



DAVID DUNLAP DOINGS

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See p. 2.

★ Grasshopper • by Leslie Tseng-Tseng Yu, United States of America. Design contributed to benefit UNICEF, the United Nations Children's Fund.

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EDITORIAL

The Early Post-war Years

I. C.S. Yu

For the past 30 years we have been receiving Christmas cards from Dr. Yu. Often they have been UNICEF cards. The one which came last month was a UNICEF card too, but it had a personal twist. The very attractive drawing of a grasshopper is by Leslie Tseng-Tseng Yu, Dr. Yu's only daughter. Our Chinese neighbour tells us that the grasshopper has no particular significance in Chinese art except that insects are favourite subjects as, for example, flowers and animals are with us.

Dr. Ching Sung Yu was a temporary member of our teaching staff from February 1947 to July 1948. His was the first appointment recommended by our then new Director, Dr. Frank Hogg.

Until the 1930's Dr. Chant and Dr. Young had carried the full teaching load of the Department with help from time to time by M.A. students. (The Ph.D. wasn't offered until the early '50's.) Quite a load it must have been too, with four pass courses and four honour courses, not to mention informal graduate courses. As the Observatory neared completion three new staff members were added: Frank Hogg, Peter Millman and I. Dr. Chant had retired in 1935 and Dr. Young became Head, so that there were then four of us to look after the teaching. Then came the war, and Peter and I joined the Air Force as navigation instructors, leaving the teaching to Dr. Young, Frank Hogg and Helen Hogg (who was appointed Lecturer in 1941). Night-assistant-mechanic Gerry Longworth also left to join the Navy and it was only with great help on the part of Helen Hogg and Ruth Northcott that the 74-inch telescope was kept busy. When the war ended in 1945 Dr. Young announced his intention to retire, and at the end of the year Peter Millman resigned to resume his Air Force career (though soon after he joined the staff of the Dominion Observatory in Ottawa). So, early in 1946, Frank Hogg, very new at the job of heading the Department and directing the Observatory, found himself with a teaching staff smaller than in pre-war years, with the University enrolment more than doubled during 1945-46 (full-time enrolment increasing from 7000 to 15,000 and extension up to 23,000), and with practically nothing by way of increase in funding. He was desperate, as his letters to his old friends at Harvard indicate.

It was at this time, early March of 1946, that C. S. Yu appeared on our horizon. He had earned his Ph.D. in 1925 at the University of California. Apparently he was being groomed for an astronomy appointment in China, for shortly after his return there he was appointed Director of the National Research Institute of China - a branch of Academia Sinica which was founded by the National Government in 1927. During the next few years he and his few assistants put all their efforts into the building and equipping of the new Purple Mountain Observatory just outside Nanking.

Yu had published seven papers between 1926 and 1928 as a result of his sojourn in the U.S. His first paper, "On the Continuous Hydrogen Absorption in the Spectra of Class A Stars" (L.O.B, 15, pp. 104-121) was apparently a condensation of his thesis under the supervision of W. H. Wright of Lick, and was an important contribution in spectrophotometry. Out of it grew "A Proposed Spectroscopic Method for Determining the Absolute Luminosities of Class A Stars" (LOB, 12, 155-164) which involved estimating the luminosities of the A-stars from the measurement of the Balmer discontinuity - a method which is still in use and is one of the mainstays of the BCD system. Other papers were on such topics as the Spectrum of Zeta Geminorum and the ultraviolet emission in the spectra of Be stars.

From these papers of the late 20's one gets the impression that Yu was a brilliant young astronomer with a very successful career ahead of him. And so it might have been. But by the early thirties China was involved in war with Japan; then followed the Civil War, the World War, and the final overthrow of the National Government by the Communists. Yu was a Nationalist, of course, and he had become involved in politics and war-time scientific activities. He was at one time Deputy Minister of Education and in 1946 he was Head of the National Physics Institute at Chungking. Astronomy had been left far behind by this time.

