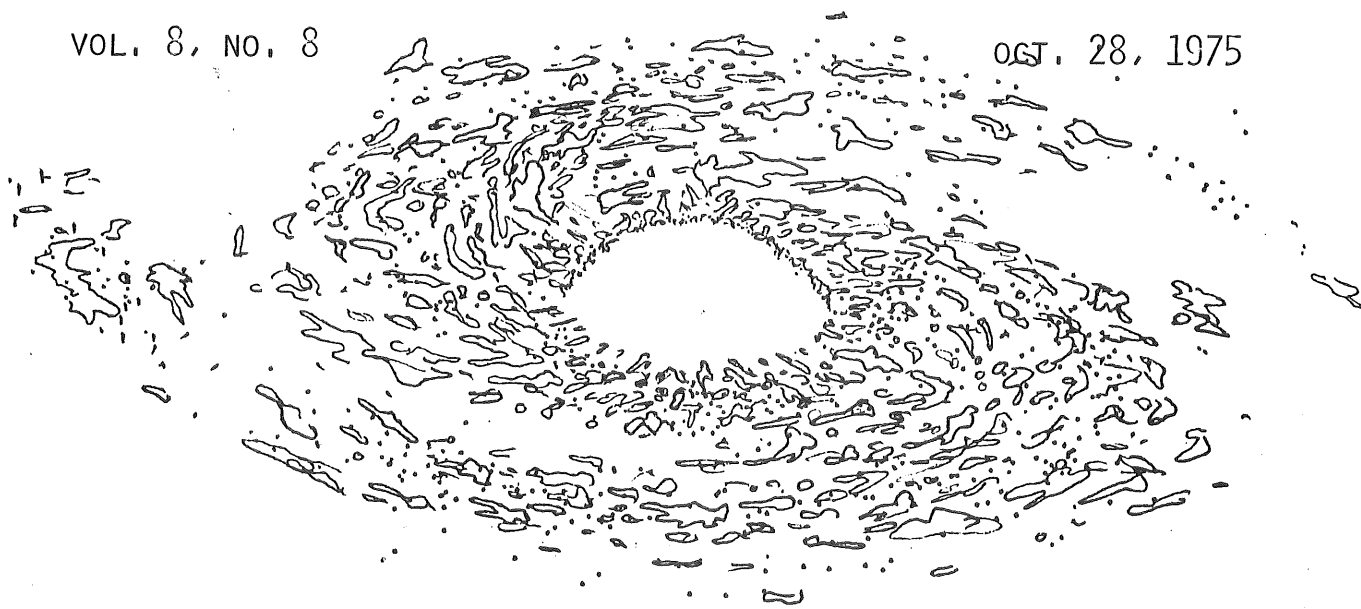


# DAVID DUNLAP DOINGS

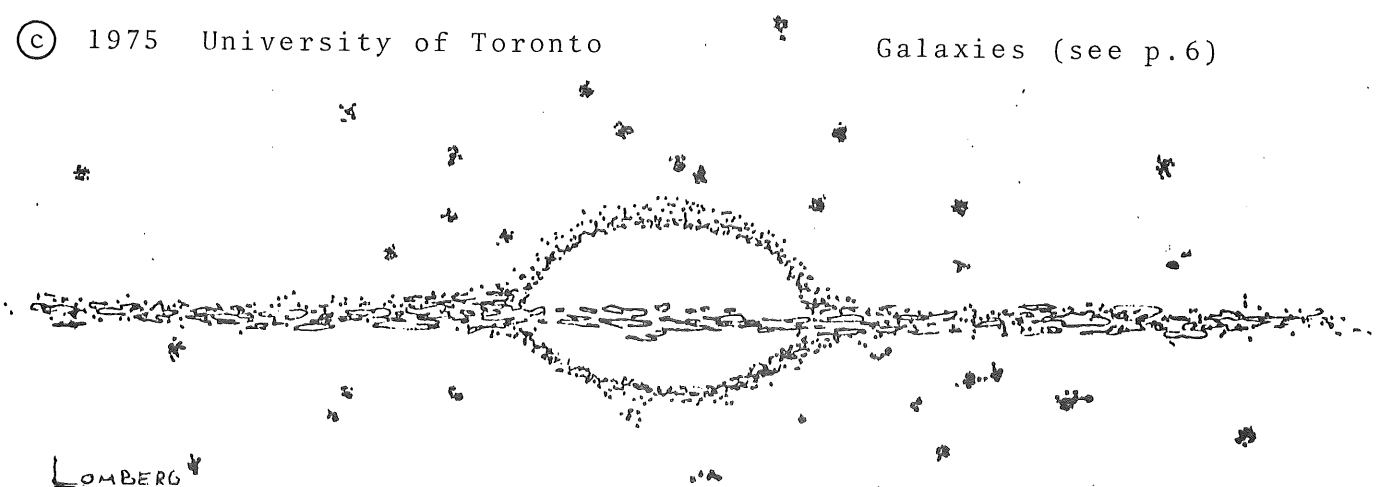
VOL. 8, NO. 8

OCT. 28, 1975



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Galaxies (see p.6)



LOMBERG

## EDITORIAL

### Chant and Lowell

*Here's to the city of Boston,  
The home of the bean and the cod,  
Where Cabots speak only to Lowells,  
And Lowells speak only to God.*

The Lowells of this irreverent little verse were the brilliant and distinguished New England family into which was born in 1855 one of astronomy's most colourful, flamboyant and contentious figures.

Percival Lowell, after taking a degree at Harvard in a program involving mathematics, physics classics and history, spent the next 16 years of his life in travel, business and the diplomatic service (Japan and Korea), and then at the age of 38 turned abruptly to astronomy. Within a year he had conducted a site search for an observatory and settled on Mars Hill near the small town (800) of Flagstaff. Within another year he had purchased and installed a 24-inch refractor by Alvin Clark. Then with two assistants he began the planetary observations and interpretations and search for Planet X which were to be his life work. Much of his work was sound and has stood the test of time; other parts were quite the reverse.

Some weeks ago, Ian Halliday ran across a paper by Lowell in the Journal of the R.A.S.C. for 1916 on "The Genesis of the Planets" which was the text of a public lecture in Toronto sponsored by the R.A.S.C. Ian was struck by some of the (to say the least) very strange statements