



**In this issue: Society events + The Darke Side + NASA's  
*SpacePlace* + Return of the Secretary's Report +  
More controversies with *Old Boots***

Cover Photograph: M51, taken by Stephen Carr. Composite of multiple images taken from Washington (with light pollution filter) and from the Lake District in March 2012.  
Equipment: Nikon D50 DSLR, Skywatcher Explorer 200 PDS on NEQ6 Pro mount

**May 2012**



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### Events list

Sunday 06 May: **Beginner's course**, 7pm. Join us and enrol for the first beginner's session, which will then run on the first Sunday of every month until October. (N.B. £1 charge.)

Sunday 13 May: 6pm Committee meeting / 7pm workshop meeting

Sunday 20 May: **Annual astrophotography competition**. Also, New Moon; annular solar eclipse over Pacific and USA; Peak of the Sagittarid meteor shower

Sunday 03 June: Beginner's course, 7pm: (£1 charge)

Wednesday 06 June: **Transit of Venus**. Group observing from Cliff Park, Seaburn, from **4am** onwards

#### \*\*\* Summer Schedule \*\*\*

N.B. During June, July and August there will be no workshop or lecture meetings at WWT on Sunday evenings. Normal meetings resume in September.

#### All Society events

- are free,
  - are held in the Washington WWT facilities, and
  - evening meetings start at 7:00pm
- unless otherwise noted.**

Please bring a torch and warm clothing to any night-time observing sessions.

All observing sessions are dependent upon favourable weather and **may be subject to cancellation.**

## Editorial

As the nights draw out, the SAS summer schedule is nearly upon us once more. The traditional astrophotography competition is a fitting end to the season, as much an exhibition of our members' achievements over the last year as it is a competition. This month's cover picture has been taken by Stephen Carr, one of our newer members who I know has prepared some entries for the competition. Stephen is one of the regular contributors to the SAS Facebook page and it's great to see members posting their images on-line, pretty much as soon as they've been processed. If you haven't looked at the Facebook page yet, it's a hive of activity and well worth signing up to.

In the last week I've received two notifications of equipment being stolen, which I have emailed out to members. Please keep your eyes open and, if by some chance you see anything you believe might have been illegally obtained, let the authorities know and drop me a line. It's a sad reflection on these harsh economic times that people are now stealing telescopes and astro-equipment. However, personally speaking I wouldn't dwell on that fact for too long if I caught someone trying to purloin any of my kit. My response would be robust and probably rather painful. Not that I encourage the rest of you to take that nonsense approach to theft, mind – I've seen the trouble that Jeremy Clarkson gets into when he suggests that some people should be publicly doused in petrol and set alight.

I'm pleased to see that there is sufficient interest for the Society to put on a beginner's course, starting this month and continuing through to the new observing season. So if you want to learn how to drink your beer out of cans correctly and change your own oil, or just brush up on your Battenberg slicing skills, get yourself down to the WWT on the first Sunday of the month. – Dave N., Editor.

#### SAS Yahoo Forum

The Society's Yahoo group provides a forum for members to exchange ideas, ask questions, and a place to post their pics:

<http://tech.groups.yahoo.com/group/SunderlandAstronomicalSociety/>

## NASA Helps Europe Study a Comet— Up Close and Personal

By Dr Tony Phillips

Europe's Rosetta spacecraft is on its way to intercept comet 67P/Churyumov-Gerasimenko. Comets have been intercepted before, but this mission is different. Rosetta aims to make history by landing a probe on the comet's surface while the mother ship orbits overhead.

"Rosetta is the European equivalent of a NASA flagship mission," explains Claudia Alexander, project scientist for the U.S. Rosetta Project at NASA's Jet Propulsion Laboratory. "It will conduct the most comprehensive study of a comet ever performed."

Rosetta's payload contains 21 instruments (11 on the orbiter, 10 on the lander) designed to study almost every aspect of the comet's chemistry, structure, and dynamics. Three of the sensors were contributed by the U.S.: Alice (an ultraviolet spectrometer), IES (an ion and electron sensor), and MIRO (a microwave sounder).

