



The Observer

September 2011 (#29)

Schedule of public programs on last page!

Making Photo Mosaics of the Night Sky

by Henry Sipes

Recently I began a project to capture a mosaic of several areas of the sky. This is not quite the tiled mosaics that people create in art class. Similar to tiled mosaics, I am worked to create an assemblage of multiple astrophotography images that, when stitched together, create a larger picture of the sky.

If you have looked through a telescope at the observatory or at your home, you realize that the view through that tiny eyepiece is, well, rather tiny. There are many times when we would like to see the heavens on a grander scale. Using a wide angle camera lens coupled with either a CCD camera or even a DSLR camera, we can take multiple images of the sky and piece them together to provide us with the grander scale.

Figure 1 shows my initial setup. I have mounted the observatory's Orion CCD camera to a piece of aluminum extrusion so that I can adjust my



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camera lens in and out until I achieve proper focus. The camera setup is piggybacked on a Meade 10" Schmidt Cassegrain telescope from Jefferson Community & Technical College that has been properly polar aligned for tracking. Before I could even begin my mosaic imaging, I had to take a test image to see if my calculations of the image scale were correct. Figure 2 shows the first image taken through my initial setup. No, that is not a smudge on your monitor, but rather a small cloud just above the Pleiades constellation.



*Figure 1: Initial Setup - 135mm Vivitar Lens mounted in front of Orion CCD camera.
Credit: Henry Sipes.*



Figure 2: Pleiades - The Seven Sisters, Image Scale Test. Credit: Henry Sipes.

Figure 3 shows the same scaled image from a free software package called Stellarium. Chris Graney, my fellow staffer at Otter Creek – South Harrison Observatory, has me hooked on this software now. It has the ability to place a field of view (FOV) circle or rectangle that is scaled for your imaging equipment. After setting this up, I was able to display the Pleiades in Stellarium and confirm that my calculated FOV was correct. My 135mm lens and CCD camera setup gives an approximately 10 degree (X direction) by 5 degree (Y direction) FOV.



Figure 3: CCD Ocular of the Pleiades from Stellarium

Astrophotography is very demanding of the equipment used and will show flaws in camera lenses that you would never notice in pictures of your favorite pet or family member. You can also image things that your eyes cannot see like faint clouds in the atmosphere of Earth (the tiny cloud in Figure 2) and faint clouds in nebulae out in the Milky Way. Figure 4 shows nebula that exist in the Orion constellation. The Horsehead and Orion nebula (M42) are favorite targets of astrophotographers. What is M78? That is a galaxy that is also visible in the Orion constellation.

My objective is to create a mosaic of a large area of the sky and also to learn about processing CCD images that can be used for science. The image in Figure 4 is unprocessed and still has a great deal of electronic noise from the CCD camera. The noise creates these bright areas that look like large clouds covering your image area. Figure 5 shows the Orion Mosaic with processing that subtracts the camera noise from the image and also divides out imperfections caused by dust on the lens.* Besides taking images with the lens cap off, I also have to take images with the lens cap on so that no light can enter the CCD camera. These are called darks. The CCD camera will still record an image. How is this possible you ask?

* This is not meant to be a tutorial on CCD devices but in very simple terms a CCD (Charge Coupled Device) uses a silicon chip that records every photon that contacts it by discharging an electron. These electrons are stored in wells, called pixels, until we are ready to end the exposure and download the data to our computer.