in Lowell's paper - statements which he thought must have seemed ridiculous even in those days to a person of Chant's insight. He wondered, and asked me, if Dr. Chant's unpublished autobiography would shed any light on his opinion of Lowell.

In the course of mentioning Lowell to a colleague at the Herzberg Institute Ian learned of the existence of a curious book published in 1921. (Lowell had died in 1916 a few months after the R.A.S.C. paper appeared.) This book was written by Louise Leonard and is entitled "Percival Lowell, an Afterglow". Miss Leonard apparently had been Lowell's secretary, and the book includes a few extravagant tributes by friends of Lowell, some anecdotes, a few facsimiles of letters written by Lowell to Miss Leonard; but for the most part (about 75 per cent) the book consists of excerpts, some as short as one or two sentences, from what must have been hundreds of letters written by Lowell to Miss Leonard between 1906 and 1916. Most of the letters were written from Flagstaff, but when he was on voyages abroad he seemed to write almost daily. Miss Leonard, it appears,

lived in Boston, and one would guess that she was his secretary at M.I.T. where he held the position of "non-resident professor of astronomy". It is clear, however, that she visited Flagstaff from time to time.

In the DDO library we have a copy of Miss Leonard's book, donated by Dr. Chant, and pasted in the back is a little hand-written note from Louise Leonard expressing the hope that Dr. Chant "might feel inclined to write a notice of it for the Journal of the R.A.S. of Canada..."