The main event of the mission will likely be the landing. The 100-kg lander, which looks a bit like a cross between NASA's old Viking Mars landers and a modern microsatellite, will spend two weeks fastened to the comet's icy surface. The European-built probe will collect samples for analysis by onboard microscopes and take stunning panoramic images from ground level.

"First the lander will study the surface from close range to establish a baseline before the comet becomes active,"

explains Alexander. "Then the orbiter will investigate the flow of gas and dust around the comet's active, venting nucleus."

Rosetta's sensors will perform the experiments that reveal how the chemicals present interact with one another and with the solar wind. Alice and MIRO detect uncharged atoms and molecules, while IES detects the ions and electrons as the solar wind buffets the nucleus.

One problem that often vexes astronomers when they try to study comets is visibility. It's hard to see through the dusty veil of gas billowing away from the heated nucleus. The microwaves MIRO detects can penetrate the dust, so MIRO can see and measure its target molecules even when other instruments can't.

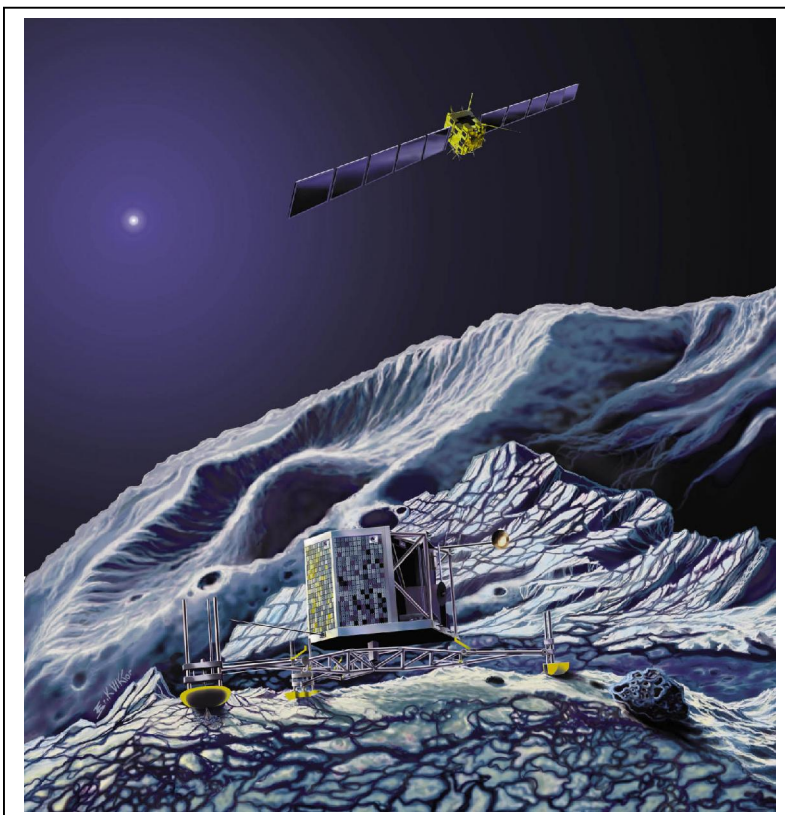
MIRO is one of several experiments focused on the comet's structural properties. It will determine the comet's dielectric constant, emissivity, and thermal conductivity to determine whether it is made of a powdery loose material, has a detectable layer of loose material, or is hard as rock.

"We want to find out whether comets have retained material from when the solar system formed," says Alexander. "If the ancient materials are still there, we can get an idea of what conditions were like at the dawn of the solar system."

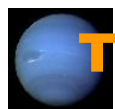
Rosetta enters orbit in 2014. Stay tuned for updates!

Check out "Comet Quest," the new, free iPhone/iPad game that has you operating the Rosetta spacecraft yourself. Get the link at [spaceplace.nasa.gov/comet-quest](http://spaceplace.nasa.gov/comet-quest).

