

Holes in Martian moon mystery

The Martian moon Phobos is cratered, lumpy and about 16.8 miles long, or 3 miles longer than the island of Manhattan. According to a recent study, the moon is also unusually light. Planetary scientists found that Phobos is probably not a solid object, and that as much as 30 percent of the moon's interior may be empty space.



The spacecraft Mars Express snapped this photo of the Martian moon Phobos on March 7.

Mars Express (illustrated here) has been orbiting Mars and collecting data about the planet since 2003. The way Phobos pulled at Mars Express provided information about the moon's mass.



That doesn't mean that Phobos is an empty shell where we could, say, set up a rest stop for spaceships on their way to the outer planets. But the new finding probably does mean that Phobos was not an asteroid that got caught in Mars' gravity as it floated by the planet.

Phobos is the larger of Mars' two moons, and astronomers have had many ideas about where it came from. Previous studies have suggested that Phobos was an asteroid. Other studies suggest the moon formed from bits of Martian rock that were sent into space after a giant object, like an asteroid, crashed in Mars. The new study suggests that neither of these ideas is completely correct. The truth might be some combination of the two.

Scientists may never know how Phobos came to be a Martian satellite, but the new study may help eliminate some possibilities, Tom Andert told *Science News*. Andert, who worked on the new study, is a planetary geophysicist at the University of the German Armed Forces in Munich. A planetary geophysicist is a scientist who studies physical properties, such as rocks and appearance, to understand more about celestial bodies such as planets and moons.

Andert and his colleagues were able to study Phobos thanks to the *Mars Express*, a spacecraft that orbits Mars and takes measurements. That spacecraft left Earth in 2003 and is a project by the European Space Agency, or ESA. In March, *Mars Express* flew closer to Phobos than any spacecraft ever had before, ESA reports.

The scientists wanted to learn the density of Phobos. Density measures how close together, on average, are the atoms in an object. If two objects are the same size but have different densities, the denser object will have more mass — which means it will feel heavier when you're holding it on Earth. Density is found by dividing mass by volume. Since the scientists already had a good idea of the volume of Phobos, they just had to find its mass in order to figure out its density.

They made their mass measurements by studying the gravitational force of Phobos. Gravity is an attractive force, which means anything with mass attracts anything else with mass. (A human body, for example, gravitationally attracts every other human body. Earth attracts those human bodies to it even more.) The more mass an object has, the stronger its gravitational force. Since a large body like the Earth has a lot of mass, it has a strong gravitational force — strong enough to hold people on its surface and the Moon in orbit.

When *Mars Express* flew close to Phobos, the small moon's gravity attracted the spacecraft. By studying changes in the motion of *Mars Express*, the scientists were able to estimate the gravitational tug of Phobos. Once they knew the strength of its gravity, they could find its mass.

They found that Phobos has a density of about 1.87 grams per cubic centimeter. The rocks in the crust of Mars, for comparison, are much denser: about 3 grams per cubic centimeter. This difference suggests that Phobos is not made of rocks from the surface of Mars.

Some asteroids have densities of about 1.87 grams per cubic centimeter, but Andert says that those asteroids would be broken apart by Mars' gravity — a fact that probably rules out the possibility that Phobos was once a free-floating asteroid.

Some scientists, like Tom Duxbury, don't mind giving up the idea that Phobos was once an asteroid. "Finally we're drifting away from the idea that the Martian moons are captured asteroids," Duxbury told *Science News*. Duxbury, of George Mason University in Fairfax, Va., did not work on the new study but also studies planets. He told *Science News* that he's "happy to see that Phobos and Deimos [Mars' other moon] are getting a lot of attention these days."

Lunch Time Video Shows: 12:20 p.m. @ Chem. Lab. (Room 512)

Date	Name of Program	Language / Subtitle	Area
1/11 (Mon)	Seconds from Disaster - Paris Train Crash(Part II) 巴黎火車撞車事故	English / Chinese	Forensics Science 鑑証科學
4/11 (Thu)	Megafactories – Lamborghini (Part I) 超級工廠 - 林寶堅尼	English / Chinese	Engineering 工程
8/11 (Mon)	Megafactories – Lamborghini (Part II) 超級工廠 - 林寶堅尼	English / Chinese	Engineering 工程
11/11 (Thu)	Frogs The Thin Green Lin (Part I) 滅蛙危機	Cantonese / Chinese	Biology 生物學
15/11 (Mon)	Frogs The Thin Green Lin (Part II) 滅蛙危機	Cantonese / Chinese	Biology 生物學
18/11 (Thu)	How Earth Made Us – Deep Earth (Part I) 天造地設 – 地球深部	English / Chinese & English	Earth Science 地球科學
22/11 (Mon)	How Earth Made Us – Deep Earth (Part II) 天造地設 – 地球深部	English / Chinese & English	Earth Science 地球科學
25/11 (Thu)	The Miracles of Jesus, Episode 2 (Part I) 神蹟透視(二)	English / Chinese	Archeology 考古學

Cockroaches could be good medicine

Scientists recently reported on a disgusting new idea for human health: The ground-up brains of cockroaches, they say, may help fight infectious diseases.

