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REFLECTIONS ON CORING A 16" MIRROR

by Mike Wesolowski


Some of the newer centre members may not be aware of this, but the centre is currently involved in the design and construction of a 16" Newtonian Cassegrain telescope to be installed in the Rystrom Observatory. The design calls for a hole in the centre of the 16" mirror so that a smaller tertiary mirror can be mounted to send the light out of the side of the tube. This article represents an attempt to record some of what I learned while I cored the mirror, so that the next time (!) the centre gets involved in a project like this, the person responsible won't make the same mistakes I did. (It should be pointed out that we did not actually grind away the glass in the centre of the mirror. Rather, a glass plug was cut using a cookie-cutter-like tool. The plug was not completely cut out - it will be removed after the optics are completely finished.)

First, a bit of history: we knew that the mirror was going to end up with a hole in the centre, but we had no idea where this could be done or at what cost. The first place tried was the machine shop at the Physics Department of the University of Saskatchewan, just down the hall from where Gordon Patterson worked. Unfortunately, the equipment there could not handle pieces of glass 16" in diameter. Further inquiries around the city were inconclusive. About this time, there was a lot of head-scratching; we didn't know what we were going to do.

About this time, I started work as a summer student at the Accelerator Lab on campus, which has a fairly well-equipped machine shop. It took me some time to realize that some of the equipment there looked like they could be adapted to cutting holes in large glass discs, but I did. Inquiries verified this, and permission was obtained from the director of the lab to set up our mirror in the machine shop for the purpose of coring the mirror.

The equipment was set up one evening by Doug Miller, Rick Huziak, the author, and Ted Walston, one of the machinists in the shop. The mirror was face-down on a piece of plywood, then affixed securely to the platform of a vertical milling machine. Ted was able to centre the mirror quickly and grinding started immediately. After several minutes there was a small but noticeable groove cut in the back of the mirror. Seeing how shallow the groove was really made us aware that the job was going to take a long time.

No one in our group had ever done this before, so it was very much a learn-as-you-go type of process, and several problems were encountered. One of the first of these was that as the hole deepened, introducing fresh abrasive became more of a problem. This was easily solved by cutting several wide, deep slots in the tool. Towards the end, though, when the hole was almost as deep as the tool was long, I had to raise and lower the tool to introduce fresh abrasive.



During the early stages, it was discovered that the tool was apparently wearing away as fast as the glass was. If this had been allowed to continue, it seemed likely that we would have ended up with a tool too short to do the job. Although making a new tool would have been feasible, if necessary, we tried to change the technique used. Small slots were cut in the end of the tool to (hopefully) trap abrasive rolling between glass and tool, wearing each of the materials away. It is not known whether or not this worked; the tool was still wearing away at an alarming rate, and ended up being half as long as when we started, just barely long enough to make the hole as deep as we wanted.

One of the problems we encountered fairly early was also quite embarrassing - we had neglected to level the mirror when we started. For some reason, we assumed that the plywood upon which the mirror was resting was flat. It wasn't! This problem was quickly eliminated when we realized this!

Next problem: how does one clean used abrasive from a circular slot 4 mm wide and several centimeters deep? It seems to be virtually impossible, unless you want to wash the mirror in a sink after each grinding session. Of course, this also requires recentering and releveling the mirror on the milling machine when you've finished. I've tried letting the stuff dry out, then using a vacuum cleaner, pieces of cardboard, and a small spatula. However, these became less effective as the hole deepened. By the time the job was finished in early December, no really satisfactory way had been devised. This will have to be a problem solved by later generations.

One of the lesser problems encountered was that of finding time to work on the mirror. As I am the only person on the mirror grinding committee with access to the machine shop, I pretty well had to do most of the work. As a student, time was not always in abundance. Consequently, it required about 3 months to do all the work on the mirror, of which about 30 hours were actually spent working on the mirror.

At the time of this writing, Doug and Rick have resumed the fine grinding on the mirror, and hope to have it ready for polishing by February (hopefully, putting this in writing will commit them to this date). As for myself, I intend to stay away from the mirror for awhile. I've probably used up all my luck while handling it and I'm sure that if I go near it, something terrible will happen.

I would like to express my gratitude to Dr. H. Caplan, director of the Accelerator Lab, for allowing the Centre to do some work on our mirror at the lab, and to Ted Walston and John Greefkes, the two machinists there, for their comments, helpful suggestions, and patience while we tied up some of their equipment.