Apparently Dr. Chant did not feel so inclined, for nothing appears about it either among Reviews or in his Notes and Queries column. It could be that he shared the shock that the little book is said to have caused in astronomical circles in the U.S. Perhaps shock is too strong a word, maybe embarrassment; there is nothing at all shocking about any of the excerpts; they are concerned with his planetary observations and his lectures and with the depth of the snow and his garden and the rabbits and trees and flowers. Yet it does seem strange that he wrote so often (and she too, apparently) and that they shared such tender sentiments about the beauties of nature. The fact that Lowell was married (at age 53) during the decade spanned by this correspondence, and the complete lack of any reference to his wife in the excerpts add to the strangeness. Of course, it may be that the excerpts were presented out of context in such a manner as to give a false impression. Perhaps each letter had a thoroughly mundane purpose; in fact some of them did: send me such-and-such slides, send so-and-so a reprint.

In 1935 the astronomer's brother, A. Lawrence Lowell, then about 78, published a definitive biography of Percival. In it he makes no mention of Miss Leonard or her book.

To get back to Dr. Chant, there were two references to him among Miss Leonard's excerpts. One, written in the King Edward Hotel, refers to his lecture in Toronto on April 27, 1916, mentioning Chant (his host) and President Faulkner of the University and a lunch with the Harvard Club of Toronto and a dinner with a few "select astronomers". The other reference is later in the book and therefore later in that year. (Miss Leonard strangely does not date her excerpts, but does say that they are presented in chronological order.) This second one reads:

"A letter came just (Sat.) now from Professor Chant who was so pleased with the Saturn's Rings Memoir that he wanted an article on it for the Journal of the R.A.S. of Canada - Eheu! "

Ian Halliday found the "Eheu" puzzling and wondered if it meant "Yech!" No, actually it means "Alas", and probably was merely a groan at the thought of writing another paper. No such paper did appear in the J.R.A.S.C., so it is presumed that he hadn't got around to it before death overtook him on Nov. 12, 1916.

As to Dr. Chant's opinion of Lowell, he expressed himself quite emotionally in a one-page note in the same Journal number (vol. 11, no. 1, 1917) which carried the obituary by Frank W. Very:

"In the months of May and June the present writer spent some weeks at Cambridge, Mass., and he had occasion to meet Dr. Lowell a number of times, indeed many courteous attentions were received from him"

And he went on to say that Lowell wasn't in the best of health - poor digestion and insomnia - but that he had been well enough in September to undertake a lecture tour accompanied, as always, by Mrs. Lowell "who gave him whatever attention that devotion and thoughtfulness could suggest". It was shortly after the conclusion of this tour that Lowell, "stricken with apoplexy" died in the night. Chant concluded with a tribute to Lowell as a great scientist.

In his autobiography written in the 1950's Dr. Chant was wont to dwell at length on his many astronomical friends and acquaintances. He doesn't as much as mention Lowell. What happened? Was there more behind the Louise Leonard book than meets the eye? Or had Chant become disillusioned about Lowell's astronomical accomplishments?

J.F.H.

## OBSERVING

### 40,000

It seems fitting that this 40th Anniversary Year should see the 74-inch telescope reach plate no. 40,000 - a spectrogram of HD19394, a Beta Cephei star, taken on the night of Oct. 3-4 by Mary Lane and Archie Ridder. These 40,000 plates if piled on top of one another would tower about 133 feet, if arrayed in a plane would just about cover the front of the Administration Building, or if melted down would yield about eight cubic feet of glass. All of which would be silly things to do with 40,000 plates.

The year ending June 30, 1975, was a pretty good observing year, by the way. According to Don MacRae's annual report the 74-inch worked very close to 1200 hours.

### Progress

René Racine and Tony Estevens have been testing the CCTV remote guiding system recently. It works quite well on 6th magnitude stars and there is every

reason to believe that another 2 or 3 magnitudes improvement can be made without even introducing integrating.

Austin Gulliver has measured a few plates for radial velocities with the PDS (microdensitometer). For F-type stars the agreement with the eyeball method is within a few tenths of a km/s, no significant systematic difference, and a time improvement of a factor of ten or better.

### COMINGS AND GOINGS

Rene Racine visited Regina on Sept. 25-27 as a member of an ad hoc advisory committee to the Faculty of Graduate Studies and Research of the University of Regina. He was also at the University of Montreal on Oct. 8 for discussions of the observatory project there.