To most of us, not even a spoonful of sugar is going to help that medicine go down.

Cockroaches are insects with simple, small brains. But tangled up in those tiny heads are chemical compounds that can kill *E. coli* and MRSA, two harmful bacteria.

Some kinds of *E. coli* live peacefully in the intestines of human beings. But when a person accidentally eats food or drinks water contaminated with *E. coli*, look out. She can become violently ill. *E. coli* can cause vomiting, diarrhea, respiratory problems and pneumonia. One type of *E. coli* can also cause meningitis.

MRSA can be bad, too. MRSA stands for methicillin-resistant *Staphylococcus aureus*, which means it's a type of *Staphylococcus aureus* that can't be killed by the antibiotic methicillin, and even other antibiotic medicines like penicillin or amoxicillin. This tiny germ can cause skin infections — which can become big problems in hospitals. Since it's so difficult for doctors to treat MRSA, ground-up cockroach brains could help a lot of people.

Simon Lee and Naveed Kahn are two microbiologists who worked on this study, and they both do research at Nottingham University in the United Kingdom. A biologist is a scientist who studies living things, and a microbiologist studies very small living things — like bacteria.

The scientists decided to study insects after noticing an interesting pattern. Some soldiers who came back from the Middle East were sick with strange infections — but locusts from the same areas were infection-free. (Locusts are types of grasshoppers.) The scientists started to wonder how insects that live in unhygienic places manage to avoid infection.



“Some of these insects live in the filthiest places ever known to man,” Khan told Science News. “These insects crawl on dead tissue, in sewage, in drainage areas. We thought, ‘How do they cope with all the bacteria and parasites?’”

To find out, the researchers ground up different parts of locusts and cockroaches and put the mixtures in Petri dishes with types of the harmful bacteria. In dishes with the fat and muscle tissue and blood of the insects, the bacteria survived. Because the bacteria didn't die, the researchers had to keep looking.

Ground-up tissue from cockroach and locust brains and locust nerves, however, killed almost all the harmful bacteria — nearly 100 percent. That means that the bug brains and nerves must contain chemicals that kill the bacteria.

It's too soon to go to your local drugstore and ask for cockroach brains to treat an infection, but that might be a reality in the future. The scientists are now trying to figure out which chemicals fight infection. One day those chemicals may help humans.

But not today. Today, cockroaches are still nasty little insects. Stay tuned.

免費科學活動

天文儀器大巡禮 (粵語講解)

時間：下午 7 時至 8 時 30 分

地點：太空館演講廳

怎樣才能把美麗的星空盡收眼簾？工欲善其事，必先利其器，一個業餘天文愛好者究竟需要那些裝備？業餘天文觀測是否一個奢侈的玩意？作為初入門的天文愛好者，通常都會為上述問題而感到煩惱，甚至因苦無入門方法而放棄觀星。這個一連五講的講座系列，將會詳細介紹各種天文儀器的操作原理和使用方法，以及如何選擇最經濟的器材去達致最佳的觀測效果。

第一講	望遠鏡簡介	11月1日(一)	彭翎怡先生(香港天文學會前副會長)
第二講	各種望遠鏡座架、配件及其應用	11月8日(一)	
第三講	攝影儀器在天文的應用	11月15日(一)	鍾泳灃先生(香港天文學會前推廣委員)
第四講	數碼及資訊科技在天文的角色	11月22日(一)	
第五講	天文儀器之改裝、如何選擇適合自己的天文儀器	11月29日(一)	

何鴻燊天象廳講座系列 (粵語講解)

時間：下午 7 時至 8 時

地點：太空館天象廳

2009年7月，全新的星象投映系統正式在太空館何鴻燊天象廳投入運作。新星象儀可謂納須彌於芥子，將浩瀚的宇宙濃縮於小小的天象廳中，利用系統儲存的最尖端天文數據，實時運算宇宙天體的變化，不但能模擬逼真的星空，更可帶領觀眾遨遊宇宙，甚至飛抵可見宇宙的盡頭，綜觀星系的分布及宇宙的大尺度結構。有見及此，太空館特別於今年推出《何鴻燊天象廳講座系列》，利用新星象儀的強大功能，與大家一起探討有趣的天文學課題。《何鴻燊天象廳講座系列》將於每月其中一個星期二的晚上舉行，10至12月的講座詳情如下：

第二講	行星科學	11月23日(二)	講者：劉啓業先生 (香港太空館助理館長)
第三講	全天域下的天球概念	12月7日(二)	講者：鍾振華先生 (香港太空館助理館長)

太空館天文活動 (粵語講解) (如天氣欠佳，觀測活動會以室內活動代替)

