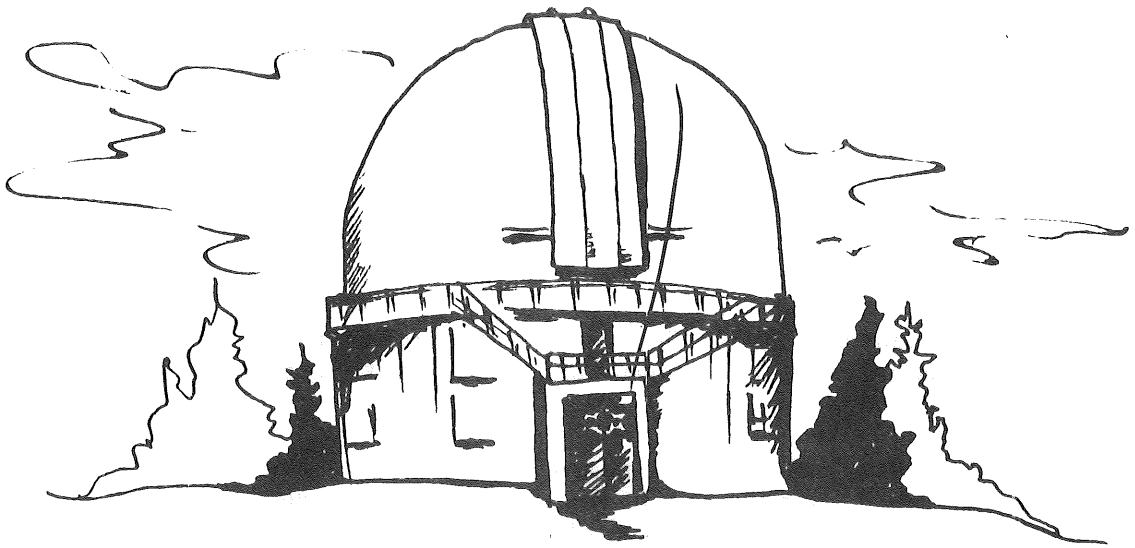
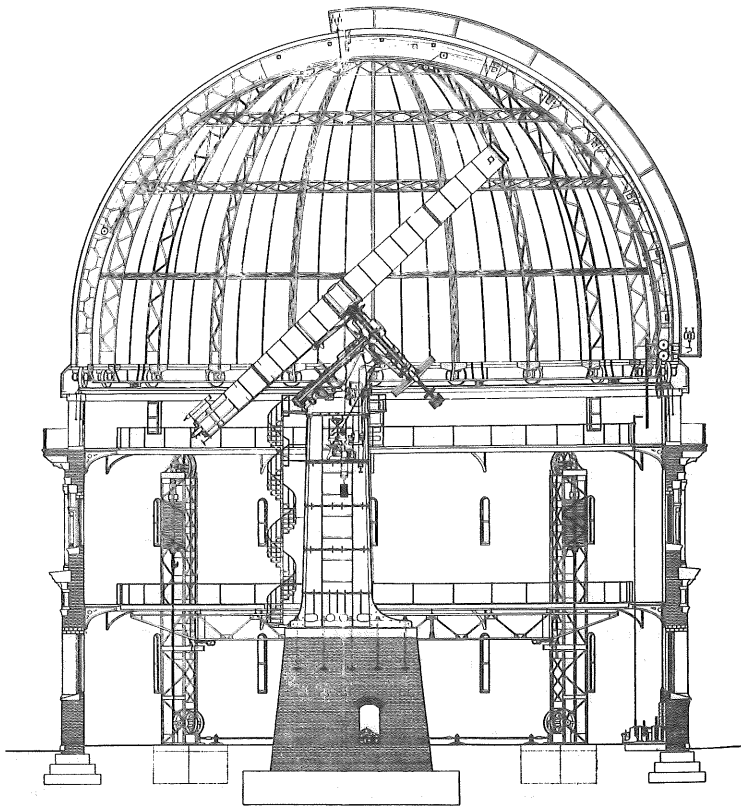


DAVID DUNLAP DOINGS

VOL. 7, NO. 3 MARCH 26, 1974



You figure it out!