This article was provided courtesy of the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



**Left:** Rosetta's lander Philae will eject from the spacecraft, touch down on the comet's nucleus, and immediately fire a harpoon into the surface to anchor itself so it won't drift off in the weak gravity.



# THE DARKE SIDE

*Society Update* with Chairman  
Graham Darke

## **Beginner's Classes**

Back by popular demand are the astronomy beginner's classes starting on Sunday 6<sup>th</sup> May at 7.00pm at the WWT. Please enrol on the first night. The course will run on the first Sunday of each month through until October, a total of six sessions. All the basics will be covered. All are welcome to join the course. There will be a £1 charge to cover copying costs, etc.

## **Astrophotography Competition 2012**

This year's competition takes place on Sunday 20<sup>th</sup> May at 7.00pm. Please do participate in this event. The categories are "Solar System" and "Deep Sky" and there will be a beginner's section and an intermediate/advanced section as usual. Prizes for the best 4 pictures.

## **Transit of Venus 6<sup>th</sup> June**

If the weather plays kindly then the final opportunity to see a transit of Venus within our lifetimes will be witnessed early on the morning of Wednesday 6<sup>th</sup> June. The event begins before local sunrise, so Venus will already be part of the way across the Sun's disk when they both rise at 4.30am BST. The Society will be attempting to observe and record the event from Cliff Park, Seaburn on the grass in front of the white lighthouse. I suggest that we aim to get down for 4.00am to set up. Bring along your cameras and suitably equipped and filtered telescopes if you wish to record the event. We are going to try and time the moment when Venus's leading edge touches the Solar limb and when the transit ends. David Kidd is going to try and carry out the same measurement from Ethiopia and we can try and recreate Captain Cook's famous eighteenth century experiment to measure the distance to Venus.

## **Summer Schedule**

After our astrophotography competition in May, we move onto our Summer Schedule but there will still be plenty going on including the Venus Transit, Summer Benker Night, Summer Trip to Jodrell Bank, Solar Observing sessions, Starbeque and of course the Beginners Courses at the WWT on the first Sunday of each month will continue too. During June, July and August there will be no workshop or lecture meetings at WWT on

Sunday evenings. Normal meetings resume in September.

## **Telescopes for Ethiopia**

After the first batch of ex-binocular lenses arrived safely at their destination, sadly, the project has hit a snag with the excise people in Ethiopia. Despite the lenses being donated free of charge, customs officials are trying to charge excise duty equivalent to the new value of the lenses which were shipped out as part of the second consignment. This is ridiculous and means that school children in that country are missing out. Until assurances can be received that the 18.5 inch mirror will not be subject to the same treatment, we can't risk sending it there. Further news will be released as it becomes available. Progress with the mirror continues: Polishing has now commenced. I will bring the mirror along to the May workshop evening so you can see it again.

## **April Lecture Meeting**

Sir Arnold Wolfendale was our guest speaker in April who told us all about local heroes, Thomas Wright and Jeremiah Dixon. Both men were born in County Durham and were contemporaries in the eighteenth century. Wright, of Byers Green, was a multi-skilled man - an astronomer, mathematician, horticulturalist and architect. He set up a school in Sunderland at the age of just 19. He is most famous in astronomy for his theory of the nature of the Milky Way Galaxy and correctly established that the band of light we see as the "Milky Way" was due to us residing in a disc of stars.

Jeremiah Dixon, of Cockfield, was a mathematician and surveyor, most famous for assisting in the establishment of the Mason-Dixon Line which bears his name and which separated the Northern and Southern United States. Dixon was involved in the measurement of gravity under the instructions of the 5<sup>th</sup> Astronomer Royal, Neville Maskelyne and chose the Scottish mountain used to study the effect that the gravitational influence that mountains could have on a plumb bob. It was a very interesting and, as always, entertaining talk.

