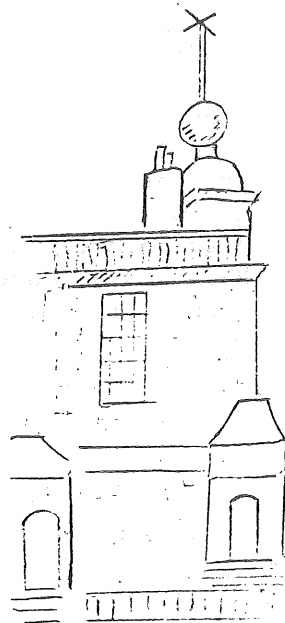


DAVID DUNLAP DOINGS

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The Time Ball at Greenwich

See Editorial

EDITORIAL

Some Memories of Greenwich and an AR-to-be

Last month, returning from Poland, my wife and I spent a few days in London. One of the things I wanted to do was to make a visit to Greenwich which I hadn't seen for forty years. So we took the interesting boat excursion from Westminster to Greenwich pier, and trudged up the steep hill to the old Royal Observatory. It was a sunny Sunday and there were many other visitors. However, I found the Superintendent, a Mr. Newton (!) and he very kindly took us to see the old 28-inch Equatorial (which, along with other instruments, has recently been returned from Herstmonceux) and sneaked us past envious-looking visitors into Flamsteed House, the original building of the Observatory and traditional home of the Astronomers Royal, which is now closed to the public pending restorations for the 1975 tercentenary celebration.

My memories of Greenwich go back to 1933 when, as a graduate student in Alfred Fowler's astrophysical laboratory at Imperial College, I was beginning to want to be an astronomer. When I timidly asked a member of the Greenwich observing staff (strangely enough also a Mr. Newton) about the chances of helping with some observing, he showed an alacrity which I understand better now than I did then. Yes, he said, in fact they would turn over the 28-inch to me for their parallax-program observations every other Tuesday. (This, I later discovered, freed up the one whose turn it was to miss the R.A.S. meeting so as to watch the clouds at Greenwich). So, after a little inadequate briefing on the 28-inch by Mr. Newton, I began making fortnightly pilgrimages by train from South Kensington to Greenwich. Mostly I watched clouds, but on one occasion it cleared up, and I went into a fever of activity and actually succeeded in taking a few photographs of parallax fields, not even forgetting to start the rotating sector which cut down the brightness of the parallax star in mid-field, or to draw the dark slide. I spoiled one exposure, though, through inadvertence. Part way through that exposure I froze in terror when there was a sudden rumbling and the dome and telescope quivered and shook for about three minutes. Mr. Newton later apologized for forgetting to tell me that the weight of the clock drive would be raised automatically every two hours, and to explain how this could be anticipated so it wouldn't occur during an exposure.

During this phase of my observing career Richard Woolley, then one of the juniors who lived in a cottage on the Observatory grounds, invited me out there for Sunday lunch. At about 12:45 Woolley asked me if I'd like to walk over to Flamsteed House with him while he dropped the time ball at 1 p.m. As we walked up the hill he grumbled that this was a lot of nonsense and a damned nuisance on week-ends when the porter wasn't on duty and junior staff members had to be scheduled for the job; and anyway no ships needed the signal in these days of radio time transmissions, but as sure as the damned time ball failed to fall some crusty old river-boat master would Write a Letter to the Times or, worse still, get his member to Ask a Question in the House. Anyway, while Woolley watched a clock I pulled a rope when he said "now", and we walked back down the hill to the very nich lunch which Mrs. Woolley had ready.

I didn't meet Woolley again until about 1950 when he made a brief stop at the DDO on a trip across the continent. He gave us a talk and I volunteered to drive him to the airport for his scheduled flight to Los Angeles. I was delaying my thanks for his visit and my farewell until he was about to step through that dread portal marked "passengers only; no return". But that little ceremony never took place. The ticket-taker looked at Woolley's ticket, consulted a list and said urbanely, "I'm sorry, sir, you did not reconfirm and your seat has been resold", Woolley turned purple and began to roar as only an aggrieved Englishman of that social class can. "Reconfirm? What kind of damned nonsense is this? Been all over the world by air, never heard of it!" The ticket-taker, visibly intimidated by Woolley's complexion and decibels, said he would see what he could do if "Sir" would please follow him. I, completely forgotten, watched them stride through the no-return portal.