Rising Floor Arrangement of the Yerkes 40-inch

see pp. 2-3

EDITORIAL

Some Recollections of Mr. van B

Word of the death of Prof. George van Biesbroeck last month, at age 94, brought back memories of my acquaintance with that distinguished and lovable American astronomer.

van B, as he was known to his peers (Mr. van B to the students) was born and educated (Ph.D. astr.) in Ghent, worked for six years in the Engineering Department for Roads and Bridges in Brussels (strange start for an astronomical career!), then for a year at Potsdam Observatory, a year at Heidelberg and seven years at the Royal Observatory at Brussels. In 1915 he came as visiting professor to Yerkes and stayed on staff there until, and for 18 years after, his retirement. In 1963, at 83, he became so upset at Yerkes' refusal to let him continue observing with the 40-inch that he accepted a research assistantship at the Lunar and Planetary Laboratory at the University of Arizona where they had no such silly age restriction. When I saw him last, in 1967, he was still grumbling bitterly about the Yerkes treatment but still observing his visual binaries at Arizona as assiduously as ever. I suppose he continued until nearly the end.

Mr. van B must have been the original bearded astronomer of this continent - or almost. His beard was short and neatly trimmed to a point, but his ample moustache so concealed his mouth that any facial expression short of a very broad smile was apparent only in the crinkling of his eyes. And they crinkled often.

Mr. van B and his charming Belgian wife were extraordinarily kind people. In 1934-35 when I was at Yerkes they made it a point to seek out any new graduate students, invite us to dinner, give us little gifts and make us feel at home in that rather isolated environment. After Mr. van B's official retirement in 1945 I understand that they converted part of their home into sleeping quarters and an overgrown dining room where they housed and fed nearly all the students - partly, no doubt, to supplement his meagre pension, but more, I suspect, to play the mother and father role which was part of their nature. One day in 1937 my wife and I answered a knock at our door in Richmond Hill and were amazed to find Mr. and Mrs. van B, smiling broadly and explaining that they were on a motor trip to Northern Ontario and decided to pay us a call. In other respects it had been a bad day; our baby had been screaming for hours, as she had been for some days, with an apparent bellyache which the doctor hadn't yet diagnosed and we were at our wit's end. The van B's noted and shared our concern, but began to tell us about the illnesses that their children had suffered and within an hour had convinced us that the bellyache probably wouldn't be fatal after all. Even the baby, fascinated no doubt by van B's beard, settled down in his arms and went to sleep. As they left they made us promise to write to them about the baby; we were glad to tell them a few weeks later that the trouble had been found and she was improving.

The Yerkes students used to tell a wonderful story about van B which I have often told my students when describing the old 40-inch refractor. In the pre-1940 days the control for the rising floor (75 feet in diameter) was an enormous rheostat near the pier with a great brass handle like the control of an old-fashioned street-car. It was often a fairly long walk from the breech-end of the telescope to the rheostat, and if the telescope was west of the meridian we would be inclined to stretch up to the eyepiece as long as we could before raising the floor. van B, it seems, had a habit of going even further: if his observation (of a double star with the filar micrometer) was nearly finished he would chin himself with one arm and complete the observation using the other hand on the micrometer controls. One extremely cold night, just after the aged observing assistant, Sullivan, had gone off for his lunch, van B found himself doing his little trick, but the observation was a difficult one and by the time he had completed it he discovered that his beard was firmly frozen to the eye-piece housing and that no amount of tugging with his free hand would free it. Indeed the harder he worked, the firmer became the attachment. There was nothing to do but to hang there until finally Sullivan arrived back, brought the floor up to him and got some warm water to defrost his beard and release him. In 1967 I told van B this version of the story and asked him if it was true. His eyes crinkled and he said that it was precisely true except in one detail: it wasn't his beard, it was his moustache. He appeared to attach some importance to this fine distinction.