ASTRONOMY DATELINE

UPDATE ON RECENT DISCOVERY AND COMING EVENTS



TENTATIVE IDENTIFICATION OF SECOND "BLACK HOLE"

by John Greer

The National Research Council announced early in January that a second "black hole" has been identified.

The object, which is reported to be located in the Large Magellanic Cloud, is estimated to be about ten solar units in mass, at a distance of approximately 150,000 light years from our solar system.

Discovered in November at the Cerro Tololo Inter-American Observatory, the announcement was not made until additional data had been gathered. Astronomers David Crampton and John Hutchins of the Dominion Astrophysical Observatory and Anne Cowley of the University of Michigan were engaged in the systematic study of stellar x-ray sources with the four-meter reflector at the Cerro Tololo station when the discovery was made.

The first "black hole" was tentatively identified in 1974 as an x-ray source in the constellation Cygnus, and named Cygnus X - 1. Both candidates so far identified as black holes are known to be part of binary or multiple star systems.

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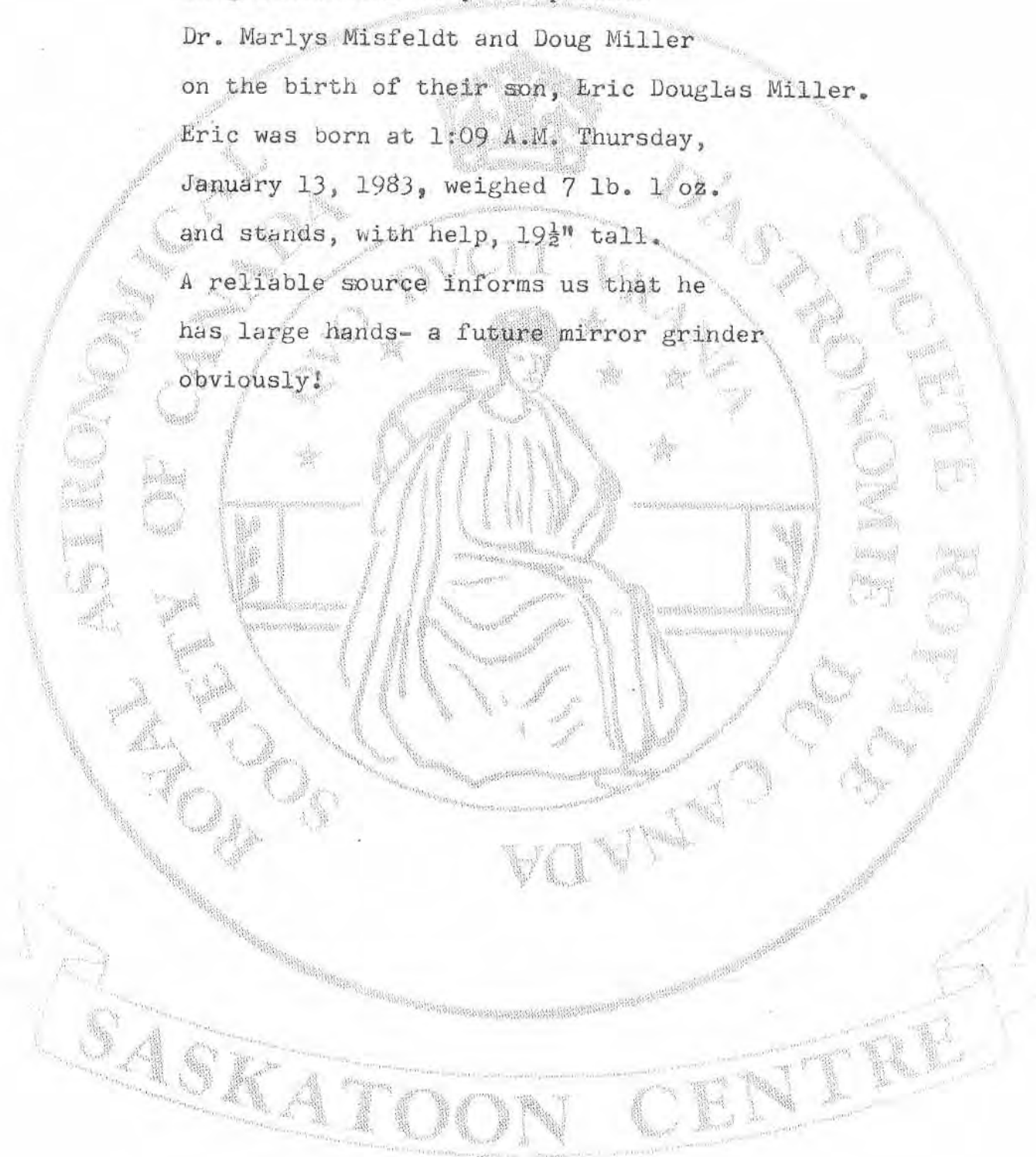
Congratulations to proud parents

Dr. Marlys Misfeldt and Doug Miller

on the birth of their son, Eric Douglas Miller.