有興趣人士可於每次活動開始前，於太空館地下大堂輪候參加，費用全免。

活動名稱	日期	時間	地點
天文快樂時光	11月10日(星期三)	晚上7時30分至9時	太空館天台
你有否想過在夜幕低垂時，與三五知己在繁華鬧市中，仍然可以仰觀天象，享受觀星的樂趣？香港太空館特別為未親嘗觀星樂的人士舉辦了一個名為「天文快樂時光」的觀星活動。在資深天文愛好者的引領下，參加者可以在本館天台輕輕鬆鬆地去辨認市區中可見的天體，享受一段快樂的時光。			
天文嘉年華	11月16日(星期二)	晚上7時至9時	何鴻燊天象廳、宇宙劇場及天台
神秘的星空，帶給人無限的遐想，正因如此它每每令人著迷。天空中閃爍的星體看似遙不可及，原來也可以近在咫尺。香港太空館舉辦的「天文嘉年華」活動正好讓大家在鬧市中近距離接觸神秘的星空。你可以透過「星空巡禮」在模擬的星空中穿梭宇宙；「魔幻行星」帶你認識太陽系八大行星的特色和面貌；而「鏡中星空」則讓你親眼窺探月球、行星及其他天體的廬山真貌。			

天文及科學電影

(英語旁白，配以中文字幕) 免費活動，即場入座，座位先到先得

電影名稱	日期	時間
「天象畫廊:鏡頭下的宇宙奇觀」電影系列 (香港太空館演講廳)	11月13日(六)	下午5時至6時
偉大工程巡禮:紐約環保摩天樓 (香港科學館演講廳)	11月14日(日)	下午3時30分至4時30分
歷史神祕檔案:天才達文西 (香港科學館演講廳)	11月28日(日)	下午3時30分至4時30分

科學講座

RFID 技術的研發	11月6日(六)	下午2:30-4:00	香港科學園	鄭利明副教授 (香港城市大學電子工程系)
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射頻識別簡稱(RFID) (Radio Frequency Identification)，又名電子標籤、無線射頻識別等，是一種無線通訊技術，利用電訊訊號識別特定目標並可讀寫相關數據，而無需與特定目標之間建立直接接觸。射頻識別技術可應用的領域十分廣泛，並可帶動新的科技發展和實體經濟效益。本講座主要介紹不同射頻識別技術、應用、限制及前景。

宇宙中的生命	11月6日(六)	下午2:30-4:00	科學館演講廳	郭新教授 (香港大學理學院院長及物理系講座教授)
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地球上的生命是如何開始的？在過去數十年，科學家相信生命源自簡單的無機分子，在適當條件下，這些無機分子逐漸演化成複雜的有機化合物，最後演變成生命。近年來，天文學家透過在地面上和太空中的望遠鏡，發現了宇宙深空中有很多有機物質，這都是由年老的恆星合成出具芳香族和脂鏈族結構的複雜有機分子。從這些年老恆星吹來的恆星風把有機物質傳遍整個星系，包括我們的原始太陽系。於地球形成初期，來自太空的天體頻繁撞擊地球因而帶來了大量有機分子，進而促使生命在地球上出現。我們現已發現了超過三百五十顆太陽系以外的行星，生命究竟是否都普遍存在於宇宙之中呢？香港大學理學院院長郭新教授將於這次講座中，探討有關宇宙中存在生命的問題，以及星塵影響地球生命起源的可能性。

3D 動畫製作	11月13日(六)	下午4:00-5:00	香港科學園	林允田先生 (聯強國際有限公司)
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創意產業在過去10年得到世界各地政府的重視，3D動畫電影更是其中的代表，日漸普遍地應用在電影製作中，如本年的獲獎電影《歲月神偷》就用3D動畫重現60年代山頂纜車登太平山的情景。你看過3D動畫嗎？你對它的製作過程和技巧感興趣嗎？快報名參加這個講座了！

科學與科幻	11月20日(六)	上午9:30-11:00	新一代文化協會	李逆燦博士 (香港科幻會)
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什麼是科幻小說？它和其他的幻想小說有什麼分別？科幻小說如何分類？它包括了怎麼樣的主題？怎樣判別科幻小說的優劣？如何創作科幻小說？點子從何而來？創作成功的科幻作品要注意什麼事項？這一切可以在是次講座中找到答案！

天才與白癡	11月27日(六)	下午2:30-4:00	新一代文化協會	曾繁光醫生 (醫院管理局)
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“邊個係天才(天才)，邊個係白癡(白癡)”出自著名歌手許冠傑先生的首本名曲“天才與白癡”。這首歌曲以幽默的歌詞打動了你我的心，同一個題目，將由曾繁光醫生重新演繹，作為一位著名的精神科醫生，他又如何看待現今香港的“資優兒童”呢？我們又可以以什麼方式來培育創意人才呢？同學、老師、家長可以透過這個講座得以進一步探索。

Science Promotion Team 2010-2011:

Chairperson: Yang Chun Pong 楊雋邦 5D

Committee Member: Chung Lai Him 鍾禮謙 5D, Hung Ka Kiu 洪嘉僑 5D, Lee Lok Tin 李樂天 5D, Lo Wai Ki 盧偉祺 5D, Mak Chun Wing 麥駿穎 5D, Lo Lai Fong 盧麗芳 5E & Yip Tsz Fung 葉子楓 5E

Website: <http://210.3.43.253/~lck/science/spt1011/spt1011.htm>