Sidney van den Bergh spoke on "Galaxy Evolution and Galaxy Classification" at Rice University, Houston on Sept. 25 and attended a special Directors' meeting of the A.S.P. in Pasadena on Sept. 22.

Shyam Jakate was observing at Kitt Peak Oct. 12-22.

Helen Hogg attended the AAVSO Annual Meeting Oct. 17-19 at Concord, Mass.

### SEMINARS

SEPTEMBER *As recorded in Vol. 8, no. 7 with the addition of:*

Tues. 30th                      Steven Shore, "Ap Stars"  
DDO 4 p.m.

OCTOBER *As announced in Vol. 8, no. 7 with the addition of:*

Tues. 7th                        Prof. Amos Yahil, Princeton, "Big Bang Nucleosynthesis"  
DDO 4 p.m.

Tues. 21st                        Dr. Sandra Faber's title was "Elliptical Galaxies: Velocity  
DDO 4 p.m.                        Dispersions, Internal Dynamics and Gas Content"

Tues. 28th                        Dr. Gustav Tammann, Hale Observatories, "Distances of  
DDO 4 p.m.                        Galaxies in the Local Supercluster".

NOVEMBER

Tues. 4th                         John Percy, "The Problem of the Beta Cephei Stars"  
DDO 4 p.m.

Tues. 11th                        Dave Hanes, "Globular Clusters in the Virgo Cluster"  
DDO 4 p.m.

cont'd . . .

Tues. 18th                      Dr. D.C. Morton, Princeton, "Mass Loss in Stars".  
DDO 4 p.m.

Tues. 25th                      Dr. David Strangway, Dept. of Geology, "A Model for Lunar  
DDO 4 p.m.                      Evolution".

DECEMBER

Dr. Robert Kraft of Lick is expected on Dec. 18th.  
Topic to be announced.

THE ELECTROMAGNETIC MEDIUM

fm Radio

CBC's "Ideas" program for this autumn deals with topics in astronomy. The astronomical series is broadcast over CBC fm (94.1 on the dial in Toronto) on Tuesday evenings at 8.03 p.m.) The astronomical series is entitled "Into the Universe" and has been conceived and written by Jon Lomberg a Toronto artist, galaxy enthusiast and illustrator of Carl Sagan's "The Cosmic Connection". Jon Lomberg dropped in on the June Institute this year to greet his friend Carl Sagan and to listen to a few of the sessions. During a lecture by Mortin Roberts on galaxies he produced some doodling which he later gave to Ihor Prociuk along with permission to use it on a DDD cover if we wished.

To date to our knowledge Jon Lomberg has interviewed Bob Garrison and Sidney van den Bergh on the subject of Galaxies.

The titles in the series have been and will be:

Tuesday, October	7	A Universe Alive
	14	Messages from the Stars
	21	Sailing the Shoreless Skies
	28	Red Planet: Mars and the Mind of Man
November	4	Both Ways from Earth
	11	Two Hundred Billion Suns: The Fires of Creation
	18	Way of the Galaxy
	25	Universes and Other Places

TV

Bob Garrison is finding the topics of UFO's and Exobiology very popular these days. On Oct. 9 and 10 he appeared on Global TV evening news comment and on Channel 19 on the talk show "Night Music" on Oct. 17.

PAPERS SUBMITTED IN OCTOBER

- J.D. Fernie "Historical Search for Stellar Parallax. Part 2"
- P. P. Kronberg "3C303- A Source with Unusual Radio & Optical Properties"
- A. Wehlau,  
J. Conville &  
H.S. Hogg "Period Changes of RR Lyrae Variables in M14"
- E. R. Seaquist "Radio Emission from the Wolf-Rayet Binary  $\gamma^2$  Velorum"
- P. Martin &  
J.R.P. Angel "Systematic Variations in the Wavelength Dependence of Interstellar Circular Polarization".

P O T P O U R R I

Died

Some staff members and former graduate students will remember Lorne Braun who was a student here in radio astronomy some ten years ago and later on the staff in Electrical Engineering. More recently he had been on the research staff in the Department of Telecommunications in Ottawa involved with the Canadian Communication Technology Satellite which is about to be launched. It is with sadness that we record his death in August from cancer. He leaves his wife and three children.