I waited a decent length of time and then went home.

J.F.H.

OBSERVING

The 74-inch

During the past few months the spectrograph collimator, the Cassegrain mirror and the primary of the 74-inch have all been re-aluminized, resulting in an appreciable increase in speed. Also the mechanical parts for the three-coordinate readout and control system have been installed and await the completion of the electronics.

Las Campanas

Bob Garrison reports good news from Las Campanas. Chris Smith has been able to carry on with observing throughout the troubles, transportation is no longer a problem and our lawyer, Antonio Urrutia in Santiago assures us that there will be no trouble for astronomers. ESO, Cerro Tololo and Carnegie have been operating as usual without problems. Austin Gulliver left for Las Campanas on October 17, and Tony Stevens will spend Nov. 5 - Nov. 20 there on technical aspects of photometry.

Observing in Northern Arizona by Frank Ahern

The outstanding feature of Northern Arizona, which profoundly influences the climate and terrain, and therefore the astronomy, is the Coconino Plateau. This is a stack of pre-Cambrian and Paleozoic rock more than a mile thick which covers most of northern Arizona. The town of Flagstaff sits at 7000 feet,

higher than the top of Kitt Peak. This results in a cooler, moister climate than in the southern desert, and Flagstaff is near the centre of the Coconino National Forest, a beautiful, extensive growth of Ponderosa Pine.

Nonetheless, Flagstaff enjoys an abundance of clear weather, especially in the long spring and fall seasons. Even in the late summer during the thunderstorm season the sky often clears completely by midnight.

There are three Flagstaff institutions doing astronomy. The Lowell Observatory, a private institution founded by Percival Lowell, is located on Mars Hill at the western edge of Flagstaff. On Mars Hill are a 24-inch reflector and a 24-inch refractor in regular operation, and numerous smaller telescopes which are used intermittently. In addition, Lowell operates 31-inch 42-inch and 72-inch reflectors on Anderson Mesa, approximately 12 miles south of Flagstaff. The 72-inch belongs to Ohio State and Ohio Wesleyan Universities and is operated by Lowell in return for half of the observing time.

The U.S. Naval Observatory operates a 61-inch astrometric reflector, a truly beautiful instrument, and a smaller reflector which is the original Ritchey-Chretien telescope.

Finally, Northern Arizona University, a branch of the state university system, has a 24-inch reflector.

Chris Pritchett and I observed for ten nights on the 72-inch and for a total of 18 nights in two sessions on the 31-inch. The sky was completely clear 80 or 85 per cent of our observing time, and I doubt that we lost even ten per cent of our time to clouds. The sky is very transparent because of the altitude, and very dark because the only town is Flagstaff, about the size of Richmond Hill, some 12 miles to the north. John Hall, the director of Lowell Observatory, has been very energetic in fighting excessive lighting in Flagstaff. All of the street lamps are being shielded, and now he is getting the commercial establishments to cooperate. Texaco has modified all its gas station signs in Flagstaff so that only the red letters in the signs are illuminated, not the white background.

We had a very profitable time in Flagstaff and wish to thank Dr. Hall for allowing us to use the Lowell facilities, and Bob Millis for generous amounts of observing time. The entire staff, especially Nat White, Bob Millis, and Jean Sheeley, were very helpful with all of the logistics during our visit.

"Observing" in Tel Aviv

The following is a paragraph of a letter received Oct. 18 by Sidney van den Bergh from Peter Wehinger of the Wise Observatory.

Life here in Tel Aviv is going on while the war rages on both fronts. The University is deserted except for women, old men, and a few of us foreigners. Food, water, and electrical power have continued to flow without interruption - fortunately. The Wise Observatory is closed as all the technicians are at the front. The night sky in Tel Aviv is very dark this week

COMINGS AND GOINGS

Sidney van den Bergh spent Oct. 3-18 at the Institute for Advanced Study and the Department of Astronomy at Princeton. Among other things he completed several more chapters of his book and gave a talk on "Supernova Remnants" on Oct. 9. On the 21st he left for six nights observing on the Palomar 48-inch.