In 1946, writing to Donald Menzel at Harvard, Yu said that "China today is in an awful mess" and he asked if there might be in America for the next two or three years some kind of fellowship or position to assist with his astronomical rehabilitation. Menzel wrote about him to Frank Hogg, and Frank recognized the possibility of acquiring a temporary staff member without having to face the competition of the relatively affluent American Universities. Frank was able to talk President Sidney Smith up to \$2800, a salary which he described to Yu as "comfortable if not luxurious".

Dr. Yu brought with him his wife (one of the most beautiful women I ever knew) and little Leslie, then about six. The Yu's were Mandarin which set them apart from the Cantonese of Toronto's Chinatown. Their only Chinese friends here were, as I remember, the Chinese Consul-General and his wife - though as Dr. Yu told me, he was really Cantonese and she was what was even worse, American-born of Cantonese parents. I had a feeling that in addition to this proud attitude Dr. Yu had been pretty well off financially. He owned a large house in Chungking which he was renting to the U.S.S.R. Government as their Embassy. Unfortunately, as the revolution proceeded the Soviets became careless about sending the rent money and finally stopped altogether. Dr. Yu, of course, finally lost it altogether.

As for Dr. Yu's work in the Department, I think he found his "astronomical rehabilitation" more difficult than he expected. He gave Astronomy 2a (second-year pass) in 1947-48, and apparently did it well; he observed regularly once or twice a week, and he spent a good deal of time catching up on the literature. He did not, however, actually get on with any research.

In June of 1948 an opportunity for a change presented itself when Dr. W.O. Roberts of the High Altitude Observatory wrote to Dr. Yu and to Frank Hogg concerning a position relating to the development of special optical and mechanical devices. After a few exchanges of letters Yu was offered the job and accepted it.

Just after Dr. Yu left Toronto Mrs. Yu and Leslie made a voyage (by sea) back to China - ostensibly because of homesickness, but I often wondered if it wasn't to try to recoup some of the family fortune before China should fall entirely to the Communists. As it was she was nearly trapped in Chungking, and it was only with help from a still-influential relative that she was able to escape back to the U.S.

Dr. Yu didn't stay long at Boulder. Within a few years he had accepted a teaching position at Hood, a girls' college at Frederick, Md. He held this position until retirement, and he still lives in Frederick. His charming and talented wife died five years ago.

When we first knew Dr. Yu we learned that there had been a child born before Leslie, a boy. When we asked what had happened to him Dr. Yu told us that at one point during the excesses of the Civil War they had been forced to flee for their lives to the mountains, carrying the baby with them. The rigours of that experience were too much for the infant - and at this point in his story Dr. Yu rather shocked us by giving a little laugh. It was only after we had other Chinese friends that we realized that the little laugh was to spare us the embarrassment of witnessing his grief.

The sensitivity of eastern people often puts us westerners to shame.

J. F. H.

OBSERVING

"Good" Nov. and Dec. WX at Home

We had 71.3 hours observing in November and 87.6 hours in December. Both figures are substantially better than the averages of 58.5 and 50.5 hours respectively. Both months are among the 10 best (for that month) that we have had since DDO opened for business.

Still Better at Las Campanas

Bob Garrison reported "terrible weather" at Las Campanas during his Christmas run - four hours of clouds in two weeks! However, he says the telescope is in great shape with the new variable frequency oscillator and the voltage stabilizer. He says his Christmas wish was "Merry Christmas to all, but to me good-nights!"

In Santiago, Bob met the new Canadian Ambassador, André Potvin, who plans to visit Las Campanas in March. Bob was very much impressed with him and is certain that he will be a credit to Canada.

Worse at K.P.

John Percy had an eight-night observing run at Kitt Peak but, unlike Sidney van den Bergh (see Nov. DDD) his luck was dismal - only three nights usable.

They Don't Say

Peter Martin and Jose Maza observed the polarization of Seyfert nuclei and QSO's at Steward Observatory Jan. 4-7.

o And

Tom Bolton and Austin Gulliver report that observations of omicron Andromedae with the 188 cm telescope (12 A/mm blue, 16 A/mm red) since August 9, 1975 have shown the steady development of a strong shell in the H lines. The last visible H line is approximately H₃₂ on plates taken in late December and early January. The red component of the H α emission has been the stronger since at least early October. The metallic shell lines are weak and highly variable in both profile and strength. The MgII λ 4481 line occasionally has one or even two sharp components. Plates of Jan 4.95 and Jan 5.95 UT show that the metallic line spectrum varies dramatically on time scales as short as one day.