Personnel Changes

Ruth Hofbauer, appointed earlier this summer as assistant secretary at the St. George departmental offices has resigned. At the moment there is no full-time replacement, but Cheryl Hurkens is coming in Mondays and Wednesdays when she is free from lectures in a part-time program of studies at York University.

Pamela Evans, Secretary to Sidney van den Bergh for the past three years has resigned to move to Niagara-on-the-Lake. Her replacement is Karen Oakley. A party and presentation was held for Pam on Oct. 1.

Relative to last month's list of new graduate students, we must now delete the name of Katie Mackrell who has decided to return to Waterloo and to study Civil Engineering.

Bob McLaren, recently appointed to the teaching staff, has reported and attended his first staff meeting on Oct. 14.

Upcoming Degrees

It seems probable that degrees in the department will be awarded at the forthcoming Convocation ( Dec. 5/75) as follows:

Ph.D. - Ted Bednarek, Serge Pineault, Chris Pritchett; M.Sc. Richard Gray, Gilles Menard.

Passes Oral

Jose Maza was successful in his Ph.D. general oral examination on Sept. 19.

FINAL ITEM

The Adams-Leverrier Affair. III

Urbain Jean Joseph Leverrier was born in 1811, some eight years before John Adams, in a small town in Normandy. His father was a minor civil servant of modest means, who, like Adams' parents, was prepared to sacrifice much for the education of his son. Urbain too showed an early aptitude for mathematics, and at the age of nineteen he graduated at the top of his class from the college at Caen. This spurred him to compete in the difficult entrance exams of the great Ecole Polytechnique in Paris, but to the surprise of all, he failed. Forced to continue his studies elsewhere, and supported financially by the sale of his father's house, Leverrier settled down to the enormously determined effort that was to characterize his entire career. By the end of 1831 not only was he in the Polytechnique, but carrying off some of its highest honours. Never again did Leverrier descend from the first rank of scholars.

But unlike Adams, Leverrier had no burning astronomical ambitions. His interests inclined more to chemistry, and his first professional job was as a chemist in the Tobacco Administration of the government. Here for some years he produced papers on experiments with phosphorus and hydrogen and oxygen (what this did for the quality of French tobacco I'm not sure), until in 1836 he resigned because, having become something of a Parisian sophisticate, he disliked being sent on field trips to the provinces. There was also the matter of a Mlle Choquet in Paris, soon to become Mme Leverrier. For a while he became a teacher in one of the lesser colleges of Paris. At the end of 1837, however, he tried to get back into chemistry by applying for the post of assistant to the famous Gay-Lussac, who was professor of chemistry at the Ecole Polytechnique. Gay-Lussac was nonplussed, for there was also another equally good applicant. And right there, the whole Adams-Leverrier affair would never have erupted if, at that crucial moment, a similar position in astronomy had not fallen vacant in the Polytechnique. Gay-Lussac resolved his dilemma by awarding the chemistry post to Leverrier's competitor, and suggesting to the mathematically gifted Leverrier that he take the astronomy post.

And so "without regret as without effort, without dividing his attention and without looking back, [Leverrier] detached himself from chemistry and, obedient to the decree of chance ... rapidly became an astronomer". The switch in no way diminished his ambition, as he told his father: "I have already begun to mount the ladder [of success], why shouldn't I continue to climb?" And with his great abilities, determination, and capacity for hard work, it wasn't long before he caught the attention of leading astronomers. A series of papers on the stability of the solar system, on the motion of Mercury (those missing 43 seconds of arc were to plague Leverrier all his life), and on comets drew well-deserved praise, and Leverrier was soon regarded as one of the 'bright young men' of French astronomy. Thus it was



that in the summer of 1845 Francois Arago, dean of French astronomers, suggested to Leverrier that a topic worthy of his talents would be an investigation of the problem of Uranus. The 34-year-old Leverrier had no inkling that its solution was just then being completed by the 26-year-old Adams in England; indeed, neither he nor any other French astronomer was even aware of Adams' existence.