Don MacRae was in Houston Oct. 21-23 for a meeting of the Universities Space Research Association.

Helen Hogg, Don MacRae, Phil Kronberg and Jack Heard attended a meeting of the NRC Associate Committee on Astronomy at U.W.O. Oct. 26-27.

Jack Heard attended meetings of the Council of the Science Section of the R.S.C. in Ottawa on Oct. 11-12.

SEMINARS

OCTOBER As announced in DDD 6, 9 except

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|------------------------|--------------------------------------|---|
| Thurs. 4th
McLennan | Dr. Tyson of Bell Labs. | "Gravity Waves" (Joint with
Physics) |
| Tues. 9th
D.D.O. | Drs. Kronberg, Roeder and Heard | "Reports from the
Poland Symposia" |
| Tues. 16th
D.D.O. | Drs. MacRae and Racine: | "Progress Reports on the CFHT" |
| Wed. 24th
McLennan | Dr. Reuven Opher, NASA, Ames | "Absorption Lines in
Quasars" |
| Tues. 30th | Dr. Richard Stothers, NASA, Goddard, | "Neutrino Astronomy". |

NOVEMBER SEMINARS

- Tues. 6th TO BE ANNOUNCED
- Tues. 13th D.D.O. Dr. Tacini, Cornell University, "Pulsar Electrodynamics and the Evolution of Supernova Remnants"
- Tues. 20th Dr. Yervant Terzian, Dept. of Physics, Université de Montréal, "Planetary Nebulae: Mild Stellar Explosions"
- Tues. 27th Jack Winzer (D.D.O.) TO BE ANNOUNCED

PAPERS SUBMITTED IN OCTOBER

- S. van den Bergh "Supernova Remnants"
- J. Winzer "Photometric Variations of the Helium-Weak Star HR 1063"
- J.R. Percy "The Statistics of the Beta Cephei Stars"
- F.J. Ahern "Modern Instrumentation for Optical Astronomy"

P O T P O U R R I

Thanksgiving Notes

On Sat. Oct. 6 Kathy and Barry Madore were hosts to about 30 staff and students for the usual good talk which their parties always engender and a Thanksgiving Buffet at midnight.

Friday's Star carried a large picture of Gerry Longworth's smallest grandson, Thomas Large, with his generous mouth wide open in a paeon of joy being rehearsed by the boys' choir of Richmond Hill's Anglican St. Mary's Church for their Thanksgiving Service.

The next day's Star carried a picture of another staff progeny: Dave Blyth's daughter Cornelia who was one of a group of new nursing students at the School of Nursing of Seneca College.

New Students

The new graduate students hard at work already are: Shyam Jakate from India, Jose (Sancho) Maza from Univ. of Chile, Martine Normandin from Univ. of Montreal, Jurg Pfund from Switzerland (via Montreal) and Simon White from Cambridge. Add to these Dr. John Sorvar

from the Univ. of Rochester who is a new post doc. We regretted that Nick Kasimos changed his mind about astronomy as a career and has withdrawn.

Appointment

Carol Boyd has joined the staff as of Oct. 4 as secretary in Room 1401, McLennan.

Visitors

Mrs. Joseph S. (Mary) Greer of Vancouver has been visiting in Toronto and area during the month. She was guest of honour at a small dinner party at the Heards' on Oct. 19 and at a ladies' luncheon given by Betty MacRae on Oct. 24 at Observatory House - after which some of the guests came to the Observatory to see the portrait of Mrs. Greer's father, the late Walter Helm.

Dr. Carlos Cesco, Director of the Felix Aguilar Observatory (the old Yale Columbia Station) in Argentina, visited the Observatory briefly on Sept. 20.

The Electromagnetic Media

Phil Kronberg was a guest of Peter Gzowski on his CBC "This Day in the Morning" radio show on Oct. 5 on a life-elsewhere theme and again on Oct. 18 on a signals-from-space theme.

