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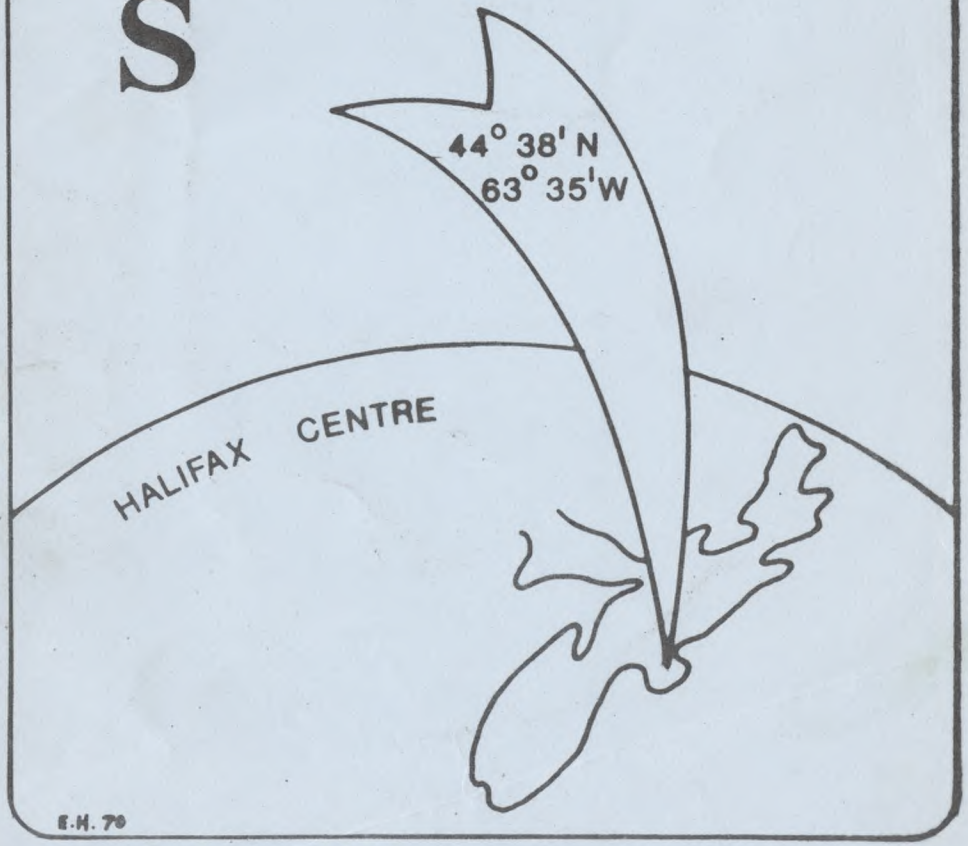
NOVA NOTES



Editor's Page

Articles,articles,articles...where are all those articles??? This month I ask you to concider the plight of the printer! Oh the poor,poor printer;can you imagine him trying to proof read blank N.N. pages? So this month,I proclaim,"Save a Proof Reader Month"! How about it? Let's see if we can't save that age old profession of uncovering other people's mistakes! Just send your articles to "The Editor",Nova Notes;c/o Nova Scotia Museum;1747 Summer St.; Halifax, N.S.

As I write this paragraph,Dr. Bishop is bravely showing our Centre's colors in Winnipeg! Remember,next year,it's our turn! How can you help make it happen? We can use your ideas and assistance!

There are displays,tours,observing sessions and meetings to be planned. Our big problem is a display. The rest will all fall into place with some "standard" planing. However,the host centre's (us) display must be something ingenious. Perhaps a model(working,of course), or a display of equipment(impressive,of course). Well,let's here some of your ideas...