When I was leaving Yerkes to come to Richmond Hill van B presented me with a hand-drawn version of his nomogram for checking the reduction to the sun for radial velocities. It consisted of a few carefully plotted curves and three weighted threads which hung over the quarter-circular edge of a board. To get the solar correction was a matter of moving vertically from a reading on scale A to the first curve then across to the black thread then down to no. 1 white, then across to scale B --- or some such complicated manoeuvre. I never knew quite why it worked, but for 35 years (until we got our I-A terminal) all measurers routinely used it to check the logarithmic computations of the solar corrections and wrote down "van B + 13.5", or whatever, at the bottom of the sheet. van B's original graph wore out eventually, but its re-drawn successor is probably still lying in or near the measuring room.

van B was an extremely modest man but, for all that, he was well aware of the importance of his life-long observations of visual binaries. His greatest concern was that when he stopped perhaps no one would continue to observe the long-period binaries which still lack accurate orbits and which are especially important inasmuch as they include preferentially the low-mass stars. Perhaps this is what kept him alive so long. In any event, his work will live for centuries in the astronomical literature along with that of his famous predecessors, Herschel and Struve and the rest.

J. F. H.

OBSERVING

TV Guiding for the 74-inch - a Progress Report

For some time now Tony Estevens and I have been playing with low-light-level (L^3) TV cameras, mostly trying to get them to work in the lab but occasionally mounting them on the 24-inch to find out what's wrong with them in real life. Eventually we hope to do science with these devices, i.e. get numbers out, but at this early stage we are satisfied with learning the idiosyncrasies of the "front end" and we simply look at the pretty(?) pictures on the monitor. An immediate application of this experimental phase will be to provide remote viewing and guiding at the 74-inch spectrograph. Hopefully the observer will then be at liberty to sit out the cold nights in the warm data room (which can be done, of course, without the TV) and also to see the star image on the slit (which cannot).

Our present workhorse is a small surveillance camera (Hitachi TIE 15) which comes with an "L^3 vidicon" (S-20 cathode) and a low noise FET video preamplifier. Obtaining an image of Sirius with the 24-inch was no problem and, in good seeing, we were thrilled at the sight of 6.5 mag stars on the screen. We quickly discarded the Hitachi vidicon and replaced it by an RCA 4532-A silicon target vidicon (SIT). These tubes are reputed to have a quantum efficiency reaching 85% at 5000Å and dropping to 10% at 1 micron and are capable of integrating the electronic image on the target for long periods of time (many minutes with a cooled tube). Operated in the standard TV mode (30 frames/sec) this system gives usable images of A stars down to V = 9.0 with the 24-inch, a gain of 10 over the "L^3 tube".

The next step (where we're at now) is to make the thing integrate and to read out the image with maximum efficiency. By playing various games with the target bias and the readout beam and by using tricks which are more reminiscent of the good old photographic techniques (pre-exposure, sensitization) than of "modern" technology, we have obtained convincing images of A stars at V = 14 in 10 seconds of integration and well resolved pictures of the globular cluster M3 on the monitor, thus achieving a further gain of 100 over the standard TV mode.

Our present set up is truly antediluvian (manual switches, no scan converter...) and the performance is evaluated visually on a TV screen that flashes an image for 1/30 of a second and then goes blank for the next integration period. The silicon target is not refrigerated and at ambient temperature (+10°F, -12°C) the dark current saturates the diodes in about 15 seconds. But even then the results appear promising. Numbers juggling indicates that the DQE of our system as presently set up is an appallingly low 0.2%, roughly similar to the efficiency of a 103a plate and more than two orders of magnitude below the quantum efficiency of the silicon diodes. We should improve this shortly by eliminating some obvious sources of system noise and by optimization of the operating parameters. We also have an intensified silicon vidicon on the shelf (RCA-4804 SCI - thank you, JFH!) awaiting camera modifications to be tried. It is likely that within a month or two we will break the 16th mag barrier. After which, the sky is the limit!