On Oct. 10 a crew from the CBC French network, Montreal, visited the Observatory and got an interview with Phil Kronberg in French for a special program on Copernicus for Nov. 25 which will be shown locally on Channel 25. They also made footage with Phil, Serge Pineault and Tricia Edwards for a forthcoming show on Quasars.

Let us hope that these efforts will be better than the CBC's long-planned "Copernicus" which was broadcast on Oct. 21. Having perfected the non-play, CBC is now working on the non-documentary. A few snippets from a Polish film, a few old bits about tracking sputniks, a few party-line propaganda bits, all interrupted repeatedly by McLuhan mouthings about the electric age and the speed of light, and a terrible gaff in the simulation of a total solar eclipse (shame on the CBC for committing it or failing to correct it).

Very disappointing, Mr. Sinclair!

ed.

Deadline for CASSIOPEIA

Will our "outside" readers please remember the deadline for sending material to David DuPuy, St. Mary's Univ., Halifax, N.S. is Nov. 15.

CAS Council

The meeting of the Council of the C.A.S. was held in the Burton Tower on Sunday 28th. Following this meeting Rene Racine left for the Hawaii meeting of the Scientific Advisory Committee of CFHT.

Erindale News

On Sunday October 14, the Erindale Campus held a successful Open House in conjunction with the official opening of the new buildings by Premier Davis. Nearly four thousand people toured the exhibits, and 2700 filed past a fist-sized lunar rock brought specially from Houston. Bob Deupree, Bill Harris, Martine Normandin, John Percy and Rene Racine set up a varied astronomy display, including two operating telescopes, the DDO classification spectrograph and photometer, meteorites, slides, a film and many photographs including some taken at Las Campanas.

The Seminar announced last month for Tues. Oct. 23 at Erindale also was expanded into an open house for the Astronomy Department of the University, including campus tours, staff meeting and tea as well as the scheduled talks by John Percy and Rene Racine.

R.A.S.C. Talks

John Percy gave a lecture on "Astronomy in Cambridge: From Newton to Now" to the R.A.S.C. Toronto Centre on October 12 and to the Ottawa Centre on October 17.

FINAL ITEM

Guass, Hegel, and the Lilienthal Detectives

On an early winter's evening in the year 1800, a small group of German astronomers met in the home of Johann Schröter in the town of Lilienthal for an evening of social talk and refreshment. Among them was Baron Franz von Zach, court astronomer to the Duke of Saxe-Gotha, and founder of the world's first journal of astronomy. As the conversation inevitably turned to shop-talk, von Zach confided to the group his long-standing ambition to organize a systematic search for the missing planet which, according to the Titius-Bode law, still awaited discovery between the orbits of Mars and Jupiter. The accidental discovery of Uranus some years before at just the distance from the sun accorded it by that law had spurred von Zach to attempt the search himself, but as the years had gone by and the work proceeded very slowly, he had come to realize that it would have to be a shared undertaking. Enthusiastically the social group now took up his suggestion, dubbing themselves the Lilienthal Detectives, and immediately proceeded to work out a plan of attack. Twenty-four astronomers would be approached, each to be asked to undertake a detailed mapping of a pre-assigned section of the Zodiac. Comparison of subsequent observations against this map would then reveal the motion of any planetary body. Among the twenty-four names appeared that of Father Guiseppe Piazzi, professor of Mathematics at Palermo.

Long before news of this election reached him down in Sicily, however, the 54 year-old Piazzi had inadvertently made the discovery von Zach hoped for. Apparently not much given to New Year cheer, Piazzi had been celebrating the opening hours of the nineteenth century working on his project of many years,

