Space News Update

— July 19, 2019 —

Contents

1. **Math Invented for Moon Landing Helps Your Flight Arrive on Time**

They say the computers on board the Apollo spacecraft were not even as powerful as your smartphone. So, how *did* they travel all that way, perform complex maneuvers in space and return through Earth's atmosphere at just the right angle to splash down in the Pacific Ocean?

Greg Schmidt knows an important part of the answer is based in math. He heard all about it from his father, Stanley Schmidt, who developed powerful computational techniques at NASA's Ames Research Center, in California's Silicon Valley, even before the Apollo program was ramping up. After a childhood steeped in this history, Greg grew up to become the director of NASA's Solar System Exploration Research Virtual Institute, based at Ames.

He remembers the story well.

"My father had been assigned the problem of navigating to the Moon and, as he told it to me, it was a very difficult problem," said Schmidt. "They didn't have a mathematical solution to it. It involved taking a number of different sources of information and combining them in an optimal way to get the best estimate of where your spacecraft is at any time, how fast you're going and other variables, too."

The calculations needed to be something the computers on board the Apollo capsule could tackle with their limited, 1960s-era computing power. The elder Schmidt, who was chief of the Ames Dynamic Analysis Branch when NASA was studying the feasibility of its future lunar missions, knew of work done a few years earlier by a mathematician named Rudolf Kalman.

"My dad invited Rudy Kalman to give a lecture at Ames, and when he did, Dad had an epiphany," the younger Schmidt explained. "Kalman had written a paper about a theoretical 'linear' solution to estimating a vehicle's location and speed."

"The problem was that this was a fundamentally 'nonlinear' problem; that's like the difference in complexity between floating down a lazy river and going over a waterfall, where your motion becomes chaotic and unpredictable," he said. "My dad then developed the equations for how to solve this nonlinear problem – a major extension of Kalman's work."

And an answer that would guide the astronauts safely to the Moon and home again.

Today, the approach underlying those historic space flights is used in applications across our lives, even helping direct air traffic to increase efficiency in our busy skies. The two scenarios have related problems to solve, and the innovative math that came to be called the Schmidt-Kalman filter provides the answers.

From Apollo to the Airport: The Schmidt-Kalman Filter at Work

At airports across the country, the demand for flights is growing, so NASA is working with partners like the Federal Aviation Administration to research ways of directing that traffic as efficiently as possible. Today at Ames, research teams are developing air traffic management systems that help things go smoothly in all phases of flight: takeoff, cruise and landing.

One principle that helps get more passengers on their way is to release additional planes for takeoff at the right moments. Knowing when that's safe to do has something in common with the challenge of navigating to the Moon: You need to estimate as accurately as possible the positions of many different aircraft – or of one very special spacecraft – and to work with the uncertainty that all measurements contain. And that's where the Schmidt-Kalman filter comes in.

Any way you measure an aircraft's position, it comes with a degree of uncertainty. That's simply because no tool can measure something *perfectly* and there are a *lot* of factors influencing a plane in flight: wind speed, weather, pilot performance… So, neither aircraft tracking systems based on radar and GPS measurements nor sophisticated calculations of your plane's expected flight path can pinpoint exact coordinates; they're really saying your plane is located somewhere within a certain limited zone. The smaller that zone, the more confident you can be that your craft's estimated position is as close to reality as possible.

The technique works, in our example, by fusing those two methods of estimating position: calculating a predicted flight path and using real-life measurements. This lets the Schmidt-Kalman filter narrow the window of possibilities for a plane's location and gives an answer that is stronger than either method alone. It's called a filter because it also removes "noise," or extra, meaningless data, from the measurements. And it's even able to tell you when to trust the equations more and when to have more faith in your measurements, shifting the balance in how much weight it gives each part to perform its analysis.

"In air traffic management, the job is to keep aircraft safe and separated," said Jeremy Coupe, an aerospace engineer in guidance, navigation and control systems at Ames. "If you have a very accurate idea of where every aircraft is, you can increase the number of flights in a given area. But if you don't have a good idea, you can't be sure how to safely pack more of them into the airspace."

So, the FAA took a cue from Apollo: To help improve that accuracy in estimating positions, the FAA added Schmidt-Kalman filters to the calculations performed by their aircraft-tracking systems.

+++

"I'm immensely proud of what my father did," said Greg Schmidt. "Before he passed away, I remember being at the hospital talking with him about his work. He was barely even able to talk, but recounted all the equations as clearly as if it were 50 years earlier. He was a truly amazing man."

Driven by those studies of spacecraft navigation in the 1960s, Stanley Schmidt's contributions turned a theory into something essential for the success of Apollo. And, today, he's still helping you fly to your destination – safely and on time.

