Science and Digital Briefs

By Shopper Editor Dave Bunting

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Spider legs used to grab tiny objects

"Spiders do not have antagonistic muscle pairs, like biceps and triceps in humans," Yap said. "They only have flexor muscles, which pull their legs to curl in, and they extend them outward by hydraulic pressure.

Their leg “bone” is like a hollow bone extending longer as it’s pumped full of air or a liquid.

When they die, they lose the ability to actively pressurize their bodies. That's why they curl up.

Humans extend our limbs by opposing muscles which only contract, extending the limb by contracting, pulling on a skeletal extension to leverage the limb outward. Pulling our limb in requires another muscle pulling on another skeletal extension to pull the limb in.

Spider limbs have only a single contractor muscle. They extend a limb by by pushing air into a chamber within the limb. They do not require the double muscles and skeletal extensions that humans require for contraction and extension of a single limb.

Internal valves in the spiders' hydraulic chamber, or prosoma, allow them to control each leg individually, and that will also be the subject of future research

Setting up a spider gripper was fairly simple. The scientist tapped into the prosoma chamber with a needle, attaching it with a dab of superglue. The other end of the needle was connected to one of the lab's test rigs or a handheld syringe, which delivered a minute amount of air to activate the legs almost instantly.

The lab ran one ex-spider through 1,000 open-close cycles to see how well its limbs held up and found it to be fairly robust. "It starts to experience some wear and tear as we get close to 1,000 cycles

"There are a lot of pick-and-place tasks we could look into, repetitive tasks like sorting or moving objects around at these small scales, and maybe even things like assembly of microelectronics,"

Info: shpr.fyi/spiderlegs

Scientists discover places on the moon where it's always “sweater weather”

People could potentially live and work in lunar pits and caves with steady temperatures in the 60s.

A team led by planetary scientists has discovered shady locations within pits on the moon that always hover around a comfortable 63 degrees Fahrenheit. The pits, and caves to which they may lead, would make safer, more thermally stable base camps for lunar exploration and long-term habitation than the rest of the moon's surface, which heats up to 260 degrees during the day and drops to 280 degrees below zero at night.

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Pits were first discovered on the moon in 2009, and since then, scientists have wondered if they led to caves that could be explored or used as shelters. About 16 of the more than 200 pits are probably collapsed lava tubes, said Tyler Horvath, a UCLA doctoral student in planetary science, who led the new research. Two of the most prominent pits have visible overhangs that clearly lead to some sort of cave or void, and there is strong evidence that another's overhang may also lead to a large cave.

Lava tubes, also found on Earth, form when molten lava flows beneath a field of cooled lava or a crust forms over a river of lava, leaving a long, hollow tunnel. The Lava Caves south of Mt. St. Helens are lava tubes. If the ceiling of a solidified lava tube collapses, it opens a pit that can lead into the rest of the cavelike tube.

The pits or caves would also offer some protection from cosmic rays, solar radiation and micrometeorites.

The temperature of 63° on the moon is not the temperature of the air, as there is no air on the moon. It is the temperature of the rocks, the side walls, floor and ceiling of the cave. The astronauts could not survive there in “sweaters”, their heavy spacesuits would be required to maintain air pressure for their breathing and the temperature of the air against their bodies at our normal living air temperatures of about 72°.

Info: shpr.fyi/mooncaves

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Read this week’s Bible Readings on page 6 which includes the apostles’ encouragement to Hebrews who had converted to Christianity: **"Since we are receiving a kingdom that cannot be shaken, let us be thankful.”** Hebrews 12:28 NIV

Dave Bunting, Aug. 15, 2022
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