

Stargazey Pie – January 2013

Society Notices

The Next HAS Meeting is on Tuesday the 5th of February.

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 –We have a guest speaker next month, St. Andrew’s University; Grant Miller will tell us about the discovery of extra-solar planets! After the tea-break, there will also be a discussion group with our speaker and our Beginners Group with Arthur and *Solar System Seasons*!

Astrofest 2013

Is taking place on 8-9 February, 2013 at Kensington Town Hall, London. More information at <http://europeanastrofest.com/>

Observatory and Home Viewing

Should you see an aurora, sprites or anything else of astronomical interest please alert Paul or Pauline.

Evening Winter Observing

Please feel free to bring your own telescope if you wish. Binoculars are available to borrow.

<u>Date</u>	<u>For whom</u>	<u>Supervisors</u>
Feb-01	public/members	Rhona, Pauline and Alaine
Feb-02	members	Gerry
Feb-08	public/members	Paul and Alaine
Feb-09	members	Paul
Mar-08	public/members	Pauline and Alaine
Mar-09	members	Rhona
Mar-15	public/members	Gerry and Alaine
Mar-16	members	Paul and Maarten.

Observatory Report from Gerry

STARGAZING LIVE

The stargazing live event was very successful with a good turnout at the observatory from HAS members and members of the public. The video link also proved to be a success as we were able to display many images on the big viewing screen. We were also fortunate with the weather as we had two clear nights out of the four (although the two cloudy nights did not deter members of the public from visiting the observatory). Many thanks to all those participated in introducing our visitors to the science of astronomy.

MINTRON CAMERA

The success of the video link during the Stargazing Live sessions was largely down to the use of Maarten's Mintron camera. Although we have a similar video camera (Stellacam) at the observatory, it is at least six years old and is now being out-performed by cameras which cost half as much. Also, the Mintron has a built-in control panel whereas the Stellacam uses a separate control box which means that there are extra cables coming from that camera which can get caught up in things in the dome or could be accidentally pulled or trampled on. We are currently debating upon purchasing one for the society.

MAXIMISING THE SPACE IN THE VIEWING ROOM.

The large numbers of visitors we had during the Stargazing Live events has highlighted the fact that we have a very limited amount of space in the viewing room. The items which seem to take the most space are the large table and numerous chairs. Therefore we are planning to change the furniture and arrangement of the viewing room, to create more room for future events.

Highland Skies – January 2013

Welcome to 2013 and congratulations on surviving the End Of The World last month.

Unfortunately we enter 2013 without one of the leading lights of astronomy. Sir Patrick Moore passed away on 9th December 2012. He was the inspiration for a huge number of amateur astronomers, no doubt some of you amongst them. Although a prolific writer of informative and inspirational books, and presenter of the phenomenally successful Sky at Night programme, he also carried out vital moon-mapping services in the run up to the Apollo moon landings, and was therefore actually instrumental in our setting foot on another planetary body. He will obviously be greatly missed, and for many of us members it will be with poignant pride that we remember meeting him in times when he visited Inverness.

Moving on to the stars above us, January sees the fantastic constellation of Orion high up in the sky from mid-evening, presenting us with numerous showcase objects to show our friends and neighbours. Friends and neighbours? Well yes, why not? It is this week that the BBC's Stargazing Live series of programmes will be airing, and our observatory will be open every night this week, from 9th through the 12th. So now is the ideal time to introduce someone to the visual wonders of our hobby. Come along to our nightly observing sessions at the JSL Observatory and bring a friend, or workmate, or neighbour, or relative, or grab a passer-by off the street and bundle them into the boot of your car and bring them. They will most likely enjoy it, especially after they've had some of this month's wondrous views shown them through a variety of telescopes at Culloden Battlefield.

Orion contains some target objects that are ideal for "showing off" the night sky. Big, bright, bold nebulae that are impressive in brightness and scale, with blazing hot young stars illuminating billowing clouds of nebulous matter. Small tightly-knit clusters of bright multiple stars with enticingly dark and relatively easy to resolve separations

between the components, which show up well even in small telescopes, but knock your socks off when viewed through our 14-inch behemoth. Or beautiful starry vistas, ideal for scanning with hand-held binoculars – there's something for every type of observing style.

