

## HAS Meeting Notices September 2012

### 2012-13 Programme Update and Dates for Your Diary.

1. **Stargazey Pie.** In response to popular demand *the Pie* will be sent to all members each month either by e-mail or by post. Pauline and Michael are the authors of our monthly newsletter. Antony posts it on the website.

2. Our **Telephone Alert System** was tested on **Saturday 1<sup>st</sup> September** around 21:00. Many thanks to all who let me know that it worked for them. If you had any problems with the system or were not contacted when you expected to be, please send feed-back <mailto:pat@spacegazer.com> or telephone or text 07930183999.

Should you see an aurora, noctilucent clouds, sprites or anything else of astronomical interest please alert Pat W. (0793 0183 999), Paul (01667 456789) or Pauline (07751 112586).

### 3. The Next HAS Meeting is on Tuesday 2<sup>nd</sup> October 2012.

The “**Youngstars**” session for 8-14 year olds, before the main meeting, will run from 19:00 until 19:30 led by Pauline and Triona.

**Main Talk** - Maarten de Vries will talk about *Stellar Siblings*, followed, after the **tea-break**, by the **Discussion Group**, with Arthur and Maarten.

Also after the tea-break, Paul will lead the **Basics Group** *Standing on the Shoulders of Giants – the History of Astronomy*. Some new members and some not so new have said that they would appreciate some basic astronomy information. If so, this is the group for you.

4. **Wed. October 17<sup>th</sup>** Apollo 12's Command Module Pilot Dick Gordon will be in Glasgow.

<http://www.walkwithdestiny.com>

### 5. Saturday 1<sup>st</sup> December HAS Christmas Dinner 19:00 for 19:30.

The dinner for members and partners will be held at the Beaufort Hotel, 11 Culduthel Road, Inverness IV2 4AG

tel. 01463 222897. Cost is £25.00 per person inclusive of tip. Drinks should be paid for separately.

Please sign the sheet tonight or contact Pat Escott if you wish to attend.

Tel. 01463 239746 or <mailto:Pat.Escott@btinternet.com>

Once you have signed up please ensure that you have paid in full by Tuesday 6<sup>th</sup> November. Cheques are to be made out to “Highlands Astronomical Society” and sent to Paul Jenkins, Meikle Kildrummie, by Nairn, IV12 5NY or can be paid at the October or November monthly meeting.

### Observatory and Home Viewing.

1. **Solar Saturday Observing Sessions - JSL Observatory, NTS Visitor Centre Car Park, Culloden Moor.** Please check [www.spacegazer.com](http://www.spacegazer.com) before setting out.

Date	For Whom	Time	Supervisor
Sat. 15 <sup>th</sup> Sep.	public and members	14:00 – 16:00	All

Sat. 15<sup>th</sup> September is the last official Solar Saturday of the year so do try to attend. Look out for ad hoc sessions.

### 2. Evening Winter Observing –

Sadly the main observatory telescope is not functioning fully and awaits repair. However, the Dobsonian, made by members, gives excellent views.

Date	For Whom	Time	Supervisor
Fri. 21 <sup>st</sup> Sept.	public and members	21:00 – 23:00	Rhona
Sat. 22 <sup>nd</sup> Sept.	members and guests only	21:00 – 23:00	Paul
Fri. 5 <sup>th</sup> Oct.	public and members	21:00 – 23:00	Gerry
Sat. 6 <sup>th</sup> Oct.	members and guests only	21:00 – 23:00	Pat W

Please wear warm clothes and check the website before setting out.

### 3. Highland Skies – September 2012

Hopefully, either before or soon after you read this, you will hear about the remarkable success of the Society's 2012 Doors Open Day on Saturday. The observatory had over a hundred visitors.

We are coming up to the time of year when anyone developing their first taste for astronomy will be able to get a really good taste of the celestial treats that are in store for them. We are in September. The sky gets properly dark again at night. The temperatures remain easily tolerable. You can set up your equipment in dusk rather than pitch black. The Society's night-time observing sessions at the JSL Observatory start up again. Add to these the fact that there are still a few Solar Saturday events remaining this summer, and what more could you ask for? Apart from clear skies, of course. And for all the midgies to emigrate.

