

東京農業大学 2026 年度 転入学選抜 試験問題

試験日 11 月 29 日	科 目	英語	受 験 学 科	デザイン農学科	受 験 番 号		氏 名	
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問題

次の英文を読んで、問 1 ～ 5 に答えなさい。なお、本文中の①～⑯は段落番号であり、第 4 段落と第 5 段落の間の“Extracting the goods”、第 9 段落と第 10 段落の間の“Putting banana extracts to the test”は本文の中見出しである。

Eco-Friendly Sunscreen? That's Bananas!

- ① “My mom always raised me to pay attention to the ingredients in my cosmetics,” says Taylor Maguire, 15. She prefers “organic products over synthetic* ones.” That led this sophomore at Garden City High School in New York to ask: “What’s in my sunscreen?”
- ② These products protect our skin against blistering* solar rays. But their use comes at a price*. Some of sunscreen’s chemicals may cause cancer, Taylor notes. And when these chemicals wash into our environment, they can hurt animals. For example, some mineral* sunscreens interfere with the ability of freshwater* animals to navigate. High enough exposures, she says, can kill some organisms.
- ③ So, Taylor looked for alternatives to mineral-based sunscreens.
- ④ Bananas can naturally filter out much of the sun’s more damaging rays. Could their natural sunblock replace mineral sunscreens? Taylor investigated. And what she found out won her a spot here in May at the 2025 Regeneron International Science and Engineering Fair, or ISEF.

Extracting the goods

- ⑤ Bananas tend to grow in a “UV-intense environment,” Taylor says. UV — short for ultraviolet — is a band of light wavelengths. This high-energy light is invisible to the human eye. But it causes most of the sun’s damage to our skin. For a sunscreen to work, it must protect against certain UV rays.
- ⑥ Taylor had reasoned that bananas “must have their own mechanism.” After all, they grow near the equator*. That’s where UV exposures are strongest.
- ⑦ Plants typically make flavonoids* — pigments* that come in a rainbow of colors — as a defense against the sun’s UV. Taylor wondered if banana flavonoids might work to protect our skin from UV, too.
- ⑧ She wasn’t sure exactly which bananas flavonoids to use. Taylor heated, froze and blended the outer layer of a banana peel. “That’s the part that’s exposed to the sunlight,” she explains. Any UV-filtering chemicals likely lie there.
- ⑨ Breaking open the cells released many of their chemicals. From this soup she made two extracts. One of these contained only components that would dissolve in water. That was her aqueous extract*. The other contained only chemicals that wouldn’t dissolve in water. That was her nonpolar extract*. Nonpolar chemicals dissolve in oil rather than water.

Putting banana extracts to the test

- ⑩ A sunscreen must absorb UV light before it reaches your skin. And the more it absorbs, the better. To test how well each extract could do that, Taylor turned to a light-measuring tool. Called a spectrophotometer, it measures how much of any color of light a liquid absorbs.
- ⑪ The tool confirmed that both of her banana extracts absorbed UV light. But the nonpolar one went a step further. It absorbed the full range of UV wavelengths — and especially the most damaging ones. They belong to a part of the UV spectrum called UV-A.
- ⑫ Would banana-based sunscreens also be safe for the environment? After all, Taylor says, typical drug-store sunscreens can harm aquatic life. To find out, she recruited planarians* (*Girardia tigrina*) as her “guinea pigs.”* Planarians are a type of flatworm that live in water. They’re often used in drug-safety studies, Taylor explains. A chemical that harms these worms might also pose a risk to other aquatic animals.
- ⑬ (1)The plan was to put planarians into dishes with different extracts and expose them to strong UV light for 10 minutes. If the worm’s movement slowed or stopped, she took that to mean the light damaged them. Her five test solutions included her two extracts, a drugstore sunscreen solution, plain water and glycerol.
- ⑭ Why glycerol? The nonpolar extract and sunscreen solution both contained this thick liquid. Taylor tested glycerol by itself to check if it caused problems on its own.

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- ⑮ And it did. “The nonpolar banana, the glycerol and the mineral sunscreen [appeared] fatal” to the worms, she found. “They stopped moving.”
- ⑯ (2)That “was surprising,” Taylor says. Glycerol “is actually an ingredient found in a lot of sunscreens,” she says. It’s not known to hurt people. But she’s “pretty sure” it killed her planarians.

(出典：“Eco-friendly sunscreen? That’s bananas!,” by Katie Grace Carpenter. Science News Explores. June 4, 2025. Used with permission.)

[注] synthetic「合成の」、blistering「焼けつくような、灼熱の」、at a price「相当な代償を払って」、mineral「〔有機物に対する〕無機（化合）物」、freshwater「真水の、淡水の」、equator「赤道」、flavonoid「フラノボイド」、pigment「色素」、aqueous extract「水性抽出液」、nonpolar extract「非極性抽出液」、planarian「プラナリア」、guinea pigs「モルモット（ここでは実験動物のこと）」、flatworm「扁形動物」

問 1 第 2 段落では、一部の市販の日焼け止めによる人体や生物への悪影響が説明されている。このうち、生物にはどのような影響があることがわかっているか、その影響の具体的な内容について本文で述べられていることをもとに日本語で答えなさい。

問 2 Taylor が実験で使用した spectrophotometer という機材は、何を調べることができるか。本文の内容をもとに、日本語で答えなさい。

問 3 下線部(1)を日本語に訳しなさい。

問 4 下線部(2)で Taylor が驚いているのはなぜか、日本語で説明しなさい。

問 5 次の選択肢 A～Eの中から、本文の内容と一致するものをすべて選びなさい。

- A. The aqueous extract does not absorb UV light at all.
- B. The nonpolar extract absorbed the entire range of UV wavelengths, especially those in the UV-A region.
- C. Glycerol was tested separately because it was included in both the nonpolar extract and the sunscreen solution.
- D. Plain water was harmful to the planarians, causing them to stop moving under UV exposure.
- E. Both of the banana extracts were fatal to the planarians.