**Oldest Material Discovered on Earth: 7 Billion Year Old Stardust**

地球上发现最古老的物质：70亿年前的星尘

Scientists say they have identified the oldest solid material on Earth – stardust believed to have formed about 7 billion years ago. It was found in pieces of meteorite that fell out of the sky in Australia 50 years ago.

科学家称他们发现了地球上最古老的固体物质——据悉为大约形成于70亿年前的星尘。该物质是在50年前澳大利亚空中坠落的陨石碎片中发现的，

Stardust is matter that forms as small particles in space when stars die. These particles can be used later to form new planetary bodies, including stars, planets and moons.

星尘是恒星消亡时物质在太空中形成的微小颗粒。这些微粒将来可以用来形成新的包括恒星、行星和卫星在内的星体。

The meteorite pieces came down in September 1969 in the town of Murchison, in Australia’s Victoria state. Scientists with the Field Museum of Natural History in the American city of Chicago have long held the largest collection of these pieces.

1969年9月，陨石碎片坠落在澳大利亚维多利亚州的默奇森镇。美国芝加哥市菲尔德自然历史博物馆的科学家一直保有最多的陨石碎片。

But until now, the age of the oldest stardust samples had not been confirmed.

然而最古老的星尘样本的年龄至今尚未得到证实。

Researchers at the museum reported their identification last week in Proceedings of the National Academy of Sciences.

上周，博物馆的研究人员在《美国国家科学院院刊》上公布了他们的鉴定结果。

 “This is one of the most exciting studies I’ve worked on,” said Philipp Heck, a curator at The Field Museum who led the research. “These are the oldest solid materials ever found, and they tell us about how stars formed in our galaxy,” he added.

“这是我参与过的最激动人心的研究之一，”主导这次研究的菲尔德博物馆馆长菲利普·赫克说。“这是迄今为止发现的最古老的固体物质，它们能告诉我们在星系中恒星是如何形成的，”他补充道。

The scientists said the microscopic particles were made of silicon carbide, the first mineral formed when a star cools. All of the samples predate the formation of our own solar system, they noted.

科学家们还指出，这些微观粒子是由碳化硅构成的。碳化硅是恒星冷却时形成的第一种矿物。

他们指出，所有的样本都早于太阳系的形成时间。

The researchers said the stardust particles “became trapped in meteorites, where they remained unchanged for billions of years.” This makes the samples “time capsules” of events that happened before the solar system.

研究人员称，这些星尘微粒“由于被困陨石中，因此数十亿年来没有变化。”这使得这些样本成为太阳系形成前活动的“时间胶囊”。

The identification process first involved crushing the samples down into a fine dust. The pieces were then mixed with acid, which left only the pre-solar particles.

鉴定过程首先是将样品压碎成细尘。然后将这些碎片与酸混合，只剩下前太阳系的微粒。

The researchers then examined samples for information that would help them identify what kinds of stars they came from and how old they were.

然后，研究人员开始对样本进行检验，以获取有助于他们识别样本来自于哪种恒星以及其具体的年龄的信息。

In space, dust interacts with cosmic rays -- high-energy particles that move through space at nearly the speed of light.

在太空中，尘埃会与宇宙射线产生相互作用。宇宙射线是一种以接近光速的速度在太空中移动的高能粒子。

Philipp Heck explained that some of these interactions result in the formation of new elements. The longer the interactions last, the more elements are formed. Age can then be estimated by measuring how many of the new cosmic ray-produced elements were present in pre-solar samples, Heck said.

菲利普·赫克解释说，其中一些相互作用导致了新元素的形成。相互作用持续的时间越长，形成的元素就越多。赫克还说道，它们的年龄可以通过测量前太阳系时期的样品中有多少宇宙射线产生新的元素来估计。

Based on examinations of this data, the researchers learned that some of the pre-solar particles were the oldest ever discovered. The team identified the age of 40 grains, most of which were estimated to be between 4.6 billion and 4.9 billion years old.

通过对这些数据的研究，研究人员发现一些前太阳系微粒是迄今为止发现的最古老的粒子。研究小组鉴定出了40个物质的年龄，其中大部分估计在46亿年到49亿年之间。

These ages relate to the time when the first stars began to break up. Since that kind of star lived for up to 2.5 billion years, the stardust can be as old as up to seven billion years.

而这些年龄段能与第一批恒星开始分裂的时间联系起来。由于这种恒星的寿命长达25亿年，所以这些星尘的年龄可能高达70亿年。

The latest dating process confirms a scientific theory that predicted “a baby boom of stars” happened before the formation of our sun.

最新的日期测定过程证实了一个曾被预言的科学理论，即在太阳形成之前有过一次“恒星诞生的婴儿潮”。

“We have more young grains than we expected,” Heck said. He added: "We basically came to the conclusion that there must have been a time in our galaxy when more stars formed than normal, and at the end of their lives they become dust producing."

赫克说:“我们拥有比预期要多的新物质。”他补充道:“我们得出的基本结论是，在我们的星系中肯定曾经有那么一段时间形成的恒星比平时要多，然后在它们分裂后变成了尘埃。”

I’m Bryan Lynn.

布莱恩·林恩报道。

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