Unlike Adams, who said nothing of his work until it was completed, and then only mentioned it privately to his professor, Leverrier documented the progress of his research in a series of brilliant papers published by the French Academy during the following year. Leverrier too wrote to Airy for the Greenwich data, Airy again put his question about the radius vector of the hypothetical planet (getting an immediate and satisfactory reply this time), but never once did Airy even mention Adams and his work. Even during Airy's numerous travels among Continental astronomers was there so much as a verbal hint given of Adams' solution. Instead, Airy heaped loud and plentiful praise on Leverrier for his work.

The following summer (of 1846), when Leverrier's papers made it clear that he was rapidly homing in on the same solution as Adams, the British group finally began to do something. Airy, presumably out of purely nationalistic motives, wrote to Challis and suggested it was about time to start looking for the new planet. Challis, he thought, had at Cambridge the best available telescope for the purpose. Adams provided Challis with updated predictions of the planet's expected position for the next few months, and Challis lumbered into action by drawing up a ridiculously cumbersome observing program that might have taken forever to complete.

Events began to move rapidly towards a climax. Challis started observing on July 29, laboriously mapping the positions of stars in the region of sky expected to contain the new planet. These maps were repeated on subsequent nights, and after the night of August 12 Challis made a partial comparison to see if his mapping technique was repeatable. He checked the first thirty-nine stars, and finding them all in stable positions, stopped. Had he continued for ten more stars he would have found No. 49 to have moved, for it was Neptune. The planet would have been his. But instead he put the work aside and went back to his routine reductions of comets.

August 31 saw the presentation of Leverrier's final paper, giving orbital elements for Neptune very similar to those derived by Adams. Still knowing nothing of Adams, Leverrier began calling for observers to search for the planet.

By early September Adams could see what was going to happen. He prepared a paper outlining his work to read at a meeting of the British Association for the Advancement of Science. Hurrying down to the meetings in Southampton he arrived to find the section on physical sciences had concluded the previous day and he would be unable to present his paper. It was Tuesday, September 15, 1846.

Meanwhile Leverrier had run into the same block as Adams. The French savants applauded his work enthusiastically, but no observer sped to the telescope. Wherever he turned among French observers there was some reason why they could not undertake the search. Finally, in some desperation, Leverrier recalled an acquaintance of his in Berlin, Johann Gottfried Galle. On September 18 he wrote to Galle and asked him to undertake the search, emphasizing that Galle should scrutinize each star carefully, for the new planet might well have a disk distinguishable from any true star, and so

cut down the length of the search considerably. The letter reached Galle on September 23, and he immediately requested permission from his Director, Encke, to begin the search. Overhearing the request, a young assistant Heinrich d'Arrest asked to be allowed to participate. That very night being clear Galle and d'Arrest opened the dome of the Berlin Observatory's 9-inch refractor and turned the telescope on Leverrier's predicted position (RA =  $22^{\text{h}} 46^{\text{m}}$  ; Dec =  $-13^{\circ}24'$ ). Galle began scanning the nearby stars. After a short while d'Arrest suggested they also use a star map, which by luck had recently been completed at Berlin for that part of the sky. Returning to the telescope Galle continued scanning, calling out coordinates to d'Arrest seated at a desk with the map. Within minutes Galle hesitated over the appearance of a star at  $22^{\text{h}} 53^{\text{m}}$ . "It is not on the map!", exclaimed d'Arrest. Neptune had at long last been discovered.

The news spread swiftly across Europe. Airy heard it in Gotha, Germany, on September 29, and said nothing. The French were ecstatic: one of the greatest triumphs in the history of astronomy had come to France.

But others in England had been hearing about Adams' work, the first public announcement of which came in a letter to the press by Sir John Herschel on October 3. Then Challis took it on himself to write to Arago on October 5 to announce that he himself had been searching for the planet since July, and (now that he'd bothered to check his observations) the planet was indeed there. He only later mentioned Adams.

It began to seem as though the British were starting a counterclaim to priority, belittling France's glory. And that was when it all hit the fan. The violent storm, long delayed but inevitable, was about to break.

J. D. F.