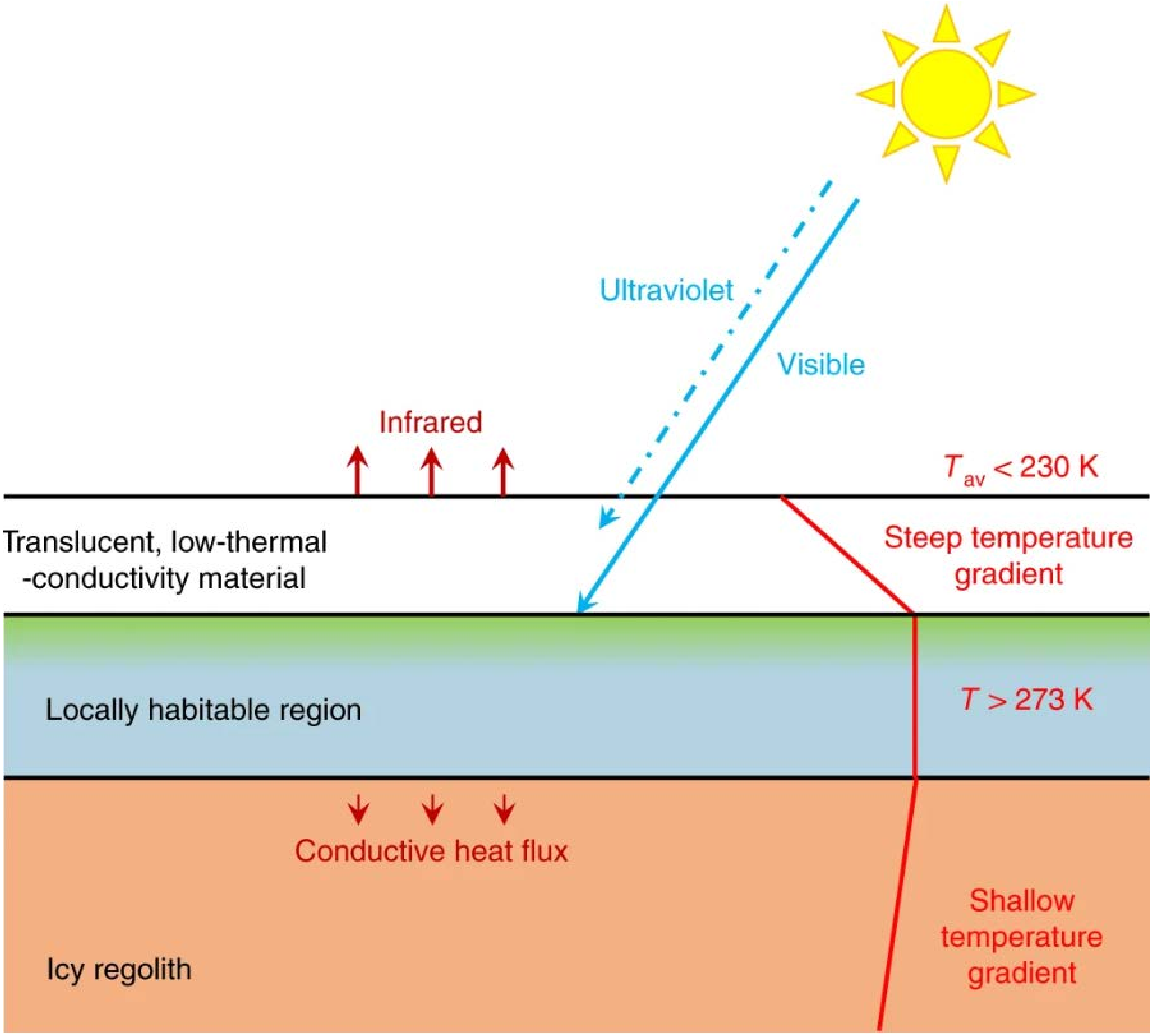
Learn more:

Stanley F. "Stan" Schmidt Oral History Interviews from the NASA Johnson Space Center Oral History Project (July 15, 2014)

Source: NASA

Return to Contents

2. Blankets of Silica Aerogel Could Make Parts of Mars Habitable



The idea of somehow terra-forming Mars to make it more habitable is a visionary, sci-fi dream. But though global terra-forming of Mars is out of reach, the idea persists. But now, a material called silica aerogel might make the whole idea of terra-forming Mars slightly less impossible.

Notable people from Carl Sagan to Elon Musk have proposed warming Mars and give it an atmosphere, and the trick lies in the frozen CO_2 and water in the planet's polar caps. Sagan said if those caps could be vaporized somehow, then the CO_2 greenhouse effect would do the rest. Musk said, glibly and half-jokingly, that atomic bombs dropped on the poles would do the trick.