Peter Edwards
The Editor

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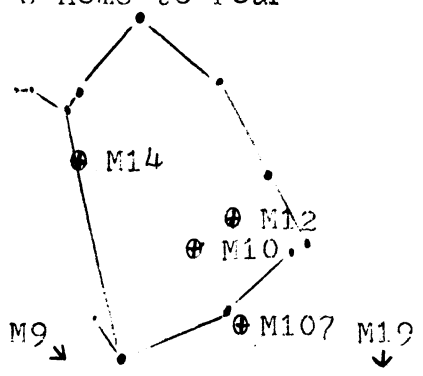
Featured Constellation for July

What does Serpentarius mean to you? I hope it means the serpent holder or Ophiuchus. That's that huge dark part of the sky just above the Scorpius/Sagittarius boarder. It's home to four Messier objects. They are M9,M10,M14 and M19. All four are globular clusters of magnitude 7.8 or brighter! Oh yes; two more globs.: M12 and M107

P.F.



OPHIUCHUS

How to Avoid "Expletives Deleted" in Astrophotography

R. C. Brooks

Astronomers, amateur and professionals, are always looking for methods to improve the quality of their photographs along with a reduction of exposure time. This means that low-intensity reciprocity failure must be overcome. [The law of reciprocity says that the light intensity of the source times the exposure time remains constant. ie. a long exposure of a faint source should be the same as a short exposure of a bright source. However, in practice this does not strictly occur--especially for very high and very low intensity sources and, hence, is known as reciprocity failure.]

The emulsions of different films have different light gathering characteristics and the easiest type to acquire that best fits an amateur's B&W needs for long exposure film is Tri-X. (For photos of the moon and brighter planets Panatomic-X and a new type, which is almost grainless when enlarged, SO-410, are recommended--both B&W.) If you want to take a little trouble to get film, then type 103 a-O film is now obtainable in 36 exp. rolls as well as 100 ft. rolls. Any film designation with an 'a' (eg. IIa-O, IIIa-J etc.) are especially prepared for low-intensity astronomical work and reciprocity failure is overcome to a large extent compared with the usual commercial varieties.

However, there are several methods known by which the performance of any photographic emulsion may be improved. These are:

1) Cooling - This familiar method has little effect on sensitivity but appears to alter the rates of the chemical reactions so the reciprocity curve is shifted towards longer exposure times, thus making longer exposures more profitable.

2) Chemical Sensitization - This is the process used by photographic companies in making an 'a' type plate or film. It consists of treating the plate with an aurous thiocyanate solution which helps build up with gold atoms the latent-image silver centres that are not of a developable size.

3) Baking - This method when used with 'a' type emulsions simply extends the reactions produced by chemical sensitization. In the production process the plate is washed after CS but some of the chemicals remain in the emulsion and when heated the reactions are extended a bit further, thus reducing the low-intensity reciprocity failure.

4) Drying - This is carried out in a vacuum or in a controlled atmosphere of inert gasses and reduces the water and oxygen in the emulsion and which tend to reduce the sensitivity of the emulsion grains to light photons.

5) Water hypersensitization - (bathing plate or film in water or ammonia) This increases the chemical reaction rates that produce the latent image. The life time of the photoelectrons is apparently increased, thus decreasing the low intensity reciprocity failure.

6) Uniform Preflashing (before or after image exposure) - This last process is the one that strikes me as being fairly simple and, hence, a method that should be attempted by our keen photographers. The theory behind the method is, in simplified form, this. For a grain in the emulsion to be developable, a certain number of photons must strike each grain--let's say 4 as an example. The trick is to make grains with 2 or 3-silver-atom images (ie. to create partially exposed grains but which remain undevelopable). Then when exposing the plate on the Orion Nebula, only 1 or 2 more photons are needed to make the grain developable. Although exposure time may be cut significantly, one must consider what preexposing will do to background fog as this restricts the usefulness to some extent. Poisson statistics of photon registration tell us that with proper preflash level many grains get 2-silver-atom centres but also gets as many 1 and 3-silver-atom centres and, unfortunately, a significant number of 0 and 4-silver-atom centres. Registration of photons to make 4-silver-atom centres means you get a detectable fog even before exposure at the telescope and if you are working in an area where the signal-to-noise situation is low (as we are at the Burke-Gaffney Obs. with container pier and city lights) preflashing will not help and may worsen the situation.