## Sex and Space by Dr Saralyn Mark – Thursday 19<sup>th</sup> April

On the above date we were pleased to welcome Dr Saralyn Mark for a one-off lecture on the effect that space travel has on the human body. This was a really interesting lecture given by someone with a fantastic range of knowledge. We were introduced to the differences in physiology between men and women and it was explained how the female body adapted better in certain circumstances than men. Dr Mark explained how the effects of space travel on the human body, mainly caused by the lack of gravity and increased radiation, were akin to accelerated aging including muscle atrophy, bone density reduction and cataract formation. She talked about some of the methods used to slow this process. At the end, copies of Dr Mark's recent book were available for a discretionary charitable donation. This was a really different talk and one that will be remembered for a long time.

### Stay up to date

Keep up to date with all society developments on the website [www.sunderlandastro.com](http://www.sunderlandastro.com) and why not sign up for the news group. Also check out our Facebook and Twitter pages.

Clear Skies,



## Some Old Controversies in Transactions.

By "Old Boots"

[An old and esteemed correspondent continues his account of the controversies which raged in the earlier numbers of this journal.]

### Sir William Herschel.

The lecture of March 1859 continued in a Biblical vein, of sorts, when Lamda offered his services to lecture on; "Solomon and Sheba: An Antiquarian Puzzle Concerning Electricity and Radio."

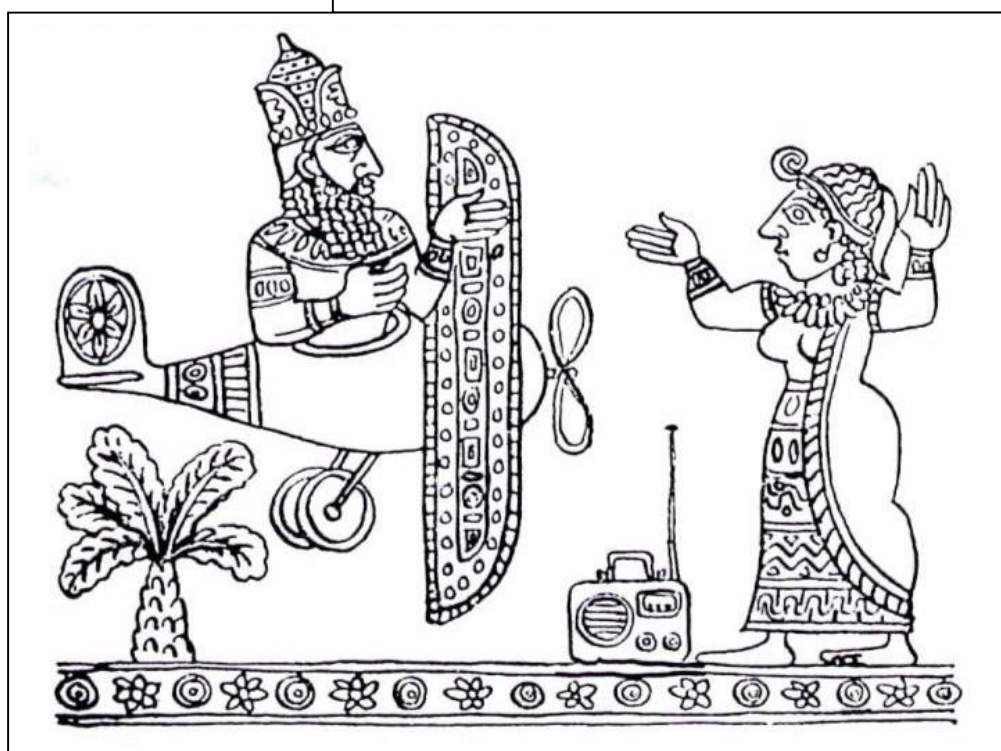
The show elicited many damning letters to Lamda via Transactions with subscribers writing letters of complaint in which one individual stated: "Sir - I have seen ten thousand of the most outrageous lies of yours in Transactions. Will you try, and for once in your life, write a few words of truth in answer to this paper? Yours obediently (!), The Enthusiastic Paradoxist.