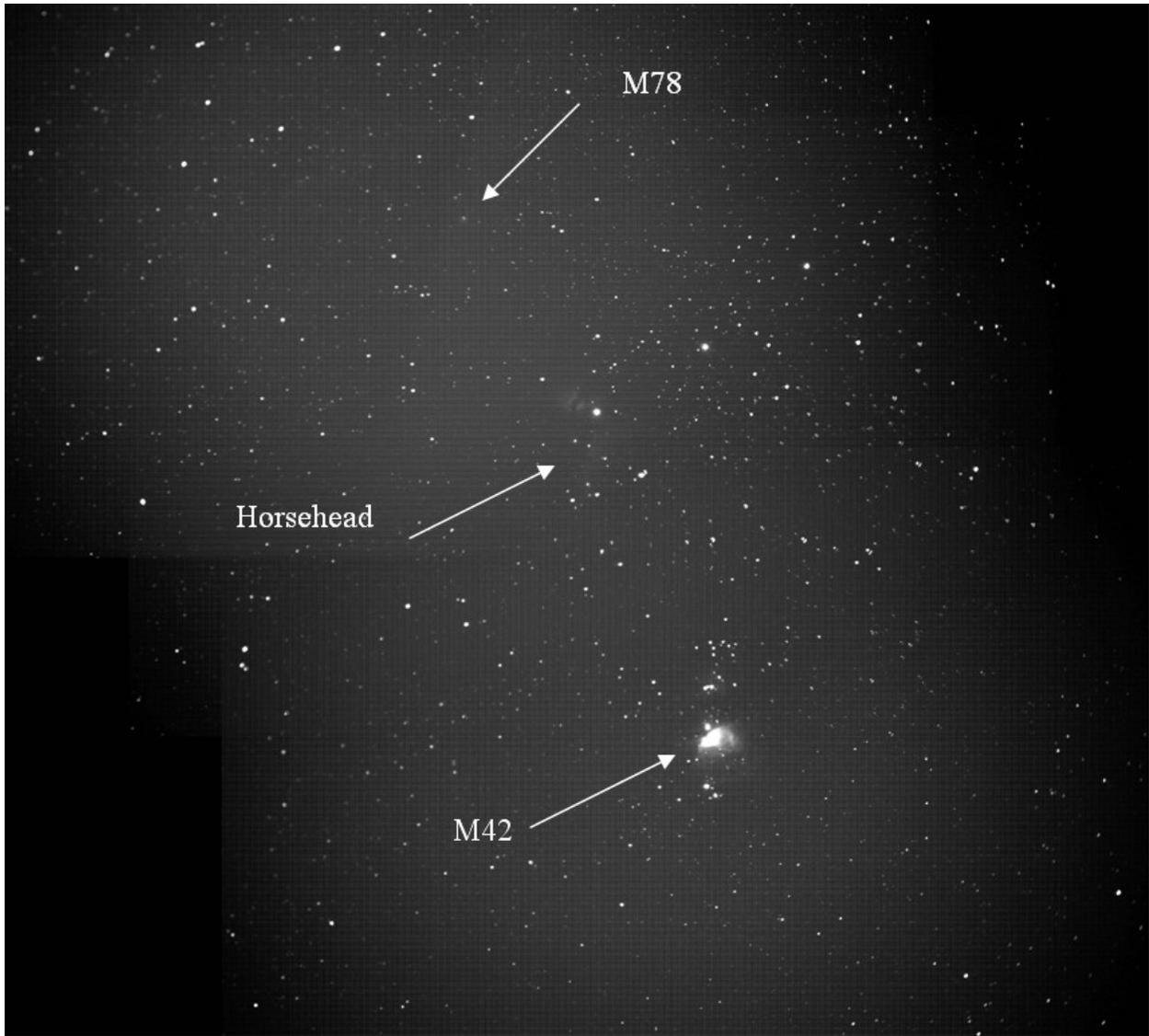


Figure 4: Orion Mosaic Test – Unprocessed. Credit: Henry Sipes.

Though the photons coming from your target have been blocked by the lens cap, there are electrons coming from within the camera that will still register on the CCD chip. Figure 5 shows the Orion mosaic with processing. I still have much to learn and many sleepless nights ahead but the results are rewarding. Figure 6 and 7 are just a few more mosaics that I have created. Those bright cloudy areas in Figure 7 are just that, clouds. This has been a terrible few months for imaging. I had to modify the color balance of Figure 7 to remove most of the red from the clouds to show the true blue color of Mizar.

Enjoy the images and we will see you out at the observatory!



Figure 5: Orion Mosaic with processing – note the dark background and the nebula detail now visible. This is also a color photograph. If you look closely at the little bright fuzzy object at the top edge of the photo you can see the elliptical shape of the M78 galaxy. Credit: Henry Sipes



Figure 6: North American Nebula in the Cygnus Constellation, see if you can find the outline of the Gulf of Mexico in the red nebula. These images were taken on different nights and with my poor processing they have not meshed well. You can, however, see the dark dust clouds from the Milky Way present across the image. Credit: Henry Sipes.