Now on the practical side, Fig. 1 shows the preflash cabinet used at Mt. Wilson and Palomar and with the legend is almost self-explanatory.

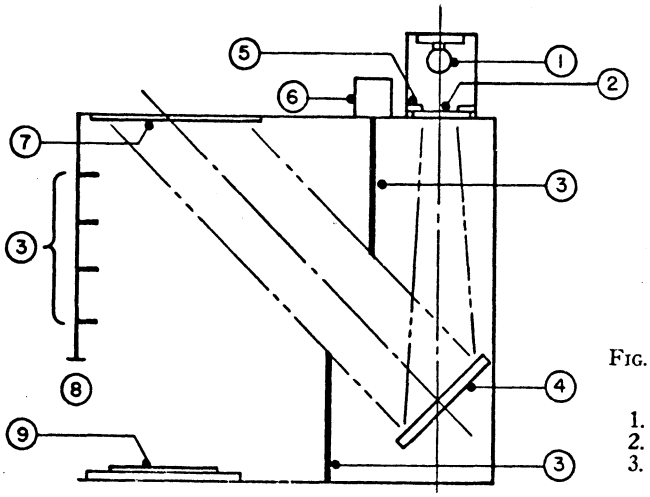


FIG. 1.—Schematic diagram of a compact pre-exposure unit.

1. Light source; argon glow lamp is ideal.
2. Diffuser.
3. Light baffles; must be carefully planned to prevent both direct illumination from the source from falling on the photographic plate and grazing reflections from walls of the box.
4. Mirror; second-surface type is satisfactory.
5. Diaphragm to adjust illumination reaching plate.
6. Electric timer; 10-second maximum is suitable.
7. Matte white surface to diffuse the light.
8. Opening for hands to permit placement of photographic plate on (9).
9. Plate, emulsion up, centered on platform.

This unit is designed for use with 10" x 10" plates; thus to get uniform illumination over this area, the light path must be at least 5 ft. For compactness the light path is folded by 2 reflections (1 mirror, 1 diffusing white surface), however, this is not necessary for the operation. The major difficulty with such apparatus is internal reflection from the walls of the cabinet. This can be eliminated by painting the interior flat black and as shown in the figure by using plenty of light baffles, and it can also be overcome by making the cabinet larger than necessary. The light diffuser (2) smooths out slight irregularities due to lettering on the bulb or straie in the glass. An incandescent light of very low intensity may be used in place of the argon bulb, but exposures would have to be adjusted for different emulsions. The preflash exposure for 'a' type films should be about 10 sec. but is only 0.01 sec. for 'non-a' types like Tri-X using the same bulb and intensity. Obviously, a very low intensity bulb would have to be used for 'non-a' types or the source to film distance increased.

Progress Report

The final scheduled meeting of the Junior Astronomy Club was held in June at the Burke-Gaffney Observatory where members had an opportunity to observe with the 16" telescope, albeit through light cloud. For most it was the first time they had seen Uranus, M13 and M81 visually. Monthly springtime attendance has stabilized at 15 - 20 which is about the ideal size for maximum participation and interaction. It is hoped that the Junior members may join the Senior group on an observing outing sometime through the summer and later in August a meteor observing party is tentitively planned.

Recent programs have included talks on satellites of the planets, astronomical photography, finding and mythology of the constellations, and design of some simple non-optical instruments. A crossword puzzle contest was held and was won by Ingrid Mathesson, Edward St. The prize was the book 'Worlds Beyond Ours" which contains many fine colour photographs and a reasonably accurate text considering the level. The runner-up was Chris Glade, Palisade Pl.

For next year I would suggest that the leader of the JAC should be included in the executive of the Society to allow for more varied and wider input and co-operation of the Society as a whole. Also, a small fee might be initiated for JAC members so more ambitious projects could be undertaken and notification of meetings may be made by mail and also to allow for printing of handouts. Of course we are always open to suggestions and assistance.

Randall C. Brooks, Co-ordinator