Rene Racine

COMINGS & GOINGS

Sidney van den Bergh gave a talk on "Supernova Remnants" at Queen's on Feb. 28. He is now at the AAS meeting in Lincoln, Neb., where he will present a paper on "Tentative Identification of M5 Stars in the Nuclear Bulge of the Galaxy".

Gretchen Hagen attended a meeting of the AAS Committee on Manpower and Employment on March 22 in Washington, D.C.

Tom Bolton spent the week of March 4-9 at DAO working with Anne Cowley and Graham Hill on b Persei.

Vic Gaizauskas and Mike Marlborough spent March 18-22 at Scarborough working with Phillip Kronberg on a second draft of the report on the future of Canadian Astronomy.

Jack Heard, Helen Hogg, Phillip Kronberg and Don MacRae attended meetings of the NRC Associate Committee and the National Committee for the IAU at Queen's, March 1-2.

René Racine was in Paris Mar. 3-9 for a meeting of the Scientific Advisory Committee of the CFHT.

As Chairman of the Board of Trustees of USRA, Don MacRae attended a meeting at the Lunar Science Inst. at Houston on Mar. 6th.

SEMINARS

MARCH

As announced, with the addition of Frank Ahern on "Observations of Young Planetary Nebulae" on March. 12.

The title of Dr. Lecar's talk on Mar. 18 was "Binary X-Ray Sources".

APRIL

Wed. 3rd Dr. P.C. van der Kruit, Cal Tech., "Nuclear Explosions
McL. 203 in Spiral Galaxies and their Effects on the Disks"
4:00 p.m.

Thurs. 4th Dr. Sidney Wolff, Univ. of Hawaii, Title to be announced.
McL. 4 p.m.

APRIL SEMINARS cont'd

Tues. 9th DDO 4 p.m.	Dr. K. A. Innanen, CRESS, York Univ. To be announced
Tues. 16th DDO 4 p.m.	Mr. R. Deupree, Non-Radial Stellar Pulsation: Free Pulsational Graffiti.
Tues. 23rd DDO 4 p.m.	Dr. Krzeminski, Inst. of Ast. Warsaw, Poland & European Southern Obs. Chile "Optical Identifications of Galactic X-Ray Sources"
Tues. 30th DDO 4 p.m.	Dr. R. Garrison, "The Spectra of Mira Variables"

PAPERS SUBMITTED IN MARCH

B.F. Madore S. van den Bergh D.H. Rogstad	Gas Density and the Rate of Star Formation in M33
R.G. Conway, P. Haves, P. Kronberg, D. Stannard, J.P. Vallee, and J.F.C. Wardle	The Radio Polarization of Quasars
S. van den Bergh & G.L. Hagen	Differences Between the Evolutionary Tracks of Young Stars in the Galaxy and in the Magellanic Clouds
J.R. Percy & C. McAlary	Further Photometric Observations of the Delta Scuti Star 44 Tauri
J.R.P. Angel, P. Hintzen P.A. Strittmatter, & P.G. Martin	G240-72 - A New Magnetic White Dwarf with Unusual Polarization.
S. van den Bergh	The Remarkable Object M2-9.

LETTER TO THE EDITOR

NATIONAL RESEARCH COUNCIL OF CANADA
CONSEIL NATIONAL DE RECHERCHES DU CANADA

Lord High Editor in Chief
David Dunlap Doings
Richmond Hill, Ont.

March 8, 1974

OTTAWA, CANADA
K1A OR8

Dear Ed:-

Surely you mean Charles G. Abbot on page 7, volume 7, number 2.

Yours

ペテロ ミルマン

Petero Miruman

Dear Petero,

So sorry! To me arr American names starting with A rook arike!

Ed.

P O T P O U R R I

Born

Congratulations to Ada and Bob Garrison on the arrival of David Charles on Mar. 3.

Leaving

We are sorry to have lost Jennie Fabian, Assistant Secretary at the Observatory since Oct. '71. Jennie and Gerry have bought a new house in Mississauga and moved there on Mar. 15. Jennie is not lost to the University, though, having found a place in the Dean's

office at Erindale. We honoured Jennie at a party on the 12th, presenting her with two gifts for the new home and thanking her for all the good help.

