



THE DAVID DUNLAP DOINGS



EDITORIAL

Editing an internal newsletter is sometimes a thankless job. Editors often feel that they have to extract forcefully most of the little bits of information and stories that they publish. To be sure, there are some truly faithful contributors, who only need to be asked once, but there are others from whom we never get a word. Why is it so? I suspect that the answer is that the monthly or quarterly appearance of a newsletter is simply taken for granted by most of us, with not a thought about it, either negative or positive - i.e. apathy, busyness, or other priorities.

This universal feeling of editors was brought home in a particularly poignant swan song from David Allen, who has just given up the editorship of the Anglo-Australian Observatory (AAO) Newsletter.

“Although I enjoyed the job, in retrospect I have one regret. I rarely elicited much response from readers. Few letters came in, whether for publication or merely in comment. Material for the coveted front page illustration rarely appeared without my solicitation. I sometimes felt that I was trying to communicate with a readership that was apathetic, if not hostile. Maybe this is the experience of all editors. Will it be Elaine’s?”

We are quoting this now in hopes that we might generate an unusually good set of responses BEFORE we retire or leave the office of editor. If you are sitting on a good story, funny or not, give a thought to writing it up for the next issue of the DOINGS. We’d be very pleasantly surprised if someone said to us, in response to a request for material, “Why, I’d love to.”

THE DAVID DUNLAP DOINGS Vol. 22, No. 1 December 15, 1988 ISSN 0713-5904
Published by the David Dunlap Observatory of the University of Toronto, P.O. Box 360
Richmond Hill, Ontario L4C 4Y6
Editors: Bob Garrison and Chris Rogers
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Our Cover

David Dunlap III and David Dunlap IV shown here with DDT II and sporting DDO T-shirts. Both Dunlaps attended the first "Friends of DDO" lecture, held at DDO in September. (T-shirts are available from DDO at \$15 each.)

Letters to the Editors

Dear Editors:

I was delighted to open my copy of a recent issue of the Faculty Association's newsletter and find enclosed a pamphlet entitled Sexual Harassment on Campus: A Guide for the Faculty. How jolly decent of these chaps to provide a do-it-yourself manual! I'll be reading it as soon as possible with a view to an early start.

Yours sincerely,

Don Fernie

Congratulations

To Chris (Ph.D. 1986) and Vicki Stagg on the arrival of their second son, Malcolm Christopher Ross, on November 12th. The Staggs have returned from England, and Chris has taken a position at the University of Calgary (working with Gene Milone).

To Scott Tremaine who was awarded the Steacie Prize, jointly with Ian Affleck of UBC.

To Louis Noreau (Ph.D. 1985) who will be joining the department in January as an assistant professor (CLTA). Louis has been a research associate at Laval University.

To Doug Gies (Ph.D. 1984) who is now in the tenure stream at Georgia State University (the GSU?) in sunny Atlanta. He's been there since September, and from the harried and infrequent communications we've had, he must be BUSY teaching!

To Judith Irwin, K-T Kim, Peter Leonard, and Raymond Rusk who all successfully defended their doctoral theses. K-T is back in Korea, Judith is in Ottawa at HIA, Peter has moved to CITA, and Raymond is in Victoria at the Defence Department labs. Some abstracts appear elsewhere in this issue.

To Bob Garrison for being invited to give the prestigious Jacob Bronowski Memorial Lecture for 1988 (at New College, 9 November). The title was: "The Process of Discovery: Supernovae, Comets and Extraterrestrial Life."

To Albert Hartviksen, who is the new caretaker at DDO, replacing Frank McDonald (see Don MacRae's article in the last issue). Albert is no stranger to the denizens of DDO. Over the years, he often filled in at DDO during Frank's vacations. Those downtown will remember Albert as caretaker in Simcoe Hall, one of whose occupants told the editors: "You are lucky to get Albert. He will always go the extra mile for you whenever you need him. He'll take good care of you." We're working hard to train him in volleyball. Welcome aboard Albert!

Comings And Goings

Maria Wong, for many years the "anchorwoman" of the DA, was feted by students and staff at the end of October. She has moved down several floors to take up a secretarial position with the geophysics group in the Physics Department.