ADVERTISEMENT

Wanted: *Night assistants for 74-inch telescope for the nights February 13, 14, 20, 21, 27, 28. Please see Tom Bolton to volunteer. Failure of volunteer response may create drafty environment.*

TV Observing at -10F

The night of Jan. 17-18 was the coldest night of the winter here (lower than -17F outside and -10F in the dome). Jack Heard and Archie Ridder observed with the 74-inch in complete comfort, guiding with the new closed-circuit-TV system in the warm room and emerging only to turn the dome and re-set the telescope. The seeing was so bad that 8.32 was the faintest magnitude we could get in any reasonable time, but the TV image was extremely bright and we were sure that we could have guided on stars one or two magnitudes fainter even with such poor seeing. Congratulations and thanks to René Racine and Tony Estevens.

COMINGS AND GOINGS

Don MacRae, along with the others of the CFHT Board, was in Victoria Dec. 13-14 inspecting the present state of the 142-inch blank. They then visited the Institute for Astronomy at the U. of Hawaii Dec. 15-18 for Board and Committee meetings, and finally ascended Mauna Kea to see the construction which has taken place there in the last year and a half.

Peter Martin and Bjarne Everson attended the "Kingston Meeting" at the U. of Waterloo on Dec. 12-13. Peter gave a paper on "The Local Galactic Magnetic Field" and Bjarne on "Disks in Dwarf Novae". Peter also gave a talk at the U. of Arizona on Jan. 9 on "Circular Polarization Observations of the Galactic Magnetic Field".

John Percy gave a colloquium on "The Problem of the Beta Cephei Stars" on Nov. 19 at the U. of Texas at Austin - whence former graduate students Tom Barnes and Martin Duncan send greetings.

Sidney van den Bergh gave talks on "Classification and Evolution of Galaxies" at U. of Waterloo on Dec. 12 and at Harvard U. on Jan. 22. He also attended the AAS meeting in Chicago Dec. 8-9.

Christine and Maurice Clement attended the A.A.S. meeting in Chicago in December, Christine reading a paper on "The Globular Cluster NGC 6273" by Coutts, Hogg and Thompson.

Bob Garrison also attended the Chicago AAS meeting en route to Chile where he presented a paper on "The Value of R in Monoceros" for Dave Turner who was home nursing a volleyball-induced sore foot. After Chile Bob spent New Years in Miami and environs.

Ernie Seaquist also attended the Chicago AAS meeting.

SEMINARS

NOVEMBER

As announced except that Martha Liller of Harvard College Observatory also gave a talk on the 19th on "The Harvard Plate Collection".

DECEMBER

As announced, including the Christmas Countdown which was very good: "Christmas Carols" by "We three Docs from Scarborough are", namely Bob Roeder, Peter Martin and Charles Dyer; guitar impressions of staff and students by René Racine; recorded impressions and "The Christmas Story" by Phil Teillet; three one-liners by Jack Heard; Murphy's Law according to Gerry Diamond as read by Ihor Prociuk; a slide show by Peter Martin including some unrecognized pictures of him in pre-hirsute days. Steve Shore also did a slide show and edited the excellent issue of David Dunlap Droppings.

JANUARY

Tues. 6th D.D.O. 4 p.m.	A. Bar-Nun, Dept. of Chemistry, U. of T., "Thunderstorms on Jupiter".
Tues. 13th DDO 4 p.m.	K. Innanen, York University, "Particle Dynamics in Spheroidal Mass Distributions"
Tues. 20th D.D.O. 4 p.m.	S. Demers, Laurentian University, "The Magellanic Plane"
Tues. 27th D.D.O. 4 p.m.	S. van den Bergh, "The Post-Eruptive Galaxy NGC 5128 = Centaurus A"

FEBRUARY

- Tues. 3rd
D.D.O. 4 p.m. F. Bertola, Asiago Observatory, - to be announced
- Tues. 10th
D.D.O. 4 p.m. D.A. MacRae, "The Canada-France-Hawaii Telescope Project - A Progress Report"
- Tues. 17th
D.D.O. 4 p.m. Helen Hogg, "Early Years of Astronomy at Toronto"
- Tues. 24th
D.D.O. 4 p.m. R. Racine, "Integrated Properties of Globular Clusters"