There's serious scientific work going on to explore the idea, at least in theory. The central question is, does Mars have enough CO_2 and water to create an atmospheric density similar to Earths?

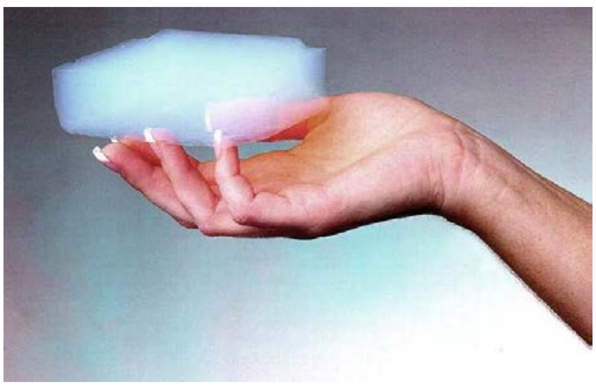
In 2018, scientists at the University of Colorado studied the question. Their conclusion? Terraforming Mars is not possible with our current technology, something that most people already felt certain was true.

“Our results suggest that there is not enough CO_2 remaining on Mars to provide significant greenhouse warming were the gas to be put into the atmosphere; in addition, most of the CO_2 gas is not accessible and could not be readily mobilized. As a result, terraforming Mars is not possible using present-day technology,” said Bruce Jakosky, professor at the Laboratory of Atmosphere and Space Physics at University of Colorado, Boulder.

But that was a year ago, and technology is constantly evolving.

In a new study in Nature Astronomy, a trio researchers from NASA’s Jet Propulsion Laboratory, Harvard University, and the University of Edinburgh, suggest that Mars could be made habitable if we change our thinking and use new technology. Rather than grand dreams of making the entirety of the red planet habitable, what scientists call Global Atmospheric Modification (GAM,) what if small regions could be transformed?

The key behind their line of thinking is silica aerogel.



Silica aerogel is not what you might think it is. Rather than an actual gel, it’s a solid, rigid, dry material. It’s created by extracting the liquid from a gel with a process called supercritical drying, the same process used make decaffeinated coffee.

The researchers behind this new study used models and experiments to show that a thin, 2 to 3 cm (.8 to 1.2 inch) layer of aerogel could allow sunlight to penetrate, but would trap heat. The gel would also allow enough sunlight for photosynthesis, and would permanently warm the area it covered, allowing water ice and frozen CO_2 to melt. Maybe best of all, it wouldn’t need an energy-hungry heat source to do so.

“This regional approach to making Mars habitable is much more achievable than global atmospheric modification,” said Robin Wordsworth, Assistant Professor of Environmental Science and Engineering at the Harvard John A. Paulson School of Engineering and Applied Sciences (SEAS) and the Department of Earth and Planetary Science. “Unlike the previous ideas to make Mars habitable, this is something that can be developed and tested systematically with materials and technology we already have,” he said in a press release.

“Small Islands of Habitability”

“Mars is the most habitable planet in our Solar System besides Earth,” said Laura Kerber, Research Scientist at NASA’s Jet Propulsion Laboratory. “But it remains a hostile world for many kinds of life. A system for creating small islands of habitability would allow us to transform Mars in a controlled and scalable way.”

The silica aerogel, island of habitability idea was inspired by something that already occurs at Mars’ poles.

Unlike on Earth, the CO_2 on Mars is frozen, trapped at the poles. While here on Earth the poles are water ice, the Martian poles are a combination of water ice and CO_2 ice. But even though it’s frozen, that CO_2 still allows sunlight to penetrate while trapping the heat.

Images of Mars’ poles show how this happens.

In this image of ice on Mars, the CO2 has trapped the Sun's warmth. This creates little pockets of warmth in the summer, which show up as black melted spots in the ice.

"We started thinking about this solid-state greenhouse effect and how it could be invoked for creating habitable environments on Mars in the future," said Wordsworth. "We started thinking about what kind of materials could minimize thermal conductivity but still transmit as much light as possible."

As it turns out, silica aerogel fits the bill. It was first invented in 1931, and it's one of the most highly-insulating materials ever made. That's because it's a very porous material that is almost completely made of air. It's about 99.8% air, kind of like a thermal window.

Silica aerogels are 97 percent porous, meaning light moves through the material but the interconnecting nanolayers of silicon dioxide trap infrared radiation and greatly slow the conduction of heat. These aerogels are used in several engineering applications today, including NASA's Mars Exploration Rovers. They're used to keep the sensitive electronics warm.

"Silica aerogel is a promising material because its effect is passive," said Kerber. "It wouldn't require large amounts of energy or maintenance of moving parts to keep an area warm over long periods of time."