John Dubinski spent a week in October at Las Campanas doing multicolour photometry of interacting galaxies. He had eight straight clear nights.

Marlene Cummins attended IAU Colloquium 110, "Library and Information Services in Astronomy", during the summer. She chaired a session on observatory publications and gave a paper on the same topic. Later she went to the IAU General Assembly where she attended a joint session with Commission 5 (Documentation and Astronomical Data).

Tom Bolton and Slavek Rucinski attended IAU Colloquium 107: "Algols" in Victoria, B.C., August 15-19. Undergraduate student Doug Johnstone and former graduate student Mercedes Richards, now at University of Virginia, also attended the meeting. Tom gave an invited paper on the effects of magnetic fields on the periods, circumstellar material, and evolution of Algol binaries, and Mercedes' contributed paper on circumstellar material in the Algol system, which was co-authored by Tom and Stefan Mochnacki, was voted the best contributed paper of the conference by those in attendance.

Dr. Stanislav Stefl of the Ondrejov Observatory is spending November and December at the David Dunlap Observatory. He has been doing some observing some Be and shell stars as part of a coordinated IUE-ground-based observing program, and he is working with Tom on the analysis and interpretation of Tom's observations of the variable Be star lambda Eridani. Stan is a former student of Petr Harmanec, who is well known to many of us from his visits to Toronto.

Mike Fieldus was observing with the 82 inch at MacDonald during September and October with collaborator Kim Venn (B.Sc. 1986). He and Dimitar Sasselov visited McMaster for a day to do some work with Doug Welch.

Chris Rogers was in Hawaii for three weeks. He spent one week observing at JCMT, a week in Hilo reducing data, and the last week in Kona at the International Conference on (Sub)Millimeter Astronomy. Among those in attendance were Louis Noreau and Chris Wilson (B.Sc. 1985). Chris, now at CalTech, gave an excellent talk on her study of M33 using Owens Valley and CFHT. John Lester and Dimitar Sasselov, with a CFHT run behind them, dropped in for the last session.

John Percy attended the 1988 Fall Meeting of the American Association of Variable Star Observers in Cambridge MA from October 20 to 23, and presented a paper with Amy Alfred (University of Toronto Mentorship Program) on "R Scuti: The (O-C) Diagram".

Bob Garrison spent a week in October observing with the University of Mexico's 84cm telescope at San Pedro Martir in Baja California. An exact duplicate of the Las Campanas and DDO classification spectrographs is now available there, so Northern-Hemisphere observations can be made in clear, dark skies. The seeing is not as good as at Las Campanas, but the site is a lot darker and clearer than Toronto! Every night was clear, of course, and the spectrograph worked well, of course.

Yvonne and Don Fernie will be spending December through February in Cape Town, South Africa, where Yvonne's mother has a large house within walking distance of the headquarters of the South African Astronomical Observatory (Feast et al.) and even closer to Brian Warner's group in the University there. He claims that "I am not planning on doing any observing at their Sutherland station, 400 km away, but will work mostly on stuff I'm taking with me (they have a terrific library) as well, perhaps, as get involved in joint ventures with some of the many variable-star people there." Don't work too hard Don; you deserve a rest!

Potpourri

Beating their previous record of 11 years, the library recently received a book overdue by 21 years- from an anonymous source!

Marlene Cummins is coordinating a programme to "twin" librarians from western and non-western countries. This idea was raised at IAU Colloquium 110 held during the summer.

Greg Scott (Northern Secondary School) will be working with John Percy in the University of Toronto Mentorship Program in 1988-89.

John Percy addressed a luncheon at the 1988 conference of the Science Teachers' Association of Ontario on "Expanding Horizons" - the theme of the conference, and also gave a workshop for 100 teachers on "Implementing the Grade 10 Astronomy Units".

Bob Garrison gave two talks in early November at the Science Teachers' Association of Ontario conference: one for teachers and one for students. The first was: "The Excitement of Discovery and Supernova Shelton 1987A." The talk for the students was entitled: "Life on Other Worlds: An Astronomer's View." Both were well attended, but the second had standing room only.

