Discovery of New Microorganisms in the Stratosphere

March 18 2009

(PhysOrg.com) -- Three new species of bacteria, which are not found on Earth and which are highly resistant to ultra-violet radiation, have been discovered in the upper stratosphere by Indian scientists. One of the new species has been named as Janibacter hoylei, after the Distinguished Astrophysicist Fred Hoyle, the second as Bacillus isronensis recognising the contribution of ISRO in the balloon experiments which led to its discovery and the third as Bacillus aryabhata after India's celebrated ancient astronomer Aryabhata and also the first satellite of ISRO.

The experiment was conducted using a 26.7 million cubic feet balloon carrying a 459 kg scientific payload soaked in 38 kg of liquid Neon, which was flown from the National Balloon Facility in Hyderabad, operated by the Tata Institute of Fundamental Research (TIFR). The

payload consisted of a cryosampler containing sixteen evacuated and sterilised stainless steel probes. Throughout the flight, the probes remained immersed in liquid Neon to create a cryopump effect. These cylinders, after collecting air samples from different heights ranging from 20 km to 41 km, were parachuted down and safely retrieved. These samples were analysed by scientists at the Center for Cellular and Molecular Biology, Hyderabad as well as the National Center for Cell Science (NCCS), Pune for independent examination, ensuring that both laboratories followed similar protocols to achieve homogeneity of procedure and interpretation.

In all, 12 bacterial and six fungal colonies were detected, nine of which, based on 16S RNA gene sequence, showed greater than 98% similarity with reported known species on earth. Three bacterial colonies, namely, PVAS-1, B3 W22 and B8 W22 were, however, totally new species. All the three newly identified species had significantly higher UV resistance compared to their nearest phylogenetic neighbours. Of the above, PVAS-1, identified as a member of the genus Janibacter, has been named Janibacter hoylei. sp. nov. The second new species B3 W22 was named as Bacillus isronensis sp.nov. and the third new species B8 W22 as Bacillus aryabhata.

The precautionary measures and controls operating in this experiment inspire confidence that these species were picked up in the stratosphere. While the present study does not conclusively establish the extra-terrestrial origin of microorganisms, it does provide positive encouragement to continue the work in our quest to explore the origin of life.

This multi-institutional effort had Jayant Narlikar from the Inter-University Centre for Astronomy and Astrophysics, Pune as Principal Investigator and veteran Scientists U.R. Rao from ISRO and P.M. Bhargava from Anveshna supported as mentors of the experiment. S.

Shivaji from CCMB and Yogesh Shouche from NCCS were the biology experts and Ravi Manchanda from TIFR was in charge of the balloon facility. C.B.S. Dutt was the Project Director from ISRO who was in charge of preparing and operating the complex payload.

This was the second such experiment conducted by ISRO, the first one being in 2001. Even though the first experiment had yielded positive results, it was decided to repeat the experiment by exercising extra care to ensure that it was totally free from any terrestrial contamination.

Provided by Indian Space Research Organization