This threw down the gauntlet. So much so in fact, it was reported that "Von Zeppelin" suffered a paralytic stroke that deprived him of his memory completely, so that he had to learn the alphabet again and gradually work back to his cherished hobbies. But he wrote well after his recovery and died full of years and honours!

The thick skinned "Acetylene Torch" also had a great deal to say on the subject but rounded off his letter of complaint with memories of stout footwear and notes on railway curves and accidents.

[To be continued]

**Right:** An image from Lamda's magic lantern show and "Notebook of Antiquities", entitled "Solomon Visiting Sheba: As I seem to Remember It," from his travels in 1840. Note the transistor radio right of centre. How such a device was constructed by ancient people has puzzled archaeologists for centuries.



## Secretary's Report

### **A summary of the Committee Meeting held on 08 April 2012.**

**Attendees:** Graham Darke (GD), David Hughes (DH), Ken Kirvan (KK), Peter Stokel (PS), Michael Tweedy (MT), John Lynch (JL), Martin Kennedy (MK), Don Simpson (DS)

**Apologies:** Paul Meade (PM) and Kev Baxter (KB)

**Dr Saralyn Mark – additional lecture:** DH advised that he had previously attended a lecture by this lady which had been very good. She was a medical doctor who had worked on the space shuttle program for NASA. There was an opportunity to welcome her to the WWT on Thursday 18<sup>th</sup> April for a talk on the effects of space travel on the human body and the impact that sex had upon this. There was no cost implication although it was agreed that Dr Mark would be taken for a meal prior to the talk. **DH agreed** to distribute a press release to the local papers and radio to advertise the event.

**May 4<sup>th</sup> Event:** GD advised that he felt the Society had enough events going on presently with other commitments and that time was running short to organise something for this now. It was agreed that it would not be pursued this year.

**Venus Transit:** GD noted that the society intended observing this event at the seafront in Sunderland on the morning of 6<sup>th</sup> June. It would be necessary to meet ahead of sunrise which was due to take place at 4.30am BST that day. It was agreed that a 4.00am meet up time would be sensible. DH advised that he had informed Hannah Bayman but that there had been no reply as to whether she and the BBC would be attending.

**Summer Trip:** It was suggested that Jodrell Bank would be a good destination for the Summer trip and that this should take place in July. **PS agreed** to investigate with Jodrell Bank. The Royal Observatory Edinburgh would provide a back-up destination in case the trip to Jodrell Bank could not proceed for any reason.

**Beginners Course:** **DS and GD agreed** to run the course for 6 sessions on the first Sunday of each month starting in May and ending in October. DS suggested that £1 be collected from each attendee to cover photocopying costs. **GD and DS agreed** to discuss content although this would be based loosely on the GCSE astronomy course that DS had previously taught. **DS agreed** to try and source a whiteboard.

**Telescopes for Ethiopia:** DH advised that the original target of 100 lenses had been met and that Dave Kidd in Ethiopia was very pleased. The second consignment of lenses was about to be posted.

**David Sinden Memorial Medal:** DH advised that David Sinden's family had given their approval for a memorial medal to be produced in his honour. Furthermore they had agreed to contribute a sum to establish a fund to administer the award. **DH agreed** to put a plan of action together.

**Access to WWT:** KK asked whether there was any progress with access to the centre following the locking of the side gate. GD advised that he had yet to speak with the centre manager about this issue. **GD agreed** that he would discuss this with the centre manager once a further meeting had been arranged.

**Step ladders:** JL queried whether the Society should invest in a small set of collapsible steps which could be taken to observing events to allow smaller children access to eyepieces. **MT agreed** to look into this. GD confirmed that a new set of steps with hand rails had been donated to the Society by former member Peter Blackwood. These made a fine addition to the observatory.

**Nissan event:** MK asked whether any more had been heard from Nissan Sports and Social Club on their idea for an observing event. **GD confirmed** that nothing further had been heard but **agreed** to try and contact them.