For any beginners new to the night sky, joining us at one of our observatory sessions would be a great way to be introduced to some of the sky's highlights. The same could be said for experienced observers too. After all, when looking at familiar nebulae, galaxies and clusters through fellow members' telescopes, would there be any more apt use for the phrase, "Old light through new windows"? Seeing other observers in action can be inspirational and informative. You can learn tips and tricks about setting up that could easily apply to your own equipment, as well as pick up some new observing techniques.

Yes, there are many pages of advice on websites and blogs, and even whole books written on the subject, but it's not the same as seeing and experiencing it for yourself. If you want to go solo and try it by yourself, simply grab a star chart (one from one of the monthly magazines will do) and find somewhere dark to compare the patterns on it to the sky above. Take a torch that has been tinted red to preserve your dark adaptation and make it easier. The Collins Gem Guide to Stars is a great little pocket-sized book of constellation charts to take out like this, and only costs a fiver or less! Combine that with a pair of binoculars and you're on the same path that many observers started along, myself included!

If you want to start on some easy to find nebulae this month, the Summer Triangle asterism, comprising Deneb, Vega and Altair, contains several good examples that can be found in binoculars and small telescopes. The Ring Nebula (M57), Dumbbell Nebula (M27) and Coathanger asterism, for example, are all easily located and are visible in virtually any telescope once it's pointed in the right direction. For larger apertures with a wide field of view, the Veil Nebula in Cygnus is a fine target and a good test of sky quality.

Just outside the Summer Triangle are two rather nice globular clusters: M15 in Hercules and M13 in Pegasus. Globulars tolerate magnification well, and it can be great fun going through the eyepiece tray, gradually increasing magnification until the optimum view is found, and then pick away at the soft glow trying to resolve the blur into distinct pinpoints of light as far into the diffuse glow as you can. Doing this, like many things in observational astronomy, can be a challenge, but it can be a fun and rewarding one. More importantly, the challenges can be shared. That's where the observatory sessions can be a real boost. If you're having trouble finding something, or can't grasp what you're looking for, a visit to one of our sessions can help.

Whether you observe in company or alone, and whether you're a beginner or adept, enjoy the September sky – it's one of the most enjoyable months of the year.

**Antony McEwan**

The Exploration of Mars by Professor Mark Sims

Mark Sims is based at Leicester University and has 30 years of experience in space instrumentation and space missions with research interests in astrobiology and the development and application of state-of-the-art instrumentation to forensics and disease diagnostics. He is involved with the ExoMars mission due to launch in 2018 and is co-director of the University Diagnostics Development Unit at Leicester Royal Infirmary where he is developing non-invasive techniques for disease diagnosis. He is also an old friend of HAS, and an honorary member, first giving a talk in 2002 about Beagle, then again in 2004 giving the story of what might have happened to this tiny, ground breaking lander which didn't 'phone

home. This time he spoke to us about Mars and whether life could have existed at some time in the past. What he was not going to do was to answer the question "Is there life on Mars?"

It would not be easy for life to exist on Mars; it is an inhospitable world with low temperatures, a thin carbon dioxide atmosphere, very low pressure, a miniscule amount of water, bathed in ultraviolet light and bombarded with radiation. In the past it appears to have been warmer, wetter and with a different chemistry. Organisms would be chemically based life synthesising organic compounds. Some life can manage without oxygen and light.

On Earth, bacteria are the dominant life form. Why might bacteria have evolved on Mars? They were the first life form to evolve on Earth, require little energy, can live in extreme environments and can hibernate. However, no bacteria on Earth could live on Mars in present day conditions. Those that might have evolved on Mars could have been preserved as chemical fossils.

To look for life, just follow the water because water is required for life as we know it. There may be biomarkers such as carbon isotopes or preserved molecules worth searching for. The places to search are within the dark markings on Mars, which indicate un-oxidised materials; areas showing water flow e.g. valley networks, outflow channels, gulleys and cross bedding (can only occur in running water); water in the soil (usually as ice) and sedimentary rocks, which form under water.

