

Main Event: ‘How Astronomy has Changed’ by Dr. Lilian Hobbs

Astronomy for the amateur nowadays includes telescopes, astrophotography, computers, various tools and the internet. The question is, how much has astronomy really changed?

Lilian started off as many of us do, with books about astronomy from the library, then received a planisphere and astronomy books as gifts. Her first telescope had an equatorial mount and a driven mount was considered to be wonderful. Then she bought an 8” Schmitt- Cassegrain (SCT) and remarkably it survived being blown over in the great storm of 1986. The Meade LX200 became the starter ‘scope for astrophotography because it had a suitable drive for photographing the night sky. The scope had to be ordered but she and her company’s mailroom were not expecting it to arrive in three large boxes and it was too big to fit in the PO cupboard.



Telescopes got bigger and it became possible to buy an SCT from 8” to 16”; her LX200 was a 12” (see left). John Dobson revolutionised telescopes by making them big but cheap with a manual push-and-shove operation. Star parties are now regularly attended by amateur astronomers with Dobsonians with very large mirrors.

Then computerised ‘scopes appeared. At first, telescopes were connected to computers but then it became possible to build computers into the telescope giving us the GOTO system without cables. Meade first introduced the ETX in 1996. Lilian bought one in America as soon as it appeared, took it home and was impressed – as were her friends who

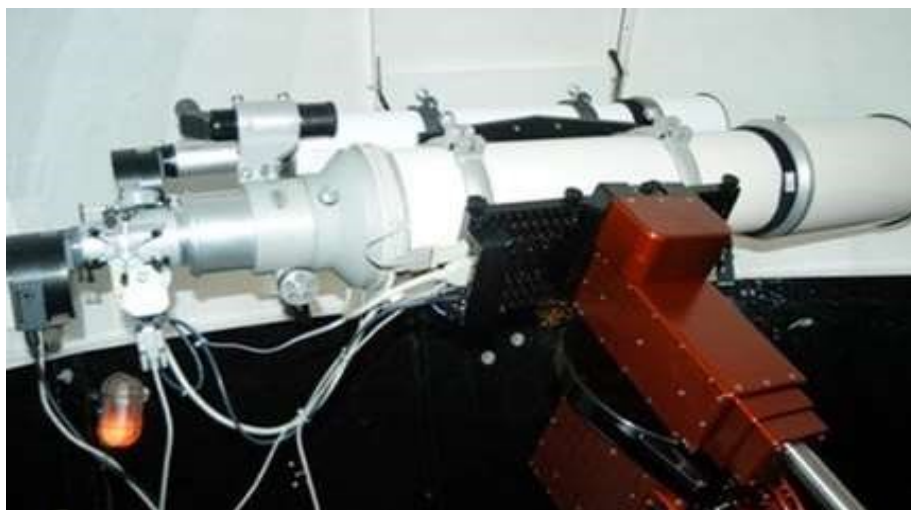
all wanted one.

She began solar observing by drawing sunspots using a projected image of the Sun shown by a light box. The views became even better when she bought a Mylar filter for her ‘scope so she could look directly at the Sun safely and even photograph it with her camera. A further improvement came by using Herschel Wedges - diagonal type filters which reject most of the Sun’s energy safely out of the way and provide a fantastically detailed image that is then safe to observe directly through the eyepiece.

Then Meade introduced the Personal Solar Telescope – the famous PST a hydrogen alpha ‘scope. Coronado produced their own solar telescopes and the market took off with Lunt and other companies becoming involved along the way. The view through a Hydrogen Alpha telescope is very different from that through a ‘white light’ filtered telescope, with many dynamic and exciting features becoming visible at that wavelength (656nm).

Eyepieces tended to consist of Kellner, Plossl and Orthoscopic designs but now it’s possible to buy expensive, large, heavy, high quality eyepieces like Naglers and a large ‘scope is required to support them!