The researchers set up experiments to mimic conditions on Mars. They experimented with two types of silica aerogel: particles and tiles. They found that both were effective at raising the temperature. Both were also effective at blocking dangerous UV radiation.

Their results show that a 2 cm or more layer of aerogel reduced UVC radiation to less than 0.5%. UVC is higher-energy UV radiation, and can be particularly harmful. On Earth, almost no measurable UVC radiation reaches the surface due to ozone, molecular oxygen and water vapor in the upper atmosphere.

"Spread across a large enough area, you wouldn't need any other technology or physics, you would just need a layer of this stuff on the surface and underneath you would have permanent liquid water," said Wordsworth. "There's a whole host of fascinating engineering questions that emerge from this."

It's easy enough to envision some kind of dome structure made of silica aerogel. It would be warm enough to be habitable, and would also block out UV. It could be kind of like a greenhouse on Earth, where water remained as liquid and plants could be grown.

There's a lot more work and research to be done, obviously. Wordsworth and the other researchers intend to test silica aerogels at Mars-like locations here on Earth. They're targeting dry valley in Chile and Antarctica.

Wordsworth is clear on one thing: engineering the climate of Mars is not just a technical and engineering question. It's an ethical and philosophical question, too.

If there's already some microbes living on Mars, perhaps under the surface somewhere, what about them? Should we do it? Do we have the right?

"If you're going to enable life on the Martian surface, are you sure that there's not life there already? If there is, how do we navigate that," asked Wordsworth. "The moment we decide to commit to having humans on Mars, these questions are inevitable."

Source: Universe Today Return to Contents

3. July 20, 1969: One Giant Leap for Mankind

Apollo 11 Commander Neil Armstrong working at an equipment storage area on the lunar module. This is one of the few photos that show Armstrong during the moonwalk.

July 1969. It's a little over eight years since the flights of Gagarin and Shepard, followed quickly by President Kennedy's challenge to put a man on the moon before the decade is out.

It is only seven months since NASA's made a bold decision to send Apollo 8 all the way to the moon on the first manned flight of the massive Saturn V rocket. Now, on the morning of July 16, Apollo 11 astronauts Neil Armstrong, Buzz Aldrin and Michael Collinssit atop another Saturn V at Launch Complex 39A at the Kennedy Space Center. The three-stage 363-foot rocket will use its 7.5 million pounds of thrust to propel them into space and into history.

At 9:32 a.m. EDT, the engines fire and Apollo 11 clears the tower. About 12 minutes later, the crew is in Earth orbit. (› Play Audio)

After one and a half orbits, Apollo 11 gets a "go" for what mission controllers call "Translunar Injection" - in other words, it's time to head for the moon. Three days later the crew is in lunar orbit. A day after that, Armstrong and Aldrin climb into the lunar module *Eagle* and begin the descent, while Collins orbits in the command module *Columbia*.

Collins later writes that *Eagle* is "the weirdest looking contraption I have ever seen in the sky," but it will prove its worth. When it comes time to set *Eagle* down in the Sea of Tranquility, Armstrong improvises, manually piloting the ship past an area littered with boulders. During the final seconds of descent, *Eagle's* computer is sounding alarms.

It turns out to be a simple case of the computer trying to do too many things at once, but as Aldrin will later point out, "unfortunately it came up when we did not want to be trying to solve these particular problems."

When the lunar module lands at 4:17 p.m EDT, only 30 seconds of fuel remain. Armstrong radios "Houston, Tranquility Base here. The Eagle has landed." Mission control erupts in celebration as the tension breaks, and a controller tells the crew "You got a bunch of guys about to turn blue, we're breathing again." (› Play Audio)

Armstrong will later confirm that landing was his biggest concern, saying "the unknowns were rampant," and "there were just a thousand things to worry about."

At 10:56 p.m. EDT Armstrong is ready to plant the first human foot on another world. With more than half a billion people watching on television, he climbs down the ladder and proclaims: "That's one small step for a man, one giant leap for mankind." (› Play Audio)

Aldrin joins him shortly, and offers a simple but powerful description of the lunar surface: "magnificent desolation." They explore the surface for two and a half hours, collecting samples and taking photographs.

They leave behind an American flag, a patch honoring the fallen Apollo 1 crew, and a plaque on one of *Eagle's* legs. It reads, "Here men from the planet Earth first set foot upon the moon. July 1969 A.D. We came in peace for all mankind."

Armstrong and Aldrin blast off and dock with Collins in *Columbia*. Collins later says that "for the first time," he "really felt that we were going to carry this thing off."

The crew splashes down off Hawaii on July 24. Kennedy's challenge has been met. Men from Earth have walked on the moon and returned safely home.