MARCH

- Tues. 2nd
D.D.O. 4 p.m. P. Martin, "The Origin of the Optical Polarization in NGC 1068"
- Tues. 9th
D.D.O. 4 p.m. R. Garrison, "Galactic Structure from the Southern Hemisphere"
- Tues. 16th
D.D.O. 4 p.m. T. Bolton, "The Algol Problem(s)"
- Thurs. 18th
McL. 102, 4 p.m. E. Purcell, Harvard University - to be announced (Joint Colloquium with Physics Department)
- Tues. 23rd
D.D.O. 4 p.m. A. Toomre, Massachusetts Institute of Technology, "Ring Galaxies and Round Galaxies"
- Tues. 30th
D.D.O. 4 p.m. M. P. FitzGerald, University of Waterloo and C. R. Purton, York University, - "V1016 Cygni - A Proto-Planetary Nebula"

PAPERS SUBMITTED IN DECEMBER AND JANUARY

- C.T. Bolton
Wm. Herbst Photometry of Stars near 3U1700-37 = HD153919 and 3U0900-40 = HD77581
- J.D. Fernie UBVR_I Observations of Miscellaneous Stars.
Further Photometry of Cepheid-like Supergiants
- S. Jakate, G. Bakos,
J.D. Fernie &
J.F. Heard The eclipsing Binary System SZPsc
- N. Evans Wesselink Radii for Classical Cepheids.
Light and Radial Velocity Observations of Classical Cepheids.

S. van den Bergh UBV Observations of the X-Ray Nova in Monoceros

J. Maza &
S. van den Bergh Statistics of Extragalactic Supernova

C.T. Bolton &
N. Geffken Bright early-type spectroscopic binaries. I. HR 8584

P O T P O U R R I

Linda Twitchin Bereaved

Bill Twitchin's father lost his life from smoke inhalation in a tragic fire at his home in Willowdale on December 21. Bill's mother was overcome by smoke but recovered in hospital.

DDO Memorial Room

About two years ago a few members of the Observatory staff joined in a substantial contribution to the York Central Hospital building fund. Room 3302 in the newly-opened Langstaff Wing now bears a plaque reading "This room has been furnished by members of the staff of the David Dunlap Observatory".

René Racine Leaving

It is with mixed feelings that we are viewing the forthcoming loss of René Racine to our staff. As all of us have known for some months, René has accepted, as of July 1, appointments of Associate Professor in the Department of Physics of the University of Montreal and Interim Director of the proposed "Quebec Observatory", René has been commuting on an irregular basis between Montreal and Toronto conducting negotiations for the telescope (approximately 60-inch aperture) and for the site (tentatively Mont Mégantic, 3700 ft. altitude, about 40 miles east of Sherbrooke and roughly equidistant from Montreal and Quebec).

Other Staff Changes

Dale Douglas has resigned from the Observatory secretarial staff to take a course at Seneca leading to a Library Assistant diploma. Penny Travis of Richmond Hill has been appointed to her job.

Susan Clarke has resigned from her Research Assistant job to enroll in a graduate program in Zoology at Queen's.

Lynda Hirtenfeld has resigned from her job on the secretarial staff of the Department on campus.

Alumnus David Hogg Acting Director NRAO

Helen Hogg's son David (Ph.D. 1962) has been appointed Acting Director of NRAO during David Heeschen's six-month leave of absence. This involves responsibility for a staff of about 300.

Radio Programs

René Racine has been heard every other Friday morning on CJBC on the program "Chronique d'Astronomie" for the past two years. Next transmission Jan. 30.

On the Jan. 7 CBC-AM program "Concern" comments of Robert Roeder, Ted Bednarek and Gary Welch were heard relative to Sir Bernard Lovell's address to the BAAS on "The Centre of Immensities".

MacRae Christmas Party

Betty and Don MacRae for the twentieth time since 1953 were hosts to staff, students and families at a Christmas party on Dec. 7. There were 91 guests including 18 children. Fred Hickok's (M.Sc. 1969) parents who were in Toronto that week-end came along with the Heard's.