Mounts generally consist of the fork mount made by Meade and Celestron on their SCT telescopes, equatorial mounts and also the push and pull of Dobsonian mounts. Now we can buy high precision equatorial mounts much more easily than in days gone by. Waiting lists for mounts like the astrophysics AP-1200 still exist, but similar mounts are now readily available, being produced by other companies at lower costs but still rich in features. Naturally, if you want the best you have to pay, but there are options for every price range.



Above is her current setup comprising a 7" TMB refractor mounted on a Paramount ME

Another advance is GPS which is now commonly built into the telescopes so it knows exactly where it is to enable it to find objects accurately in the sky.

Photography has also changed over time. Lilian started out with a standard SLR camera and she took photographs of the Moon, sunspots and constellations as these were bright objects, but you needed to work out the exposure. In those days, film had to be processed (hopefully correctly) and you never knew how the photos would turn out. Then CCD cameras came along which revolutionised astrophotography, and in 1989 the ST4 was introduced. Initially they had small chips, were hard to use, had a tiny field of view but did yield an instant image.



The successors to these cameras have large chips and, with a 'flip mirror', it is easy to see what you are looking at making it possible to produce fantastic images – but they are still expensive. There is also a wide choice of cameras and it's possible to buy something like the ZWO camera which is relatively cheap but does the job very well. Lilian showed her photograph of M81 and M82 taken with her 7" refractor and Movarian Instruments G3 16-megapixel camera (left).

The first webcam was introduced in 2001 and used to monitor a coffee pot!

Now they have multiple uses e.g.

chatting to friends and to take photos through a telescope. Damien peach uses a Toucan Pro for imaging planets and has taken stunning images. There are now high-resolution video cameras that can be used.

Digital cameras appeared in 1994 and were initially very expensive but are now much cheaper and readily available giving instant results. Canon and Nikon have dedicated astrophotography cameras which can be connected to the telescope.

The advent of computers has helped enormously in astronomy. From the simple desktop and simple software to help predict eclipses to laptops and tablets running planetarium programmes which can even move the telescope so if you want. Everything can be done from indoors and the images viewed on your laptop or tablet. Even 'phones now have a huge number of astronomy apps and many are free.

Remote focusing is ideal for photographers because the image can be focused by the computer. She bought a great focuser in the US and it was around the time of 9/11 so security was tight. One of the security people took it out of her case and asked what it was so she told him. He then yelled down to the person on the X-ray machine that it was a focuser for a telescope. "OK, he said" and Lilian continued through security. Her software is Maxim DL.



Image processing has made a huge difference to astrophotography and has changed the way we now take photos because we spend more time processing the images. In the past you took a photograph and hoped for the best. Now, it's possible to take many short photographs, stack them together using lots of different filters then can process them later. That is a real art and needs constant practice at improving processing techniques.

Image processing software that can be used includes: Photoshop, Pix Insight, Deep Sky Stacker, Maxim, Firecapture and there are many more.

The Internet has also been a major game changer in astronomy. It is an amazing source of information and a great way to chat to fellow astronomers for help and advice, or to swap images and stories. It is a very useful tool for checking to see if the sky will clear or if it will stay clear. It is possible to watch live events such as those on NASA TV and find out what's happening with ongoing space missions, viewing the images as they come in. A Moon app names all the craters – useful for doing the Lunar 100 – and other apps can give a reminder as to when the ISS is about to appear.

There are so many books available as well as magazines and many are now in digital form. Social media is a great way to keep in touch and to showcase photos. Lilian took a photograph of M1, (right) posted it on Facebook and immediately received a comment from the University of Southampton asking where she had taken the photograph. She said it was from her garden using narrow band filters to eliminate the light pollution. The Professor then sent the image around his physics department saying if Lilian can take a photograph like that then so could they!



NASA has a twitter feed that keeps you up to date and YouTube which is ideal for finding out how to do certain things. She likes videos where people try to balance their telescopes...

In the past, tools available included books, planispheres, sky charts and telescopes. Now there are red dot finders, laser pointers, apps on 'phones and tablets. Telescopes are often small and compact, mounts light and sturdy. There are solar telescopes and computerised telescopes (GOTO readily available and many at an affordable price. It's possible to control a telescope remotely, reach out to others via the Internet and watch space missions in real time.