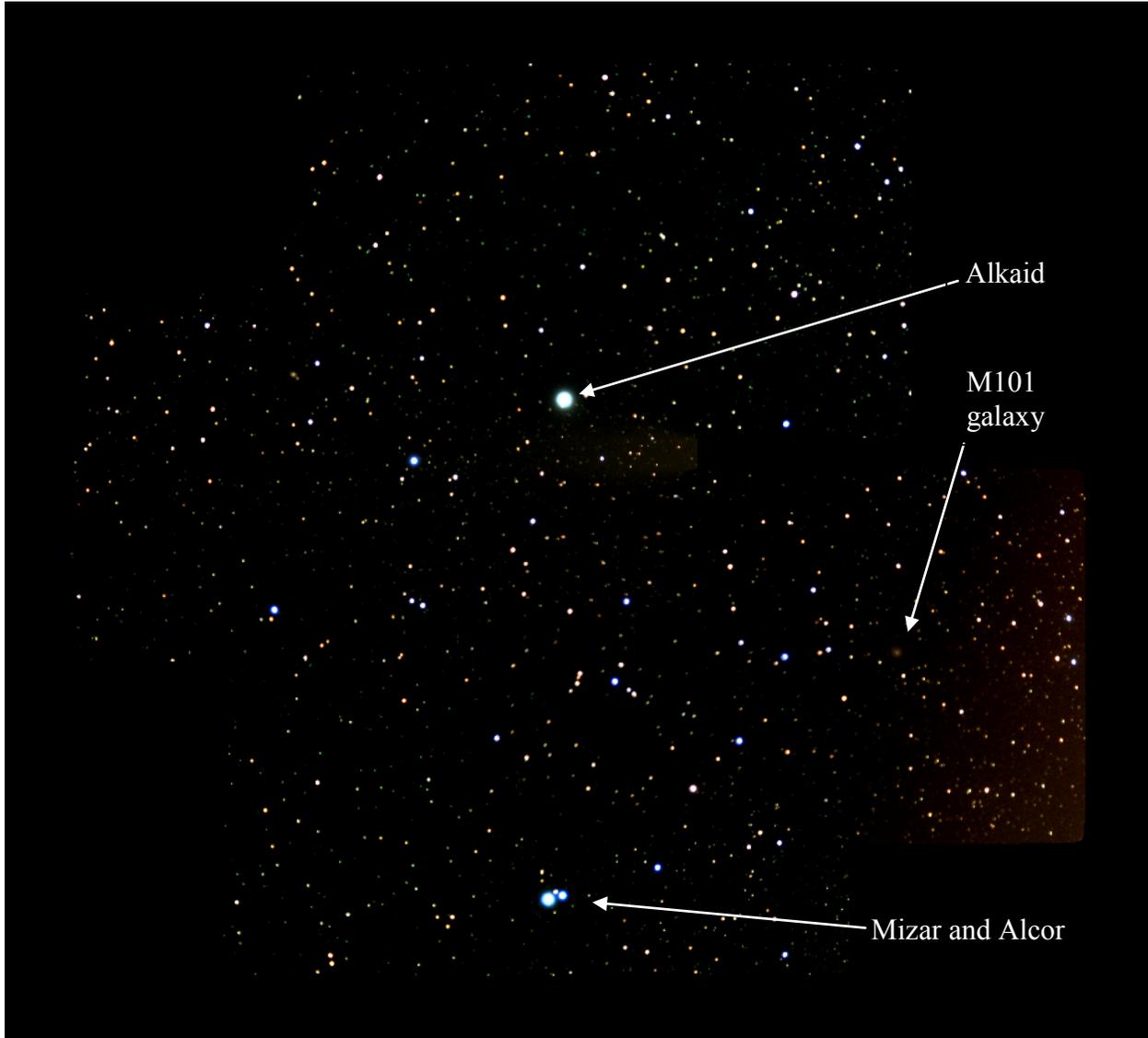


Figure 7: Ursa Major - This is a mosaic of the end of the dipper handle. Credit: Henry Sipes.

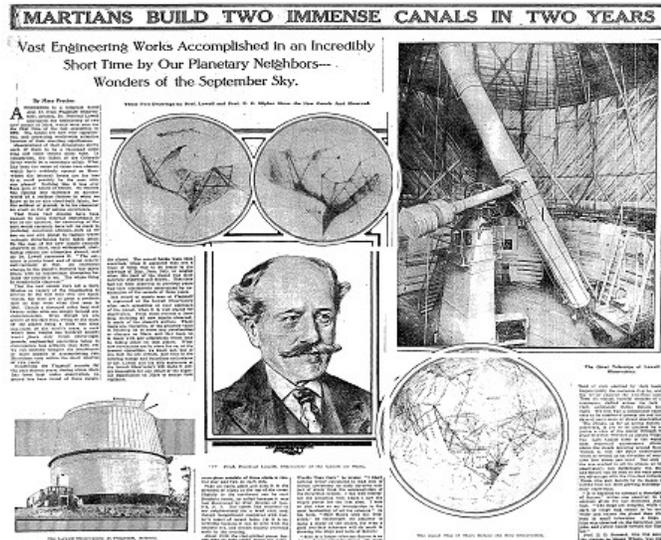
Summer 2011 Telescope Camp

This summer's Otter Creek – South Harrison Observatory Telescope Camp was a success, once again. The camp was held in June and was a NASA "Summer of Innovation" program sponsored by a number of different organizations and businesses. Much of the equipment for the telescopes the children built was provided by Jefferson Community & Technical College. One highlight of the camp was observing a spectacular group of sunspots. Observatory staff member Henry Sipes, who conducted the camp, described them as "the most amazing and beautiful set of sunspots ... I have not seen anything like it in many years".