In an interview years later, Armstrong praises the "hundreds of thousands" of people behind the project. "Every guy that's setting up the tests, cranking the torque wrench, and so on, is saying, man or woman, 'If anything goes wrong here, it's not going to be my fault.'" (› Read 2001 Interview, 172 Kb PDF)

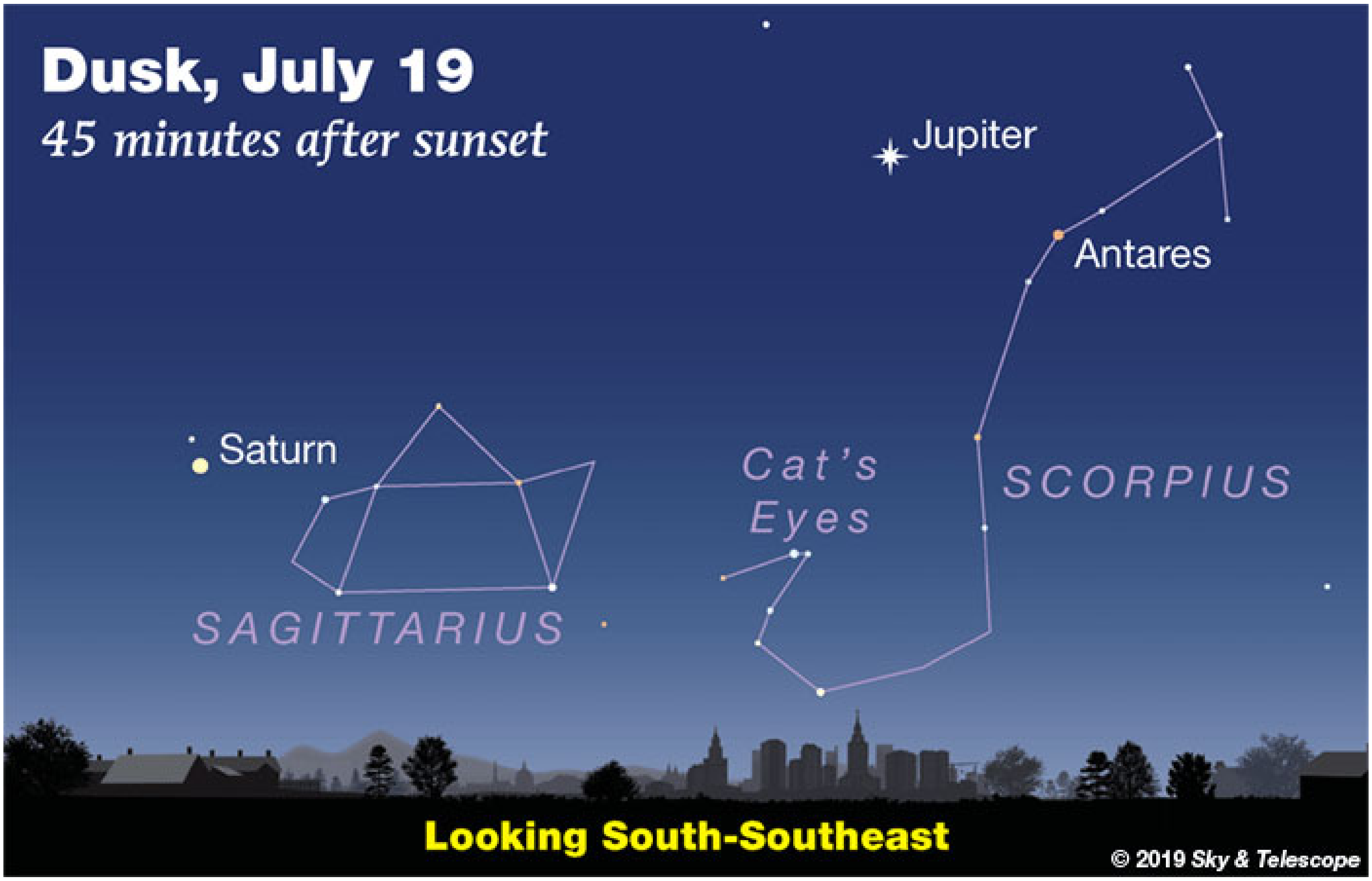
In a post-flight press conference, Armstrong calls the flight "a beginning of a new age," while Collins talks about future journeys to Mars.

Over the next three and a half years, 10 astronauts will follow in their footsteps. Gene Cernan, commander of the last Apollo mission leaves the lunar surface with these words: "We leave as we came and, God willing, as we shall return, with peace, and hope for all mankind."

Source: NASA

Return to Contents

The Night Sky



Friday, July 19

• The tail of Scorpius is low due south after dark, as shown above. *How* low depends on how far north or south you live: the farther south, the higher.