the compilation of a new star catalogue. In the course of that New Year's night of 1801 he plotted the position of an eighth-magnitude star in Taurus, and, since it was his custom to observe the same stars on four consecutive nights, he came back to it the following night, only to find its position changed. It was a crucial moment. More than one astronomer before him had arrived at such a moment, ignored the discrepancy by simply rejecting the first observation, and so missed everlasting fame. Uranus, for example, would have been found almost a century earlier if others had not shrugged off such seemingly minor discrepancies. Perhaps with this in mind, Piazzi paid close attention to his moving 'star', and sure enough, there was soon no doubt that it must be a planet. By mid-January it had gone into retrograde motion, and then again into direct motion. Piazzi kept after it until severe illness forced him to stop on February 11, and between that and bad weather, he could get no further observations of the planet before the sun had moved into that part of the sky. On January 24 he had written letters to Oriani in Milan, Lalande in Paris, and Bode in Berlin, telling them of his discovery, but the mails being then frequently no better than they are now occasionally, it was around March and April before the letters reached their destinations. No one was able to check Piazzi's findings, and the crucial question was whether they would be able to predict where to find the new planet among the stars when the next observing season came around the following Fall. Piazzi himself was a model of modesty, writing to Bode and Lalande that the object was probably just a comet; only to his friend Oriani did he confide that he thought it a planet. But the observations spoke for themselves, and soon the word had spread that a new planet had been found. von Zach, generously, was overjoyed.

Another victim of the delay in Piazzi's letters was George Wilhelm Hegel, 30 year-old philosopher at Jena, the fame of whose philosophic works was to be exceeded only by their abstruseness. Even as Piazzi was observing the new planet, Hegel was writing a treatise showing conclusively on philosophic grounds that no such object could exist. This remarkable piece of sophistry was published just as von Zach was announcing the discovery of the planet in his astronomical journal, but whether Hegel's face ever reddened is doubtful. A man who upon first viewing the Alps could offer only a shrug and the comment "Es ist so" may not have cared that much.

Meanwhile, during that summer of 1801, Piazzi had decided to name his planet Ceres Ferdinandea, after his ruler and the titular goddess of Sicily. The problem, though, was how they were ever going to find Ceres again. After von Zach had published Piazzi's observations several eminent astronomers attempted to calculate its orbit and predict its position for the coming observing season. Not only did the results disagree, but when September rolled around and observations began, all the predictions proved wrong. The available methods of orbit calculation were simply too crude.

Ceres might have had to await another accidental discovery had it not been for a young and as yet relatively unknown mathematician in Brunswick. Karl Friedrich Gauss, later to be recognized as one of the greatest mathematicians in history, was then just beginning his profound work in pure mathematics. But coming on von Zach's article about Ceres, the 24 year-old Gauss thought it would be fun to take a little time off and see if he could develop a new method of orbit calculation based on only the simplest of assumptions. His interest was stimulated not merely by orbital theory, but because the problem would allow him to indulge a

small vice of his. Not only was Gauss a mathematical genius, he was also a calculating prodigy. There is the celebrated story of little Karl, aged two, casually correcting his father's addition of a long list of labourers' wages, and all his life, while others slaved over their log tables, Gauss did prodigious arithmetic calculations in his head. Thus the Ceres problem not only allowed scope for new theory, but afforded Gauss an excuse to amuse himself with some calculation as well.

It didn't take long. In one month (October) he had essentially re-written orbital theory forever, and in early November he checked his theory by calculating the orbit of a comet. What had taken no less a person than Euler three days to solve, Gauss solved in under an hour. (Gauss, incidentally, took some years to polish his theory before publishing it. Along the way he noted that astronomers never really knew how to incorporate more than the essential minimum number of observations into their calculations, so he developed least-squares to take care of that.) Later in November he communicated his predictions for Ceres' position to von Zach, and the Lilienthal Detectives went to work at their telescopes.

After a frustrating spell of bad weather, skies cleared on December 31, and on almost the precise anniversary of Piazzi's discovery, von Zach and Heinrich Olbers (of paradox fame) and one of the original Detectives) independently found Ceres at just the position predicted by Gauss.

In its way, that was just the beginning. William Herschel, for instance, was to doubt literally his own eyes over the smallness of Ceres as a planet (hence, perhaps, his unfortunate misnomer 'asteroid' for minor planets), while Olbers was astonished to discover accidentally another such object (Pallas) three months later. The Lilienthal Detectives were not to close their casebooks yet.

(More in Morton Grosser's 'The Discovery of Neptune', Harvard Univ. Press 1962, Willy Ley's 'Watchers of the Skies', Viking Press, New York, 1969, Eric Bell's 'Men of Mathematics', Simon & Schuster, New York, 1937, and Eric Forbes, JHA 2, 195, 1971.)

J.D.F.