Don Fernie in "Retreat"

Don Fernie is on sabbatical leave for six months and, although he is at the Observatory every day, he hopes we will leave him alone to get on with the book which he is writing on a theme in astronomical history.

Bob Watson

Bob Watson from U. of Tasmania is here on a six-month sabbatical leave collaborating in research with John Percy and teaching a first-year course in place of Don Fernie.

Sidney van den Bergh IAU VP

Sidney van den Bergh has accepted nomination to a six-year term as Vice-President of the International Astronomical Union starting in August of this year.

Alumni

Ken McCulloch, a student in astronomy in the 1950's and now working in atmospheric environment at Baker Lake, N.W.T., has written to Don MacRae about a recent holiday in (where else?) Mexico. Ken and his wife observed the lunar eclipse in Merida, Yuc. and was interviewed about it on the local TV station. Ken also says that at Chichen Itza (kind of a Mexican Col. Sanders joint?) they discovered a hazard for tropical meteor observers - lots of fireflies!

Jacques Vallée (Ph.D. 1973) is with the NRC radio astronomy group in Ottawa for a while. He recently returned from a two-year post-doc at Westerbork.

Nancy Gorza, wife of Walter (M.Sc. 1970) has been visiting her parents in Weston over Christmas and New Years. She brought greetings from Walter to all his old friends here and says that Walter enjoys teaching in New Zealand where he says High School standards are higher than in Ontario.

Gretchen (Ph.D. 1974) and Bill (Ph.D. 1974) Harris were here for a few days early this month en route from Bill's parents' home in Edmonton back to Yale.

Exams

Dave Hanes and Serge Pineault both successfully defended their Ph.D. theses on Dec. 17.

Steve Shore and Jose Maza have recently passed their Ph.D. general examinations.

Degrees

At the Fall Convocation (early December) Ted Bednarek and Chris Pritchett got Ph.D.'s, and Richard Gray, Martine Normandin and Gilles Menard M.Sc.'s.

Rudolph Minkowski

Friends of Dr. Minkowski of the Hale Observatories will be sorry to know of his death in Pasadena on Jan. 4.

FINAL ITEM

The Dogon Tradition

Even in our latitudes Sirius is prominent, shining whitely in the southern skies of winter. But although the brightest star in the sky, Sirius seems to have played no special role in the prehistory of Western Culture, in the way in which the Moon or Sun did. Only in ancient Egypt was it important to a people as a whole. There, under the name of Sothis, it was for thousands of years a central feature of Egyptian religion, the calendar, and everyday life. And there is a perfectly reasonable explanation for this: the time of year when Sirius can first be seen rising in the dawn light generally coincides with the flooding of the Nile, so it's quite obvious (isn't it?) why the early Egyptians would attach great significance to Sirius.

But if their ancient ancestors ignored Sirius, modern astrophysicists have not. There is, of course, the famous little mystery of why a variety of authors in Biblical and pre-Biblical times referred to Sirius as a red star, when a simple glance tells you it is white. The intriguing thing here is that modern stellar evolutionists believe that Sirius must once have appeared red, but the timescale of a mere couple of thousand years for the change seems quite implausible.

That, however, is all very speculative. Modern astronomy over the last century or so has painstakingly built up a body of hard facts about Sirius, and in the process received one of the most remarkable surprises in recent astronomical history.

It was in 1834 that Friedrich Bessel, from the laborious analysis of many careful micrometer measurements, first noted that the motion of Sirius relative to other stars shows a slight wiggle. After another ten years of observation and analysis he felt certain enough to publish the result and suggest that the wiggle, which is periodic, is due to the presence of an unseen companion star which pulls the bright star around in an orbit as they both travel through space. During the 1850s several people, notably Peters and Auwers, carried out mathematical investigations of the results to determine the orbital parameters of the two stars. They found that the orbit must be quite elongated ($e = 0.38$), that the period is 49.9 years, that the mass of the unseen star is very close to that of the sun, and that the two stars never appear more than about 10 seconds of arc apart in the sky. It seemed rather surprising that a star as massive as the sun should be invisible at the relatively nearby distance of Sirius.