Bob says "One of the reasons for giving such talks is that these teachers and their students are the cream of Ontario high-school-science programs and it is from this pool that many of our future astronomers develop. So, rather than complain about the quality of undergraduate students, I prefer to do something positive about it by stimulating the sources from which they spring."

Bob gave talks to RASC groups at the Niagara and Hamilton Centres (12 Nov and 1 Dec respectively). He was interviewed on CIUT (15 Nov, live) about the Chile operation, and on Rogers TV by Randy Atwood (6 Dec for Jan airing).

A Test of the Efficiency of the Canadian Postal System by Peter Leonard

Pretty well everyone in Canada who has mailed a letter has been frustrated by the unpredictability of the Canadian postal system. My father, whose career depended on getting things to his company's head office on time, told me once that letters mailed early in the week seemed to move faster than those sent late in the week. Recently, I have quantitatively tested my father's belief, and it appears that he was not totally out in left field (where George Bell aimlessly roams).

The test was conducted as follows. A total of 15 letters were sent to a colleague of mine in New Jersey during September and October of this year. Each letter was posted on a different day, with a total of three letters being sent on each of the five weekdays. All letters were mailed between 1:30 and 2:00 p.m. using the mail box in front of Simcoe Hall. The mail is supposed to be picked up from this box every weekday at 3:00 p.m.

The test did indeed reveal a significant difference in arrival times as a function of the weekday a letter was posted, but the difference was not as dramatic as I thought it would be. The median travel time for letters mailed on either Monday, Tuesday or Wednesday was three days, compared with a median travel time of five days for the letters sent on Thursday or Friday. The difference is significant; all letters sent on the first three weekdays took at *most* four days, while those sent on the final two weekdays took at *least* four days.

Obviously, the mail does not move very far on the weekends, and it is likely that a letter sent on a Monday will not arrive all that far behind one mailed on the previous Friday, if at all. Often on a Friday people feel a great sense of urgency to finish something off and get it in the mail by the end of the day. My advice in this situation is to take your time and send your letter on the following Monday. It shouldn't take very much longer for it to get where it's going.

Finally, I checked to see if there was any correlation between the mail travel times and the phase of the moon. The letters sent during the seven day period which bracketed the full moon in September arrived slightly faster than those mailed during the rest of the lunar cycle. However, the difference is not very significant, and, therefore, I find no evidence that the phase of the moon correlates with mail travel times. I tested this possibility even though there is no observational or theoretical reason whatsoever to believe that the moon affects the mail. Despite this obvious fact, it would not surprise me if I hear someday from an astrologer who vehemently holds the opposite point of view.

GASA Gossip
by Mike Fieldus

There is nothing new under the sun. Even this saying is as old as the stars. But just how true this statement is was very forcefully brought home to me the other day, as I was perusing through some old David Dunlap Doings issues left in the lounge by some nameless benefactor. I suddenly came across one of the original GASA Gossip columns written by Geoff Clayton in 1982. Those of you who were in the department at the time will smile at the memories this article will bring back from 1982, those of you who are currently in the department will smile at the memories it will bring back from yesterday evening. I reprint it here and now, without any permission from the author.

The Night of the Living Grad
by Geoff Clayton

As I touch the up button, all four elevators leave for the 14th floor without me. Could this be an omen? I am about to enter a world unknown to those who inhabit DA from 9 to 5. The sun has set and even Maurice will have put on his coat and fled the department. This is the world of the graduate student, populated by zombies wandering aimlessly about the darkened corridors as they try to remember the significance of names like Wilson and Bappu: do they have something to do with spectral lines or do they play on a line for the Boston Bruins?

