

GENERAL SCIENCE

Oldest Rocks Found

► THE WORLD'S oldest rocks, formed 4.55 billion years ago, may actually be part of the earth's mantle, having the same chemical composition as when this outer shell was created.

Their age was determined by scientists at the Carnegie Institution of Washington, who measured the amount of two radioactive strontium isotopes contained in them.

The ancient rocks were obtained from St. Paul's Rocks, a group of small islands located on the mid-Atlantic ridge halfway between South America and Africa near the equator.

They are tiny desolate islands left from a

volcano that became extinct more than ten million years ago.

However, old as these rocks are, they are less than half the age estimated for the Milky Way galaxy of billions upon billions of stars, in which the sun and its planets are located. Measurements of star clusters by astronomers of Mt. Wilson and Palomar Observatories confirmed the generally accepted age of 12 billion years for the Milky Way galaxy.

The astronomical observations also showed that the center, or nucleus, of the Milky Way is only about half the size of the relatively nearby Andromeda Nebula, which

was once believed to have the same general shape.

This means that the Milky Way should be classified as "late spiral" rather than an "intermediate" system. A late spiral galaxy is more open in structure than the intermediate type.

Combined optical and radio studies of the universe increased the observed number of "quasars," short for "quasi-stellar objects" to 13.

Quasars are the most distant objects so far discovered in space and the most powerful sources of radiation, both light and radio waves, yet known.

The light reaching the earth from the most distant of these objects, known as 3C-147, had left its source when the universe was only half its present age. This tremendous penetration into space is believed to mean that man can now look over a large fraction of the entire universe.

The light from 3C-147 has a pattern indicating that this quasar is rushing through space at a speed more than half that of light, which travels 186,000 miles a second, speeding in a direction away from earth at a velocity greater than 100,000 miles a second.

Drs. Jesse L. Greenstein and Maarten Schmidt of Mt. Wilson and Palomar Observatories believe quasars consist of a large, very bright, luminous nebula of gas, within which is contained a much smaller, extremely dense, hot core. The luminous nebula is surrounded by a much more extended volume of tenuous gas that is the source of the radio waves.

Quasars may have resulted from a massive explosion. However, astronomers now believe that when the physical nature of these objects is known, quasars may turn out to be very different from anything familiar among the more usual galaxies in the sky.

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Science More Important, Says Carnegie President

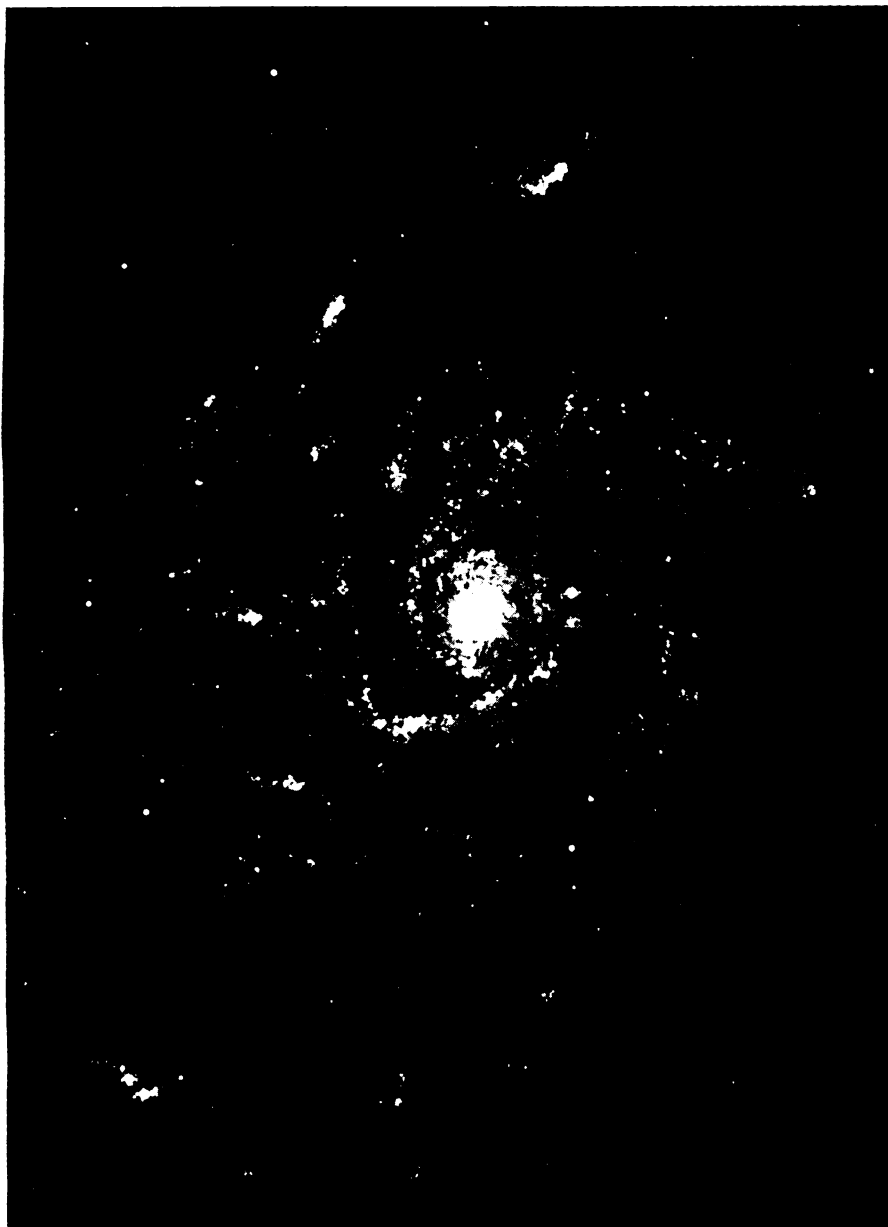
► SCIENCE has become so important to societies and nations, and is supported at such high levels of public expenditure, that it may henceforth tend to be as directly accountable to its supporting public as any other activity of like social impact, Dr. Caryl P. Haskins, president of Carnegie Institution, reported.

He pointed out that it has long been necessary "for scientists to plan in science in choosing their areas of investigation and their modes of attack; now it is becoming imperative, in a different way, to plan for science as well—and we had better learn to do it with knowledge, insight and care."

Skillful and effective planning for science can enhance the freedom with which active scientists can choose and shape the direction of their research, he said.

The rapid increase in the number of people who have become active in scientific research in the past decade, Dr. Haskins said, is one indication of the growing weight of science on the nation and on the public.

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Mt. Wilson and Palomar Observatories

STRUCTURE OF THE MILKY WAY—The Milky Way galaxy, long thought to resemble the Andromeda galaxy, or M-31, is now reported to be of a more open type, such as the "late spiral," NGC-5457, shown here.