Even without any optical aid Orion serves up views that inspire awe in the observer. The very size and shape of the constellation draws a picture in our minds of a gargantuan hunter striding through the heavens on his adventures. Standing well away from streetlights, in a dark sky site and with dark-adapted eyes, it is sometimes just possible to see huge swathes of nebulosity that sweep around the body of the constellation.

The largest of these areas is known as Barnard's Loop, named after the pioneering astrophotographer who photographed it and published his images in 1894. It may help if you hold various types of filter – Ultra High Contrast or HIII for example – to your eye and then “blink” the view back and forth: with filter, without filter, with filter, etc. This activity can sometimes make it easier to detect faint nebulous objects or regions.

It is expected that members will be providing a selection of different telescopes to see this month's highlight objects through, giving a chance for potential telescope purchasers to try different types and decide on which model might be best for their circumstances and favoured targets. If nothing else it is also a great chance to meet up with like-minded people and indulge in some speculation and conversation about all matters telescopic and celestial. I hope to attend some of the events and also hope to see lots of you (and some strangers too hopefully) there in our red torchlight!

Sir Patrick Moore leaves us bereft of his participation in this year's Stargazing Live activities this year, and forever more, but he would be delighted to see the project continuing around the country, and the ways in which it inspires newcomers to our hobby. This was exactly the type of community-based activity that he was most supportive of, so it should be with a little pride and lots of enthusiasm that we can carry on converting everyday normal people to our rewarding and fascinating pursuits.

Rest in peace, Patrick. Carpe Noctem everyone else.

Antony McEwan

Main Talk

Space Medicine by Bethany Jones

Bethany is a neurologist at Raigmore hospital, and when researching this subject, found it fascinating. Her interest in astronomy began as a child when she lived in the country; her bedroom had a window in the ceiling through which she could view the stars. She moved away to a city so it wasn't until she returned to the Highlands where she could see the stars once again that her enjoyment of astronomy was renewed although she professes to know very little.

Bethany began by telling us that space medicine is more than just dealing with injuries in space; it is also important to be able to keep astronauts safe and healthy. In space microgravity can affect the body in a number of ways. In addition, food needs to be provided, the ability to sleep can be difficult and the isolation of living in small spaces can lead to psychological effects so the selection and training of astronauts is important.

There are many benefits of space travel and the research from it, in the form of spin-offs e.g. the MRI scanner, cardiac pacemaker and memory foam mattresses to name a few.

During space missions, adaptive changes to the body occur, which do not cause problems when the astronaut is in space but can result in a serious medical problem when returning to Earth. Most astronauts have spent an average of 12 days in space and only a few have remained for extended periods of time so research is limited; more is required before we can send a mission to Mars which would last for close to three years. Although humans would adapt to being in space, once they reached Mars they would be unable to work (or even stand up) because they have not been in a gravity environment for many months.

The space environment is very different to that on Earth where humans have evolved in a gravity environment. Microgravity is basically weightlessness although not absolute zero gravity. This has effects on:

1. The neuro-sensory system, which is necessary for balance and orientation and uses the eyes, proprioceptors in muscles (providing an awareness of your position) and in particular, the inner ear. The inner ear contains many thousands of hair cells which bend with movement, allowing the brain to work out how the body is orientated and, together with the other senses in a gravity environment, provides information of your position allowing you to balance. In space there is no gravity, thus no feedback on your position and this can cause disorientation (astronauts cannot tell which way is up even though there is no “up and down”) and sometimes space sickness. Astronauts are not allowed to space walk until any space sickness has passed, as it would be lethal to vomit into their spacesuits. When back on Earth, astronauts can feel dizzy, and head movements can make them feel as though they are moving forwards; it takes time to readapt and relearn the signals provided by the senses once again.
2. The musculo-skeletal system – our support framework. Up to 50% of muscle mass can be lost during a space stay and on return to Earth, astronauts can feel very weak. 1 – 2 % of bone loss per month also occurs and this would continue for the duration of the space mission unlike muscle loss which reaches equilibrium eventually. In fact bone loss continues for a few months on return to Earth and may never return to pre-flight levels – they have osteoporosis. There is also a higher risk of kidney stones.
3. The cardio-vascular system – heart and circulation. Due to microgravity, fluid shifts to the upper body resulting in chicken legs and puffy face. The body responds by trying to remove fluid, which results in having to empty the bladder frequently so astronauts wear nappies. On return to Earth most of the blood volume now goes into the legs, reducing the amount elsewhere and this leads to a drop in blood pressure called orthostatic hypotension. Astronauts may feel light headed or even faint. They also have a diminished exercise capacity which can take a while to recover, and the feeling of weakness and being out of breath make still be present a month later. After long missions lasting months, Russian cosmonauts were unable to exit the spacecraft without assistance.

To help prevent the difficulties encountered by astronauts on their return to Earth, they need to exercise during the mission for at least 1.5 hours a day. Resistance training can also help. Prior to landing, taking 1 litre of fluids and 8 salt tablets can help increase blood pressure, and if astronauts feel faint, other medication can be offered. Nutrition and calcium tablets with vitamin D can help prevent bone loss. However, these measures are not enough to prevent these physiological changes on long duration missions, e.g. to Mars.

In addition, astronauts can have impaired taste and smell; depressed immune function leading to minor infections, poor quality of sleep due to a noisy, bright environment and their body clock is unable to work properly due to the sun rising every 90 minutes. They may have headaches from the increased fluid in the upper body.

Radiation is also an issue and astronauts need to be protected from solar flares and cosmic rays. There is only thought to be a 3% increase in the risk for cancer but a much greater risk for cataracts. A trip to Mars will expose an astronaut to a lifetime dose of radiation.

The living environment in space is noisy, bright and it vibrates. Air filters are needed to filter out skin particles, CO₂, odours, etc. Water is recycled, including urine, although solid waste is brought back to Earth.

Psychological issues have to be taken very seriously. The crew must be happy and not too stressed (a little is good). They have to deal with isolation, living in a confined space, being part of only a small group, limited privacy, noise, different hygiene routines, cultural differences and rewards which are less satisfying (no more heroes now that going into space has become more commonplace). They will also be tired, have low energy levels, may develop mood/thought disorders and psychosomatic problems. Mixed gender groups would probably work best rather than an all male or all female crew.

Selection of astronauts is important. There has to be 'opt out' criteria such as major depression, paranoia etc., and overall it has to be the best person for the job e.g. the best scientists instead of the best pilots as it used to be. Psychological training and support makes a big difference to how the crew copes. It's the little things like special foods, a gift or 'phone call from the family that matter most.

When going into space it is important to prevent problems that may occur, thus selection of crew, medical checkups, fitness and quarantine for 7 days before the mission to prevent exposure to disease is necessary. It is also important to give medical training and there is always a crew medical officer who has undergone more training than the others. During the flight it is important to exercise, be shielded from radiation and have medical care if it is required. After the mission astronauts require rehabilitation, a medical debriefing and medication.

If injury or illness occurs onboard, examination and management of the patient may have to be different to the way it is done on Earth, e.g. patient restraint systems are required as it is difficult to give medical care to someone floating around the cabin. For long duration space flights, a video link for remote assistance could be necessary and medicines may have to be manufactured unless those taken with them have long expiry dates. However, prevention is always best.

Bethany concluded her talk with a question; why do we want to go into space, maybe even one day to visit Mars? We do it for the rewards that the achievement will ultimately bring us. Thank you, Bethany, for an insightful talk in making us aware of all the difficulties long duration space missions will have. A visit to Mars is going to have to wait some time.

Next time we have a special visitor all the way from St. Andrew's University; Grant Miller will tell us about the discovery of extra-solar planets. There will be the usual discussion group and beginner's group, so come and listen, enjoy the tea and chat and we hope to see you then.

Pauline Macrae