My elevator stops and the door opens. Warned by the sound of Beethoven's 9th Symphony being whistled backwards, I leap out of the way just in time as Louis streaks by and crashes through the closing door. Moving to 1405, I answer the phone. Before the caller can speak, I inform him that Doug Gies (pronounced Gees) is not in his office at the moment, take the message and deposit it atop the pile on Doug's desk. As I do this, I pass by Neb who is quietly reading today's issue of Pravda while waiting for his programme to run on the VAX. Just as I'm about to sit down at my desk, the caretakers arrive and order me out of the office so that they can wax the floor. I move back into the hallway passing 1408 where Doug Welch is telling his VDT to eat flaming death. I assume he is working on his solar model again and move on. I am attracted to 1416 by the shouts emanating from the latest friendly discussion between Ed and Fred, but before I get there I am accosted by Al who is hustling Ping Pong. I can see he's serious about playing as he already has the cover off his paddle. I consent to the game since the caretakers are now piling furniture on top of my desk. On reaching the 15th floor, we are momentarily startled by the presence of Dieter sitting in the dark. After being trounced again, I return to the 14th and decide to try the reference room while my office floor dries. I am startled once more, this time by Louis who is asleep on the couch. The journal I'm looking for is missing so, finally allowed to return to my desk, I put on my coat and make my way home after a good night's work.

Some things never change, just the names do. And in some cases, even the names don't change.

I'm sorry that I was unable to get a GASA gossip column to you last issue, but I was away observing when the calls for articles came out and didn't get back until after publication. I thought, however, it was an ideal time for some of the people I have been making up things about and generally debasing to have their own opportunity to say something; to present a vicious and completely unjustified attack on myself in way of retaliation. But I guess my earlier comments about apathy amongst the students and staff were taken to heart; nobody bothered. Just remember everyone, if you are upset about what I say about you, tough. You had your chance.

So what have we students been up to over the last couple of months? A rather remarkable thing occurred, actually. Peter Leonard, KT Kim, Raymond Rusk and Judith Irwin all finished off PhD's, and have left (or are in the process of leaving) the department for newer pastures. It is nice to see the department reverse its long standing tradition of retaining students as long as it can and turning over the junior faculty every couple of years. We also had 3 MSc defenses during the last month (Mike Richer, Rob Straker and myself), bringing a rash of 7 thesis talks to the department since September. It is a shame that two of the PhD talks and all three MSc talks occurred during the G2000 time slot, as most of the faculty then missed them.

A lot has happened since the last issue, so I will just try to give you some of the highlights. Apparently one of our more prominent faculty members was observed by a nameless undergrad during the Algols conference in B.C. this summer to be drinking Pepsi. This is an unsubstantiated rumor that nobody who knows Tom would believe. Other rumors you must have heard include a budding romance in Scarborough and two of our grad students finally cutting the apron strings and moving away from their parents. Yep, life has lots to offer the truly adventurous.

The last thing I want to comment on is a brief mention in the coming and goings section this month. Dimitar and I, who are involved in a project on Cepheids, had the opportunity to visit Doug Welch (noted Cepheid expert and UofT grad) at McMaster this month for what turned out to be a very productive and stimulating day of discussion. We were even invited back to Doug's home for dinner that evening, but I am not allowed to tell you that because the condition of our receiving dinner was that nothing to do with his home life appear in any part of this publication. I will stand by that promise and let you discover what Doug is hiding for yourselves.

PAPERS SUBMITTED

PREPRINTS BY FACULTY AND STUDENTS RECEIVED IN THE ASTRONOMY LIBRARY

Bolton, C.T. The effects of magnetic fields on period changes, mass transfer and evolution of Algol binaries. DDO/U of T. 88-1211. 23 Nov 88.

Clement, Christine M.; Hazen, Martha L. The variable stars in the globular cluster NGC 2808. DDO/U of T. 88-1075. 21 Oct 88.

Evans, Nancy Remage. The binary companion of the classical cepheid AW Per. DDO/U of T. 88-1103. 2 Nov 88.

Fernie, J.D. Pulsational periodicities in R CrB. DDO/U of T. 88-1057. 14 Oct 88.

Fernie, J.D.; Sasselov, D.D. The evolutionary state of UU Herculis stars. DDO/U of T. 88-1055. 14 Oct 88.

Fernie, J.D. Uncertainties in period determinations. DDO/U of T. 88-1056. 14 Oct 88.

Fernie, J.D. 89 Herculis and HD 161796 in 1986 and 1987. DDO/U of T. 88-1198. 21 Nov 88.

Fernie, J.D. Delta Coronae Borealis in 1987. DDO/U of T. 88-1199. 21 Nov 88.