# NEWS

## Venus to Appear in Once-In-A-Lifetime Event

On 5 and 6 June this year, millions of people around the world will be able to see Venus pass across the face of the Sun in what will be a once-in-a-lifetime experience.

It will take Venus about six hours to complete its transit, appearing as a small black dot on the Sun's surface, in an event that will not happen again until 2117.

In this month's *Physics World*, Jay M Pasachoff, an astronomer at Williams College, Massachusetts, explores the science behind Venus's transit and gives an account of its fascinating history.

Transits of Venus occur only on the very rare occasions when Venus and Earth are in a line with the Sun. At other times Venus passes below or above the Sun because the two orbits are at a slight angle to each other. Transits occur in pairs separated by eight years, with the gap between pairs of transits alternating between 105.5 and 121.5 years -- the last transit was in 2004.

Building on the original theories of Nicolaus Copernicus from 1543, scientists were able to predict and record the transits of both Mercury and Venus in the centuries that followed.

Johannes Kepler successfully predicted that both planets would transit the Sun in 1631, part of which was verified with Mercury's transit of that year. But the first transit of Venus to actually be viewed was in 1639 -- an event that had been predicted by the English astronomer Jeremiah Horrocks. He observed the transit in the village of Much Hoole in Lancashire -- the only other person to see it being his correspondent, William Crabtree, in Manchester.

Later, in 1716, Edmond Halley proposed using a transit of Venus to measure the precise distance between Earth and the Sun, known as the astronomical unit. As a result, hundreds of expeditions were sent all over the world to observe the 1761 and 1769 transits. A young James Cook took the *Endeavour* to the island of Tahiti, where he successfully observed the transit at a site that is still called Point Venus.

Pasachoff expects the transit to confirm his team's theory about the phenomenon called "the black-drop effect" -- a strange, dark band linking Venus's silhouette with the sky outside the Sun that appears for about a minute starting just as Venus first enters the solar disk.

Pasachoff and his colleagues will concentrate on observing Venus's atmosphere as it appears when Venus is only half onto the solar disk. He

also believes that observations of the transit will help astronomers who are looking for extrasolar planets orbiting stars other than the Sun.

"Doing so verifies that the techniques for studying events on and around other stars hold true in our own backyard.. In other words, by looking up close at transits in our solar system, we may be able to see subtle effects that can help exoplanet hunters explain what they are seeing when they view distant suns," Pasachoff writes.



Not content with viewing this year's transit from Earth, scientists in France will be using the Hubble Space Telescope to observe the effect of Venus's transit very slightly darkening the Moon. Pasachoff and colleagues even hope to use Hubble to watch Venus passing in front of the Sun as seen from Jupiter -- an event that will take place on 20 September this year -- and will be using NASA's Cassini spacecraft, which is orbiting Saturn, to see a transit of Venus from Saturn on 21 December.

"We are fortunate in that we are truly living in a golden period of planetary transits and it is one of which I hope astronomers can take full advantage," he writes.

## Black Hole Caught Red-Handed in a Stellar Homicide

Astronomers have gathered the most direct evidence yet of a supermassive black hole shredding a star that wandered too close. NASA's Galaxy Evolution Explorer, a space-based observatory, and the Pan-STARRS1 telescope on the summit of Haleakala in Hawaii were among the first to help identify the stellar remains.

Supermassive black holes, weighing millions to billions times more than the Sun, lurk in the centers of most galaxies. These hefty monsters lay quietly until an unsuspecting victim, such as a star, wanders close enough to get ripped apart by

their powerful gravitational clutches.

Astronomers have spotted these stellar homicides before, but this is the first time they can identify the victim. Using a slew of ground- and space-based telescopes, a team of astronomers led by Suvi Gezari of The Johns Hopkins University in Baltimore, Md., has identified the victim as a star rich in helium gas. The star resides in a galaxy 2.7 billion light-years away.