There are a number of problems in looking for life. Mars is difficult to land on – lots of rocky areas, the mass and volume of the probe cannot be too big, the length of time it could survive, the evidence for life could be deep underground, there are cost implications, too many sites that may provide evidence of life and the launch opportunity for spacecraft is only every 26 months.

However, a number of spacecraft have visited Mars either by going into orbit around the planet or landing on its surface. The Rovers have been incredibly successful; landing in 2004, Spirit travelled 7.7km, got stuck in soil and finally stopped communicating in 2010 whereas Opportunity is still going strong having covered a distance of 35km. Spirit's biggest discovery was evidence of a hydrothermal system (this system can provide chemical energy for some bacteria), Opportunity found its landing site covered with haematite which was most likely laid down in water.

Astronomers often ask the question as to whether water still flows. Mars Global Surveyor (orbiter) photographed gulleys within craters a few years' apart and discovered changes suggesting water flow leaving behind salt deposits and yet liquid water cannot exist on the surface today because temperatures and pressures do not allow it. Nevertheless this was not the case in the past as various landforms on Mars shows. Odyssey (orbiter) provided evidence for a northern basin, having found salt deposits. In fact there appears to have been two oceans on Mars, one early and another later. Ice may lie just 70cm below the surface in some areas. Mars Reconnaissance Orbiter has found signs of hot springs and also photographed what appear to be caves – these may provide warmer conditions. There are also indications for glaciers, linked lakes and briny streams.

Mars Express (orbiter) has made a number of interesting discoveries. It has detected methane, which is a gas that doesn't stay around long in the atmosphere so there must be a source. This source could be: volcanic, bacterial or perhaps it's from the melting of methane ice as the methane is correlated with water vapour. After a large spike in concentration of the gas it should have dispersed throughout the atmosphere but it disappeared faster than expected suggesting it was actively being destroyed – it is known that some bacteria use methane as an energy source and so has caught the attention of astronomers. Mars Express also found evidence of clays, which can only be laid down in water, and evidence for water deep underground.

Phoenix (lander near the north pole) found ice which gradually sublimated once exposed. It also found a substance called perchlorite, which when mixed with water in the right proportions can help water to remain liquid at very low temperatures.

Mars may have started out like Earth, warm and wet (and Mark Sims doesn't believe the Sun was fainter early on in the history of the solar system) when something happened to Mars, perhaps a giant impact which caused the Tharsis bulge (the one with the four large volcanoes including Olympus Mons). This then changed the chemistry of Mars and could have forced life to go underground – if it got started.

Curiosity, the size of a Mini Cooper with a radioisotope thermoelectric generator, arrived in Gale Crater on 06/08/12 after a technologically challenging but successful landing. This is a place with lots of

evidence of the early history of Mars and on Mount Sharp (the central uplift of the crater) it is possible to see the transition from warm, wet conditions to the present day cold, dry conditions, from clays to sulphites and these are what this large rover will be sampling. Even the landing site indicates running water at some point by the distribution of pebbles. It has two years to explore the area and the hope is that it will find conditions that were once hospitable for life.



### ***MOUNT SHARP in Gale Crater***

Exo Mars is the next possible lander; a joint mission between ESA and now Russia (since NASA withdrew). Unfortunately a number of instruments have been removed to make way for those from Russia as part of the deal. A tiny solar powered rover will be able to drill 2m below the surface to look for water and organics.

Where do we go after Exo Mars? The hope is for a sample return mission, perhaps in the mid 2020s where rocks can be brought to Earth and analysed here.

As for the distance future, perhaps people will visit Mars, but only once various problems have been ironed out, e.g. what happens if there is a medical emergency and the radiation hazard.

Thank you to Mark Sims for a concise history of Mars Exploration, showing the evidence found by various spacecraft where conditions may have been conducive for life. Perhaps the Viking landers really did find life after all.

Next time we have Maarten, a long time HAS member, to speak to us about Stellar Siblings as well as the usual delicious tea, coffee and chocolate biscuits, and a chance to chat to other members. After the tea break there will be the discussion group with Arthur and Maarten and the first of a series of talks for those new to astronomy, starting with *Standing on the Shoulders of Giants* with Paul – a brief history of the subject.

Pauline Macrae