Look for the two stars especially close together in the tail. These are Lambda and fainter Upsilon Scorpii, known as the Cat's Eyes. They're canted at an angle; the cat is tilting his head and winking.

The Cat's Eyes point to the right by nearly a fist-width toward Mu Scorpii, a much tighter pair (shown as a single dot on the map) known as the Little Cat's Eyes. They're oriented almost exactly the same way as Lambda and Upsilon. Are your eyes sharp enough to resolve the Mu pair without using binoculars? Not many people can!

Saturday, July 20

• Scorpius is sometimes called "the Orion of Summer" for its brightness, its blue-white giant stars, and its prominent red supergiant (Antares in the case of Scorpius, Betelgeuse for Orion). But Scorpius passes a lot lower across the south than Orion does, for those of us at mid-northern latitudes. That means it has only one really good evening month: July.

Catch Scorpius due south just after dark now, before it starts to tilt lower toward the southwest. It's full of deep-sky objects to hunt with a sky atlas and binoculars or a telescope.

• Once the Moon does rise, contemplate the moment 50 years ago today when a man took the first step onto another world. The sunset terminator tonight is approaching Tranquillity Base, and everything there must be casting long shadows.

Sunday, July 21

• After nightfall, Altair shines in the east-southeast. It's the second-brightest star on the eastern side of the sky, after Vega very high to its upper left. Above Altair by a finger-width at arm's length is little orange Tarazed.

A bit more than a fist-width to Altair's left or lower left is little Delphinus, the Dolphin, leaping leftward.

Above the midpoint between Altair and Delphinus is even fainter little Sagitta, the Arrow.

Monday, July 22

• Got a really dark sky? Or planning to vacation under one? The Milky Way arches high across the eastern sky now — from Perseus and Cassiopeia low in the north-northeast, across Cygnus and through the Summer Triangle high in the east, and down through Sagittarius and the tail of Scorpius low in the south.

Bring a low-power, wide-field scope for some grand star fields. And for an unusual excursion, bring the July issue of *Sky & Telescope* to hunt out some of the spooky dark nebulae in Ophiuchus over Jupiter — using Richard Wild's "Going Deep" column and chart starting on page 57.

Source: Sky & Telescope Return to Contents

ISS Sighting Opportunities

For Denver:

Date	Visible	Max Height	Appears	Disappears
Fri Jul 19, 9:58 PM	6 min	28°	11° above W	10° above NE
Fri Jul 19, 11:39 PM	< 1 min	11°	11° above N	10° above NNE
Sat Jul 20, 1:17 AM	1 min	12°	12° above NNE	10° above NE
Sat Jul 20, 2:51 AM	< 1 min	15°	10° above NW	15° above NW
Sat Jul 20, 4:32 AM	< 1 min	11°	11° above S	11° above S
Sat Jul 20, 9:08 PM	6 min	45°	10° above WSW	10° above NE
Sat Jul 20, 10:49 PM	1 min	13°	13° above N	10° above NNE
Sun Jul 21, 00:27 AM	< 1 min	11°	11° above N	10° above NNE
Sun Jul 21, 2:01 AM	< 1 min	10°	10° above NNW	10° above NNW
Sun Jul 21, 10:00 PM	2 min	16°	16° above N	11° above NNE
Sun Jul 21, 11:37 PM	< 1 min	10°	10° above N	10° above NNE
Mon Jul 22, 1:12 AM	< 1 min	14°	10° above NNW	14° above NNW
Mon Jul 22, 9:10 PM	2 min	22°	22° above NNW	11° above NNE
Mon Jul 22, 10:48 PM	< 1 min	10°	10° above N	10° above N

Sighting information for other cities can be found at NASA's Satellite Sighting Information

NASA-TV Highlights
(all times Eastern Daylight Time)

No Special Programming

Watch NASA TV on the Net by going to the NASA website.

