1 Article：
Amino Acids Found In Hayabusa2's Treasures from Ryugu: Where Did Life Come From?

Directions: Read the following article aloud.

Research institutes around the world analyzing the asteroid's sand samples have found more than 20 kinds of amino acids, the building blocks of life.

Living organisms can arise **by chance** from inanimate objects without parents. The theory of **spontaneous** generation proposed by Aristotle of ancient Greece was rejected by the experiments of Pasteur, a French chemist, in the mid-19th century.

So what brought life to Earth, which was created around 4.6 billion years ago? Various theories have emerged since then.

The "panspermia **hypothesis**" proposes that the origin of matter, which is the basis of life, is not on Earth but in space. "Pan" means "all" and "panspermia" means "seed."

Hints from Ryugu's Samples

About 100 years ago, Swedish Nobel Prize-winning scientist Arrhenius proposed that the seeds of life are moving between planets under the pressure of light.

To test this hypothesis, a Japanese research team has analyzed dust samples taken from the International Space Station (ISS), which orbits at an altitude of about 400 km. The research is named the "Dandelion Project" because the seeds of life are thought to drift through space like dandelion fluff.

On the other hand, there is also a strong theory that the seeds of life were brought to Earth by falling debris from asteroids and comets.

Amino acids, which are the building blocks of proteins, have already been detected in meteorites found on the ground. However, scientists have not been able to deny the possibility that the amino acids were mixed in after the meteorites had contact with the planet's soil and air.

This is why the sand from the asteroid Ryugu has **attracted attention**.

The Building Blocks of Life

After a long journey of 5.2 billion kilometers, the Japan Aerospace Exploration Agency (JAXA)'s probe "Hayabusa2" brought back to Earth a capsule containing sand samples on December 6, 2020.

About 5.4 grams of sand samples were distributed to research institutes around the world, where they have been analyzed without being exposed to Earth's air. As a result, more than 20 kinds of amino acids have been **confirmed**.

The capsule brought back to Earth by Hayabusa2 was, just as expected, a "treasure box." How close can we get to solving the greatest mystery in biology? We shall look forward to the papers that will be published in the near future.

Source：Amino Acids Found In Hayabusa2's Treasures from Ryugu: Where Did Life Come From?
https://japan-forward.com/amino-acids-found-in-hayabusa2s-treasures-from-ryugyu-where-did-life-come-from/

2 Key phrases and vocabulary

Directions: First repeat after your tutor and then read aloud by yourself.

1. by chance 偶然に、たまたま
- We bumped into each other completely **by chance** on the street.

2. spontaneous 自然発生する、自発的な、自然と、(行動などが)突然の・思い付きの・突発的な・とっさの
- She was suddenly filled with tears of **spontaneous** emotion.

3. hypothesis 仮説、ある現象を説明する理論、仮定
- Most common way to test a **hypothesis** is to create an experiment.

4. attract attention 注目を浴びる・集める、関心を引く、話題になる
- She always wear something unusual on the red carpet to **attract attention**.

5. confirm (事実であることを)確認する、裏付ける、承認する
- The diagnosis was **confirmed** by skin biopsy.

3 Questions

Directions: Read the questions aloud and answer them.

1. **How does “panspemia hypothesis” explain the beginning of life on Earth?**
2. **What is the other wildely accepted theory on the origin of life?**
3. **Which theory of origin of life do you think is the most possible?**
4. **Do you follow astronomy news? Why/Why not?**

4 日本語関連記事：はやぶさ２、地球外の砂にアミノ酸　生命の源はどこからきたのか

生物は親なしに無生物から偶然発生することがある。古代ギリシャのアリストテレスが唱えた「自然発生説」は、19世紀の半ばにフランスの化学者、パスツールの実験により否定された。

では、約46億年前に誕生した地球に何が生命をもたらしたのか。その後さまざまな説が生まれた。実は生命の基となる物質の起源は、地球ではなく宇宙にあるとするのが「パンスペルミア仮説」である。パンは「汎（すべて）」「スペルミア」は種子を意味する。

生命の「種」が、光の圧力を受けて惑星間を移動している。約100年前、ノーベル賞受賞者でもあるスウェーデンの科学者、アレニウスが提唱した。その仮説を検証するため日本の研究チームは、高度約400キロを回る国際宇宙ステーション（ISS）で採取したちりを分析してきた。生命の種は、たんぽぽの綿毛のように宇宙空間を漂うと考えられることから、「たんぽぽ計画」と名付けられている。

一方で、生命の種は小惑星や彗星（すいせい）の破片の落下により地球に運ばれた、との説も有力である。確かに地上で見つかった隕石（いんせき）からはタンパク質の材料となるアミノ酸がすでに検出されている。ただ地球上で混入した可能性も否定できない。そこで注目されたのが小惑星「リュウグウ」の砂である。

宇宙航空研究開発機構（JAXA）の探査機「はやぶさ2」が、52億キロメートルに及ぶ長旅の末1年半前に地球に持ち帰った。約5・4グラムの砂は、世界各国の研究機関に配られ、外気に触れない状態で解析が進められてきた。果たして20種類以上のアミノ酸が確認された。

やはり期待通りの「玉手箱」であった。生物学最大の謎にどこまで迫れるのか。これから発表される論文が楽しみである。

出典：はやぶさ2、地球外の砂にアミノ酸　生命の源はどこからきたのか
https://japan-forward.com/japanese/103353/