June Institute

The dates June 18-21. The speakers: Dr. Wm. Bidelman, Director Warner and Swasey Observatory; Dr. Pierre Demarque, Director Yale University Observatory; Dr. Stephen Strom, Kitt Peak Observatory; Dr. Barry Turner, N.R.A.O. For more information write to Dr. John Percy at the Department of Astronomy, U. of T.

Wins Award

Don Fernie, faithful final itemizer, has turned his talents into cash by winning third prize in the Griffith Observatory Annual Essay Contest with his entry, "Transits and Travels, Trials and Tribulations".

Wins PDF

Bob Deupree has been awarded a post-doc fellowship at Princeton where he will work with Prof. Martin Schwarzschild.

Talks

John Percy was a guest lecturer at the Faculty of Education on Feb. 20, giving a talk to the physics specialists on "Astronomy in the Elementary and Secondary Schools".

Helen Hogg spoke in the U. of T. School of Continuing Studies series on Problems of Growth on "Growth in Understanding of the Physical Cosmos" on Mar. 21.

DDO VISITOR

Dr. Barry Newell was at the Observatory at noon on Sat. Feb. 23 to discuss the Yale system of electronographic photometry with those interested.

Derek Sida Leaving

A farewell luncheon on the 15th floor has been arranged for Mar. 29 in honour of Derek Sida who will return to Carleton soon. Derek has been a stimulating presence among us during the past few months. Sorry to see him go.

FINAL ITEM

The Carpenter's Chronometers. II.

As described last time, the problem of determining longitude at sea had become so urgent that in 1714 the British Government offered a prize of £20,000 to anyone who could provide a method for obtaining longitude to within half-a-degree. Despite a flood of imaginative schemes, the prize went untouched for fifty years. In fact, the long-suffering Board of Longitude became so used to rejecting everything put before it, that when eventually John Harrison laid legitimate claim to the prize, the Board couldn't really bring itself to hand it over. Surely there had to be a catch somewhere.

John Harrison was born in a Yorkshire village in 1693, the son of a carpenter, and was brought up to follow his father's trade. His interests lay elsewhere, however, and without any training in the subject at all, he had soon taught himself enough about clocks to be able to repair and even construct them while he was still a teenager. Before he was twenty he had made two important contributions to horology: the invention of a temperature-compensated pendulum, and the invention of a remarkably efficient escapement known as a 'grasshopper'.

At twenty-one, hearing of the newly-offered £20,000 prize, Harrison set to work to build a seaworthy clock that would meet the necessary specifications. He soon had plans drawn up, but needed financial assistance to build the instrument. Since the Board of Longitude was empowered to advance money for likely schemes, Harrison went to London to see Edmond Halley, a member of the Board. Halley told him flatly that the Board would not advance him money since they had no idea of whether the clock would work or not, and that he would be better advised to consult George Graham, London's leading clockmaker. Graham was impressed by the young man, and generously gave him an interest-free loan to build his clock.

Harrison, being a craftsman, took seven years over the job. The completed instrument hardly looks like any modern clock; it weighs 72 lbs., has four dials, and occupies an entire table-top. But it worked, and the Board arranged for a trial at sea. The clock was sent off on a voyage to Lisbon and back, with Harrison in attendance. Unfortunately the trial was inconclusive because the ship's captain, who was conducting the test, died in Lisbon without leaving any report. However, the ship's navigator gave Harrison a statement to the effect that on the voyage home both he and Harrison made an estimate of their expected point of landfall, and that he was 90 miles out while Harrison was correct. (Such was the state of navigation: even on a short, well-worn route like that a navigator could unblushingly admit to being 90 miles out in longitude.)