Return to Contents

Space Calendar

- Jul 19 - [Jul 18] Tiangong 2 Reenters Earth's Atmosphere
- Jul 19 - Comet C/2019 J2 (Palomar) Perihelion (1.723 AU)
- Jul 19 - Apollo Asteroid 2019 NJ2 Near-Earth Flyby (0.034 AU)
- Jul 19 - Asteroid 13677 Alvin Closest Approach To Earth (2.081 AU)
- Jul 19 - Amor Asteroid 5653 Camarillo Closest Approach To Earth (2.249 AU)
- Jul 20 - [Jul 13] 50th Anniversary (1969), 1st Man On The Moon (Neil Armstrong - Apollo 11)
- Jul 20 - [Jul 19] Soyuz MS-13 Soyuz-FG Launch (International Space Station 59S)
- Jul 20 - Comet C/2019 J1 (Lemmon) At Opposition (1.713 AU)
- Jul 20 - Comet 84P/Giclas Closest Approach To Earth (2.134 AU)
- Jul 20 - Amor Asteroid 481984 Cernunnos Closest Approach To Earth (0.947 AU)
- Jul 20 - Asteroid 8553 Bradsmith Closest Approach To Earth (0.959 AU)
- Jul 20 - Apollo Asteroid 4257 Ubasti Closest Approach To Earth (1.539 AU)
- Jul 20 - Asteroid 580 Selene Closest Approach To Earth (2.420 AU)
- Jul 20 - Amor Asteroid 887 Alinda Closest Approach To Earth (2.768 AU)
- Jul 20 - [Jul 13] Sky Fest Event: Apollo 11 - Looking Back to Move Forward, Tucson, Arizona
- Jul 20 - Event: Apollo 11 50th Celebration, London, United Kingdom
- Jul 20 - 20th Anniversary (1999), Retrieval Of Liberty Bell 7 Capsule From Ocean Floor
- Jul 21 - [Jul 14] Dragon CRS-18 (SpX 18)/ IDA 3/ RFTSat 1 Falcon 9 Launch (International Space Station)
- Jul 21 - Comet P/2008 Y12 (SOHO) At Opposition (0.852 AU)
- Jul 21 - Comet C/2019 L1 (PANSTARRS) At Opposition (1.891 AU)
- Jul 21 - Comet P/2010 H2 (Vales) Closest Approach To Earth (2.987 AU)
- Jul 21 - Comet C/2019 K8 (ATLAS) Perihelion (3.195 AU)
- Jul 21 - Aten Asteroid 2016 KO Near-Earth Flyby (0.095 AU)
- Jul 21 - Plutino 2014 JR80 At Opposition (39.936 AU)
- Jul 21 - Apollo 11 50th Anniversary Event: Open Day at The British Interplanetary Society, London, United Kingdom
- Jul 21 - 105th Anniversary (1914), Seth Nicholson's Discovery of Jupiter Moon Sinope
- Jul 22 - [Jul 18] Chandrayaan 2 GSLV Mk II Launch (India Moon Orbiter, Lander, Rover)
- Jul 22 - Hyperbola 1/ CAS 7B SQX-1 F1 Launch
- Jul 22 - Comet C/2019 L2 (NEOWISE) At Opposition (1.332 AU)
- Jul 22 - Comet 187P/LINEAR At Opposition (3.110 AU)
- Jul 22 - Apollo Asteroid 3752 Camillo Closest Approach To Earth (1.504 AU)
- Jul 22 - 10th Annual Lunar and Small Bodies Graduate Forum (LunGradCon 2019), Mountain View, California
- Jul 22 - Asteroid 19911 Rigaux Closest Approach To Earth (2.272 AU)
- Jul 22 - Asteroid 5738 Billpickering Closest Approach To Earth (3.099 AU)
- Jul 22 - Friedrich Bessel's 235th Birthday (1784)

Source: JPL Space Calendar

Return to Contents

Food for Thought

Red Wine's Resveratrol Could Help Mars Explorers Stay Strong

.Mars is about 9 months from Earth with today's tech, NASA reckons. As the new space race hurtles forward, Harvard researchers are asking: how do we make sure the winners can still stand when they reach the finish line?

Published in *Frontiers in Physiology*, their study shows that resveratrolsubstantially preserves muscle mass and strength in rats exposed to the wasting effects of simulated Mars gravity.

Space supplements

Out in space, unchallenged by gravity, muscles and bones weaken. Weight-bearing muscles are hit first and worst, like the soleus muscle in the calf.

"After just 3 weeks in space, the human soleus muscle shrinks by a third," says Dr. Marie Mortreux, lead author of the NASA-funded study at the laboratory of Dr. Seward Rutkove, Beth Israel Deaconess Medical Center, Harvard Medical School. "This is accompanied by a loss of slow-twitch muscle fibers, which are needed for endurance."

To allow astronauts to operate safely on long missions to Mars—whose gravitational pull is just 40% of Earth's—mitigating strategies will be needed to prevent muscle deconditioning.

"Dietary strategies could be key," says Dr. Mortreux, "especially since astronauts travelling to Mars won't have access to the type of exercise machines deployed on the ISS."

A strong candidate is resveratrol: a compound commonly found in grape skin and blueberries that has been widely investigated for its anti-inflammatory, anti-oxidative, and anti-diabetic effects.

"Resveratrol has been shown to preserve bone and muscle mass in rats during complete unloading, analogous to microgravity during spaceflight. So, we hypothesized that a moderate daily dose would help mitigate muscle deconditioning in a Mars gravity analogue, too."

Mars rats

To mimic Mars gravity, the researchers used an approach first developed in mice by Mary Bouxsein, Ph.D., also at Beth Israel Deaconess, in which rats were fitted with a full-body harness and suspended by a chain from their cage ceiling.