"When the star is ripped apart by the gravitational forces of the black hole, some part of the star's remains falls into the black hole, while the rest is ejected at high speeds. We are seeing the glow from the stellar gas falling into the black hole over time. We're also witnessing the spectral signature of the ejected gas, which we find to be mostly helium. It is like we are gathering evidence from a crime scene. Because there is very little hydrogen and mostly helium in the gas we detect, we know from the carnage that the slaughtered star had to have been the helium-rich core of a stripped star," Gezari explained.

This observation yields insights about the harsh environment around black holes and the types of stars swirling around them.

This is not the first time the unlucky star had a brush with the behemoth black hole. Gezari and her team think the star's hydrogen-filled envelope surrounding its core was lifted off a long time ago by the same black hole. In their scenario, the star may have been near the end of its life. After consuming most of its hydrogen fuel, it had probably ballooned in size, becoming a red giant. The astronomers think the bloated star was looping around the black hole in a highly elliptical orbit, similar to a comet's elongated orbit around the Sun. On one of its close approaches, the star was stripped of its puffed-up atmosphere by the black hole's powerful gravity. Only its core remained intact. The stellar remnant continued its journey around the black hole, until it ventured even closer to the behemoth monster and faced its ultimate demise.

Astronomers have predicted that stripped stars circle the central black hole of our Milky Way galaxy, Gezari pointed out. These close encounters, however, are rare, occurring roughly every 100,000 years. To find this one event, Gezari's team monitored hundreds of thousands of galaxies in ultraviolet light with NASA's Galaxy Evolution Explorer (GALEX), a space-based observatory, and in visible light with the Pan-STARRS1 telescope on the summit of Haleakala

in Hawaii. Pan-STARRS, short for Panoramic Survey Telescope and Rapid Response System, scans the entire night sky for all kinds of transient phenomena, including supernovae.

The team was looking for a bright flare in ultraviolet light from the nucleus of a galaxy with a previously dormant black hole. They found one in June 2010, which was spotted with both telescopes. Both telescopes continued to monitor the flare as it reached peak brightness a month later and then slowly began to fade over the next 12 months. The brightening event was similar to that of a supernova, but the rise to the peak was much slower, taking nearly one and a half months.

"The longer the event lasted, the more excited we got, since we realized that this is either a very unusual supernova or an entirely different type of event, such as a star being ripped apart by a black hole," said team member Armin Rest of the Space Telescope Science Institute in Baltimore, Md.

By measuring the increase in brightness, the astronomers calculated the black hole's mass to be several million suns, which is comparable to the size of our Milky Way's black hole.

Spectroscopic observations with the MMT (Multiple Mirror Telescope) Observatory on Mount Hopkins in Arizona showed that the black hole was swallowing lots of helium. Spectroscopy divides light into its rainbow colors, which yields an object's characteristics, such as its temperature and gaseous makeup.

"The glowing helium was a tracer for an extraordinarily hot accretion event," Gezari said. "So that set off an alarm for us. And, the fact that no hydrogen was found set off a big alarm that this was not typical gas. You can't find gas like that lying around near the center of a galaxy. It's processed gas that has to have come from a stellar core. There's nothing about this event that could be easily explained by any other phenomenon."

The observed speed of the gas also linked the material to a black hole's gravitational pull. MMT measurements revealed that the gas was moving at more than 20 million miles an hour (over 32 million kilometers an hour). However, measurements of the speed of gas in the interstellar medium reveal velocities of only about 224,000 miles an hour (360,000 kilometers an hour).

"The place we also see these kinds of velocities are in supernova explosions," Rest said. "But the fact that it is still shining in ultraviolet light is incompatible with any supernova we know."

Observations from the Chandra X-ray Observatory showed that the characteristics of the gas didn't match those from an active galactic nucleus.

"This is the first time where we have so many pieces of evidence, and now we can put them all together to weigh the perpetrator (the black hole) and determine the identity of the unlucky star that fell victim to it," Gezari said. "These observations also give us clues to what evidence to look for in the future to find this type of event."