ALIENS! 100 Years Ago, Martians Were Real

A century ago, on August 27, 1911, headlines of the *New York Times* announced that Martians had completed stunning feats of engineering and construction: two 1000-mile-long canals built on Mars in a two-year period (see below). These canals had not only been seen and sketched by astronomers, but also had been captured photographically, appearing in the photos as “the most marked features on that part of the planet”.



At the time, it was widely believed that Martian aliens existed – four years earlier the *Wall Street Journal* had reported that the biggest news of 1907 had been the discovery of intelligent life on Mars.

See, and read, the original article directly from the *New York Times* at

<http://query.nytimes.com/gst/abstract.html?res=F20E13FF3D5813738DDDAE0A94D0405B818DF1D3>

The canals turned out not to exist – being an illusion of shading – and there are no Martians after all.

More ALIENS! Dr. Michael Crowe to Speak on the Extra-Terrestrial Life Debate October 17 at the Gheens Science Hall and Rauch Planetarium



If you like astronomy, history, and invading extraterrestrials, mark your calendar for Monday, October 17, 7 PM.

Dr. Michael J. Crowe of the University of Notre Dame is speaking at the Rauch planetarium at the invitation of Jefferson Community & Technical

College and the Louisville chapter of Sigma Xi, the scientific research society.

His talk is entitled

“E.T. at the Rauch: Seventeen Key Developments in the Extraterrestrial Life Debate”

Visit <http://www.jefferson.kctcs.edu/observatory> for details.

Come hear a top scholar speak on a topic with plenty of popular appeal! Dr. Crowe is recipient of the 2010 LeRoy E. Doggett Prize awarded by the AAS for significant influence on the field of the history of astronomy by a career-long effort, and author of the 2008 book *The Extraterrestrial Life Debate: Antiquity to 1915*, among others. (And if you watch The History Channel, you might possibly recognize him.)

Dr. Crowe argues that, regardless of whether or not extraterrestrials exist, they have “invaded” our culture in that the very idea of their existence has been hugely influential. “E.T. at the Rauch” will discuss how the extraterrestrial life debate did not begin in the twentieth century. It was already underway in classical antiquity and it has continued until the present. This historical presentation will survey seventeen of the most significant, exciting, and/or controversial turning points in this debate, involving those associated with such figures as Aristotle, Cusa, Copernicus, Bruno, Kepler, Herschel, Paine, Locke, Whewell, Schiaparelli, Lowell, Wallace, Hubble, Brock, and the discoverers of the exoplanets. The discussion will include both astronomical and cultural issues, will challenge various historical interpretations that appear in the literature, and will provide suggestions concerning the role that non-scientific issues, including metaphysical and religious issues, have at times played in the debate. Among the theses proposed are that this debate has centered on one of the great questions humanity faces, that some of the effects that are predicted to follow if astronomers detect extraterrestrial intelligent beings have already occurred, and that not only has astronomy affected the debate, but the debate has had significant impacts on astronomy.



Jefferson



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2011 Spring - Fall Schedule

South Harrison Park Observatory Events

*** **ALL PROGRAMS ARE FREE!** ***

Nighttime programs:

Mar. 19 8:30 pm to 10:30 pm

April 16 8:30 pm to 10:30 pm

May 14 9:00 pm to 11:00 pm

National Astronomy Day Celebration

June 18 At Buffalo Trace Park for **NASA's in the Park** Program

July 9 9:30 pm to 11:30 pm

Aug 6 9:30 pm to 11:30 pm

Sept 3 9:00 pm to 11:00 pm

Oct 8 8:00 pm to 10:00 pm

NASA's International Observe the Moon Night

Nov 5 7:30 pm to 9:30 pm

Daytime programs:

Mar. 5 11 am to 1 pm

April 2 11 am to 1 pm

April 30 11 am to 1 pm

May 28 11 am to 1 pm

July 23 11 am to 1 pm

Aug 20 11 am to 1 pm

Sept 17 11 am to 1 pm

Oct 22 11 am to 1 pm

Nov 19 11 am to 1 pm

**** Closed in December except by special request.

All programs at South Harrison Park are open rain or shine.

Daytime programs allow you to safely view the Sun using solar filters.

Nighttime programs allow you to view the Moon, Stars, Planets, and more.

The facility is handicapped accessible and we feature a video display system for cloudy days and/or nights.

Contacts: Park Astronomer – Henry Sipes Home 270-828-6191
Cell 270-668-2103
Harrison County Park Office – 812-738-8236

Websites: <http://www.harrisoncoparks.com/Observatory.html>
<http://www.jefferson.kctcs.edu/observatory/>
<http://astronomy2009.us/>