Thus, 24 male rats were exposed to normal loading (Earth) or 40% loading (Mars) for 14 days. In each group, half received resveratrol (150 mg/kg/day) in water; the others got just the water. Otherwise, they fed freely from the same chow.

Calf circumference and front and rear paw grip force were measured weekly, and at 14 days the calf muscles were analyzed.

Resveratrol to the rescue

The results were impressive.

As expected, the 'Mars' condition weakened the rats' grip and shrank their calf circumference, muscle weight and slow-twitch fiber content.

But incredibly, resveratrol supplementation almost entirely rescued front and rear paw grip in the Mars rats, to the level of the non-supplemented Earth rats.

What's more, resveratrol completely protected muscle mass (soleus and gastrocnemius) in the Mars rats, and in particular reduced the loss of slow-twitch muscle fibers. The protection was not complete, though: the supplement did not entirely rescue average soleus and gastrocnemius fibers cross-sectional area, or calf circumference.

As reported previously, resveratrol did not affect food intake or total body weight.

Perfecting the dose

Previous resveratrol research can explain these findings, says Dr. Mortreux.

"A likely factor here is insulin sensitivity.

"Resveratrol treatment promotes muscle growth in diabetic or unloaded animals, by increasing insulin sensitivity and glucose uptake in the muscle fibers. This is relevant for astronauts, who are known to develop reduced insulin sensitivity during spaceflight."

The anti-inflammatory effects of resveratrol could also help to conserve muscle and bone, and other anti-oxidant sources such as dried plums are being used to test this, adds Dr. Mortreux.

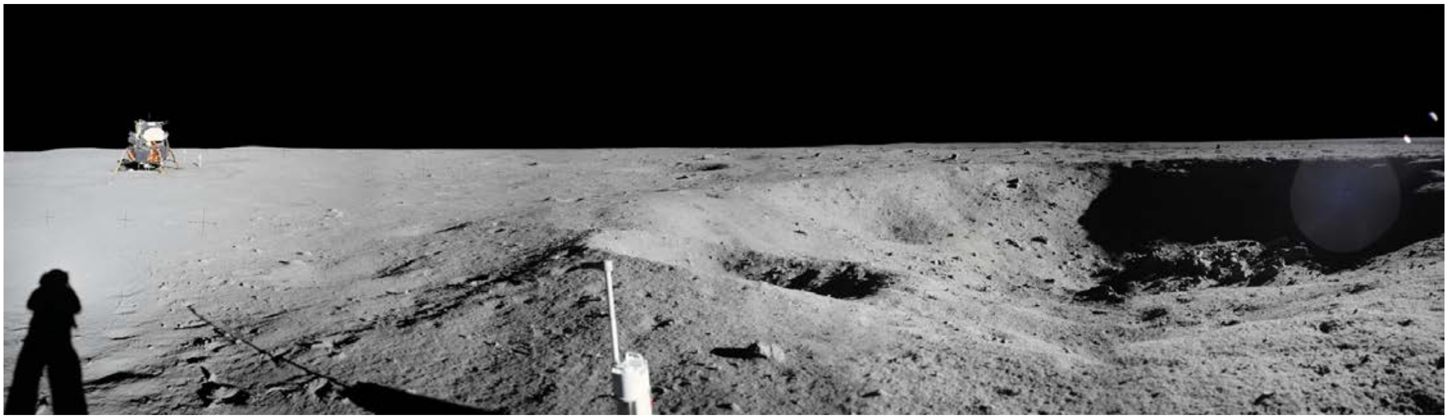
"Further studies are needed to explore the mechanisms involved, as well as the effects of different doses of resveratrol (up to 700 mg/kg/day) in both males and females. In addition, it will be important to confirm the lack of any potentially harmful interactions of resveratrol with other drugs administered to astronauts during space missions."

Explore further

Another reason for wine lovers to toast resveratrol

Source: Phys.org Return to Contents

Space Image of the Week



Tranquility Base Panorama

Explanation On July 20, 1969 the Apollo 11 lunar module Eagle safely touched down on the Moon. It landed near the southwestern corner of the Moon's Mare Tranquillitatis at a landing site dubbed Tranquility Base. This panoramic view of Tranquility Base was constructed from the historic photos taken from the lunar surface. On the far left astronaut Neil Armstrong casts a long shadow with Sun is at his back and the Eagle resting about 60 meters away (AS11-40-5961). He stands near the rim of 30 meter-diameter Little West crater seen here to the right (AS11-40-5954). Also visible in the foreground is the top of the camera intended for taking stereo close-ups of the lunar surface.

Image Credit: Neil Armstrong, Apollo 11, NASA

Source: APOD

Return to Contents