In 1862, however, Alvan G. Clark in the United States had just finished grinding a new 18-inch telescope lens, and in order to test it, turned it on Sirius. There, quite unexpectedly, was Sirius' companion, shining faintly alongside its brilliant primary. But faint it was, and to this day it takes good instruments and good conditions to see Sirius B, as the companion came to be called.

The most stunning surprise, however, did not come for another half-century. In 1915 Walter Adams succeeded in determining the spectral type of Sirius B: it proved to be that of a relatively hot star. As such it was just like another faint binary companion, 40 Eridani B, which had already produced very unexpected results. Henry Norris Russell tells us how in 1910 he was at Harvard to obtain spectral data for certain stars (data, incidentally, which led to the discovery of the H-R diagram). "I asked Pickering [the Harvard Director] about certain other faint stars, mentioning in particular 40 Eridani B. Characteristically he sent a note to the Observatory office, and before long the telephone rang and Mrs. Fleming announced that the spectrum of this star was A. I knew enough about it ... to realize at once that there was an extreme inconsistency...."

What Russell had so quickly realized was this: a star which has a low luminosity and yet is hot, can only have a very small size. In fact, Sirius B and 40 Eridani B are smaller than the Earth. That in itself was astonishing, but what was really overwhelming was that they each have a mass close to the sun's mass. How could there be so much matter packed into so small a volume? It requires densities three million times that of water, or some 50 tons to the cubic inch. For almost a decade, Arthur Eddington reported, this result, although quite easy to derive, was regarded simply as absurd. It was not until 1925 that Ralph Fowler was able to show from the quantum theory how this strange state of matter, quite unknown and unguessed at on Earth, is able to exist.

Finally, there is the question of whether or not there exists a third star in the Sirius system. Several experienced and conservative observers have claimed sightings, and a recent photographic study shows there are still residuals in the motion suggestive of another body. On the other hand, other equally experienced observers have never been able to see it. The question remains open.

With all that as background, then, let me finally come to the point of this story. It concerns a primitive and obscure tribe, called the Dogon people, in the Republic of Mali in West Africa. They were the subject of a study by two French anthropologists, Marcel Griaule and Germaine Dieterlen, in the 1940s, and the extraordinary findings of these two reputable scientists are only now coming to the attention of astronomers.

To begin with the Dogon traditions include a strong belief in a heliocentric solar system, something quite remarkable among primitive African tribes, most of whom have little in the way of cosmological beliefs at all. Even more remarkably, they claim that the Earth rotates on its axis, that Jupiter has four moons revolving around it, and that Saturn has a ring which "is different from the ring sometimes seen around the Moon". Well, although the evidence is against it, one has an uneasy feeling that perhaps some influence from early missionaries might be at work here.

But what to say about the central feature of the Dogon tradition, which is the most arresting of all? It is quite definite and detailed and in no way vague. The star Sirius, say the Dogon, is orbited by another star, which although invisible to the eye is nevertheless there. The Dogon sand drawings invariably show an elongated orbit with the bright star at one end. It takes 50 years for the dark star to orbit the bright one, they say, and the dark star is the smallest type of star there is, and yet is the heaviest. It is made from a metal they call 'sagala', a small quantity of which they suppose to be heavier than all the grains of sand on Earth. They further insist that there is a third star to the system, around which a planet revolves.

The anthropologists used physical evidence among the Dogon to trace the rites associated with these beliefs back to the thirteenth century. Earlier than that there were major tribal migrations, and the Dogon themselves hold that their ancestors came from elsewhere in Africa: the anthropologists find it most likely to have been Egypt!

What to make of this extraordinary result? An elaborate hoax? A fairly simple coincidence embellished to seem astounding? It's possible, I suppose. Or could the coincidence between the heliacal rising of Sirius and the flooding Nile only have been a reinforcement of some other belief the Egyptians had in Sirius? We know so little of their astronomy that we cannot say.

Of course we smile (or fume) at von Daniken and his 'Chariots of the Gods'. And rightly so, I think. But doesn't the Dogon tradition send just the tiniest of shivers up your spine?

J.D.F.