Things looked promising, but before another trial could be arranged, Harrison's inventiveness overtook him and he announced that he would now build an even better clock. No. 2 was completed in a mere two years, and looked even

less clock-like than its predecessor, weighing in at an impressive 102 lbs. By this time, though, Britain was at war with Spain, and the Board declined any sea trials on the grounds that the valuable instrument might be captured by the enemy. Always foreseeing further improvements, Harrison started on No. 3. This one, however, took him no less than seventeen years to complete, bringing the date to 1757.

By now Harrison had made a name for himself, and on the strength of clock No. 1, the Board was prepared to advance him small sums of money from time to time for development purposes. His reputation reached such heights that the Royal Society awarded him its Copley Medal, an unheard of thing for a relatively uneducated village carpenter to achieve.

While No. 3 was in the making, Harrison realized the need for a much more compact timekeeper, and so simultaneously built No. 4. This was a very large watch, about five inches in diameter, and was the first true marine chronometer. Harrison was so pleased with it that when they finally got around to sea trials again in 1761 he withheld No. 3 and went for broke with No. 4.

This trial would be no less than a trans-Atlantic voyage to Jamaica and back. John Harrison himself, by now 68, decided to wait at home, sending in his place his son William. No sooner were they out of port than the longitude reckonings of Harrison and the ship's navigator began to diverge; who would be right in getting them to the first port of call, Madeira? The entire ship's company anxiously awaited the outcome, for to the horror of all hands it had been found that the beer had spoilt, over a thousand gallons of it, and as the captain put it "the People oblidged to drink water". Happily the captain put his faith in Harrison's watch, which soon delivered them to Madeira and "3 Pipes of Wine for the Ship's Company". They reached Jamaica with the watch giving their position only 1' in error. The conditions had been well and truly met, the prize won!

With provincial optimism the Harrisons applied for their £20,000. Ah no, said the Board of Longitude; so excellent a result could only be a sheer fluke. They'd better have another trial. So off went William with No. 4 again, this time to Barbados. There William was outraged to find that Nevil Maskelyne, arch-rival for the prize, had been sent ahead as one of the judges. But despite Maskelyne's sneering attitude the watch proved its worth, even to the length of still being within the specified limits after the voyage home. Surely the prize must now be handed over. But no, the Board would only offer half the prize money, and that only upon receipt of all the timekeepers and full drawings and plans. For the rest Harrison would have to build two more chronometers, show that other clockmakers could duplicate them, and the whole lot would have to undergo new stringent tests. While John Harrison, now 78 and going blind, set to work on No. 5, Maskelyne tested the others at Greenwich, doing his best to report poor results. (This even included an initially un-reported dropping of one of the timekeepers.)

The Harrisons began to get the hang of the game, and when No. 5 was completed they gained an audience with the King prior to submitting the watch to the Board. The King listened with growing incredulity to their story. At the end Farmer George, as he became known, roared "By God, Harrison, I'll see you righted!". No. 5 was tested at the King's private observatory at Kew, His Majesty

personally attending the daily readings. The Board didn't care; it wasn't their test. Aloofly they proposed sending the watch on a voyage to Hudson Bay, then possibly with Cook to the Pacific (which it eventually did, proving a godsend to Cook), and topping it off with a few months bucking around the North Sea.

The Yorkshireman wouldn't give up. He petitioned Parliament. The King offered to appear at the Bar under a lesser title to plead the case. When the Board heard that Parliament would likely investigate the case they finally capitulated. But with sneaky meaness they had the last laugh; in giving Harrison the remaining £10,000 they (illegally) kept back the small amounts of money they had previously granted him. Harrison let it go; he had only three years of life left.

Finally, what became of the first four timekeepers? For many, many years they were left in neglect at the Greenwich Observatory. In the 1920's a Commander Gould found them broken, corroded, with parts missing, and as a labour of love and at his own expense he was allowed to restore them to working order. (So intricate were they, it took him 13 years.) Today, if you find yourself in London, take a trip down to Greenwich. There, in the beautiful Maritime Museum you will find John Harrison's timekeepers, quietly ticking away the hours as accurately as they did 200 years ago, while outside on the river ships set forth on voyages first made possible by them.

J.D.F.