, Dr. Haeussermann also became active in civic and political affairs in Huntsville. In 1984, when the German space pioneers learned that Arthur Rudolph, their colleague and Saturn V rocket manager, had been terrorized into leaving the country under threat of prosecution for Nazi war crimes, Dr. Haeussermann became the public spokesman for the group's fight against the outrageous charges. Dr. Haeussermann organized support for Rudolph's exoneration, and co-authored an op-ed with *21st Century* Associate Editor Marsha Freeman, which was published in space periodicals.

Walter Haeussermann was a part of the generation that, through all of the privations of the Depression, World War II, and the attacks on their contributions in the post-Apollo United States, never lost their optimism that space exploration would be mankind's future.

NEW STUDY: 'GREEN' WATER TREATMENTS FAIL AGAINST BACTERIA

A University of Pittsburgh study of non-chemical treatment systems touted as green substitutes for chemicals like chlorine suggests that these systems are ineffective. According to a Dec. 10 university press release, researchers found that the green systems "can allow dangerous bacteria to flourish in the cooling systems of hospitals, commercial offices, and other water-cooled buildings almost as much as they do in untreated water." The two-year study of five non-chemical treatment devices found that "none significantly prevented bacterial growth." The researchers found that the standard chlorine treatment, "controlled these organisms, even after bacteria had been allowed to proliferate."

NUBIAN DESERT ASTEROID (2008 TC3) YIELDS METEORITE TREASURE TROVE

The 13-foot asteroid that crashed into the Nubian Desert in October 2008 has provided an international team of scientists with at least 10 different types of meteorites, including those with polycyclic aromatic hydrocarbons and amino acids, which are considered "building blocks" of life. It had been assumed previously that the molecules of these amino acids would have been destroyed in the strongly heated fragments of the asteroid.

The asteroid 2008 TC3 was the first celestial object to be observed and tracked prior to entering the Earth's atmosphere. A recovery team of 150 students from the University of Khartoum in Sudan searched the impact target area and recovered nearly 600 meteorite fragments, weighing more than 23 pounds total.

"Right from the start, the students were surprised to find so much diversity in meteorite texture and hue," said Muawia Shaddad, an astronomer at the University of Khartoum, who led the search effort. The asteroid was estimated to weigh about 59 tons, with about 86 pounds surviving the explosion in the atmosphere.

Most of the fragments, scientists determined, are a rare type of meteorite called ureilites, which comprise less than 10 of the nearly 1,000 known meteorites. This was the first time that freshly fallen mixed composition ureilite has been found. The international research on the meteorites is featured in several papers published in a special issue of *Meteoritics and Planetary Science*, in December 2010.