Eric was born at 1:09 A.M. Thursday,
January 13, 1983, weighed 7 lb. 1 oz.
and stands, with help, 19½" tall.

A reliable source informs us that he
has large hands- a future mirror grinder
obviously!



NEWSLETTER

Mailing Address:

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Members of the Executive Council

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Gorden Mack, Doug Miller, Patrick Skinner
Rystrom Complex Committee : John Greer, Mike Wesolowski
Merlyn Melby, Gordon Patterson

Notice of Meeting

Place Room B111, Health Sciences Building, U of S.

Date January 17, 1983 (Day) Monday

Time 8:00 p.m. (Central Standard)

Purpose January General Meeting

Program Colour film "The Universe" will be shown.

Stan Shadick will present colour slides of the total

lunar eclipse in December, taken in British Columbia.

MINUTES OF AN EXECUTIVE MEETING

Saskatoon Centre of the Royal Astronomical Society of Canada

PLACE - - - U of S Observatory, U of S Campus

DAY/DATE - Monday, December 20, 1982

TIME - 7:00 p.m.

C.S.T

Present: Mike Wesolowski, Mike Williams, Jim Young, Pat
Skinner, Joan Badger, John Greer.

19. Meeting called to order 7:10 p.m. Mike Wesolowski

20. The National Office has communicated the
following information:

a) Requests for travel grants to the 1983
General Assembly in Quebec should be
made as soon as possible.

b) The yearly report should be sent to
the National Office before the end of
January.

c) A list of officers should be sent to
the National Office as soon as
possible.

Mike Wesolowski

21. The speaker exchange with Edmonton will
be going ahead as planned.

Mike Wesolowski

22. The core in the 16" blank is down as
deep as possible. Grinding will resume
at the start of the new year.

Mike Wesolowski

The meeting adjourned at 7:25 p.m.

MINUTES OF A GENERAL MEETING

Saskatoon Centre of the Royal Astronomical Society of Canada

PLACE - - - Room B111, Health Sciences Building, U of S Campus

DAY/DATE - Monday, December 20, 1982

TIME - 8:00 p.m. C.S.T

Executive Members Present: Mike Wesolowski, Mike Williams,
Jim Young, Joan Badger, John Greer, Doug Miller,
Richard Huziak.

24. Meeting called to order 8:00 p.m. Mike Wesolowski

25. Correction to November minutes: item
no. 10 should read "Fahmi" not "Gahmi". Mike Wesolowski

26. November minutes adopted as published.

Proposed - John Greer

Seconded - Joan Badger

CARRIED

27. Those interested in attending the 1983
General Assembly in Quebec may be eligible
for travel grants, and should apply to the
National Office as soon as possible. Mike Wesolowski

28. Membership fees are already past due,
and should be paid as soon as possible. Mike Wesolowski

29. The Centre's 16" mirror is ready for
grinding to resume. Mike Wesolowski

30. The morning of December 30th, 1982 from
3 - 8 a.m. will see the last total lunar
eclipse visible in this locality until
1986. Mike Wesolowski

(cont'd)

31. A motion was made that money for a two-year subscription to "Sky & Telescope" be approved.

Proposed - Mike Williams

Seconded - Jim Young

CARRIED

32. Mike Wesolowski was introduced as the guest lecturer and gave an interesting talk on "The Ends of the Universe".

John Greer

33. The meeting was adjourned to the Observatory 8:55 p.m.

Mike Wesolowski

AROUND THE CENTRE

A Résumé on the Activities of the Centre



LUNAR ECLIPSE, DECEMBER 30, 1982

by Garry Grotsky

The total lunar eclipse of December 30th was fairly uneventful for Saskatoon area members of the Variable Cloud Observers' Society. Only about 30 seconds of the five-hour eclipse was observable, due to cloud. Jim Young and Gordon Patterson each managed to squeeze off a few pictures of the event, but nothing spectacular is anticipated. Also present for the eclipse were John Greer, Pat Nelson, and Garry Grotsky.

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