Webster, Rachel L. et al. Detection of statistical gravitational lensing by foreground mass distributions. U of T/CITA. 88-1086. 24 Oct 88.

Radio Lobe Spiral Galaxies A Case Study of NGC 3079

Ph.D. Thesis Abstract
Judith Iwin

We have undertaken a study of NGC 3079 as part of a program to determine the nature and origin of nuclear radio lobes in spiral galaxies. Specifically, we investigate possible interactions between the radio lobes and the disk, by mapping the neutral hydrogen in this galaxy with three configurations of the *Very Large Array*. In addition, we obtain VLBI observations of the compact central object in order to examine the relationship between the kpc scale lobes and pc scale nuclear activity.

The HI line profiles in this nearly edge-on galaxy were successfully modelled, assuming a disk of finite thickness in circular rotation, steadily declining density distributions both in, and perpendicular to the plane, as well as a classical Brandt rotation curve. A number of kinematic and geometric parameters are derived, including a large (kpc scale) perpendicular scale height. Numerous HI Heiles shells and 'chimneys' extending away from the plane have been discovered, with shell energies comparable to the most energetic of those observed in the Galaxy. The Heiles features appear to be unrelated to nuclear activity and, as well as the thick disk, may be the result of outflow from star forming activity. The residual line profiles as well as the HI nuclear absorption profiles reveal an anomalous redshifted component which is suggestive of some gas inflow onto the nucleus. A larger scale, global disturbance is also visible in the form of a cosine-like curvature of the disk, and an asymmetric warp.

VLBI observations reveal three aligned nuclear components on pc scales, whose characteristics are suggestive of jet-like outflow from a compact object, rather than supernovae. The momentum flow from these components can adequately account for the outer kpc scale radio lobes, and the conditions in the surrounding interstellar medium are sufficient to focus the outflow along the minor axis. We show that the ram pressure of escaping nuclear gas is capable of generating an HI tail which has been discovered extending outwards from the companion galaxy, NGC 3073.

A Radio Continuum Study of the Coma Cluster of Galaxies

Ph.D. Thesis Abstract

Kwang-Tae Kim

Continuum radio observations of the Coma cluster of galaxies have been made with the VLA and DRAO. The existence of the non-thermal halo has been confirmed and its morphology has been imaged in unprecedented detail. The halo has a smooth and elongated distribution of surface brightness whose centroid is significantly displaced from the centroid of X-ray emission from the cluster. An upper limit of 30% has been established for the percentage polarization of the radio emission at 1.4 GHz. The magnetic field strength in the intracluster medium has been estimated from measurements of the Faraday rotation of polarized emission from radio galaxies belonging to the cluster, and from background sources seen through the cluster. The value obtained for the field is 1 microgauss. This agrees with the value obtained from equipartition arguments. The origin of the radio halo is reviewed, and it is concluded that the particle re-acceleration must be occurring in the intracluster medium.

It is proposed that the role played by an intracluster magnetic field is essential in forming a radio halo in a cluster of galaxies. To be specific, its significance is two-fold: firstly the strength of the magnetic field determines the synchrotron emissivity of the radio halo and, secondly, the existence of an intracluster magnetic field enhances the possibility for relativistic particle acceleration in ICM.

Continuum radio surveys were carried out at eight different frequencies with the DRAO and the VLA synthesis telescopes. These surveys detected a total of 482 sources within a circular region of about diameter 6° above 30 mJy at 408 MHz and a total of 298 sources at frequencies 1.3 – 1.7 GHz within a circular region of diameter $188'$ from the DRAO phase center. The completeness level of the surveys is 10 mJy at 1.4 GHz for those sources located with a $65'$ radius from the phase center. These observations determined a total of 17 new rotation measures in the field of the Coma cluster of galaxies. Out of a total of 107 sources detected at 1380 MHz with the VLA in an area of $30'$ radius from its phase center, there were a total of 33 sources optically identified with galaxies. This is a 31% identification rate. The number of yet unidentified cluster sources expected from the survey is estimated to be about 20. With the redshift data currently available, only 29 Coma cluster radio galaxies have been identified to date.

Using the continuum radio observations of the radio sources in the field of the Coma cluster of galaxies as bases, various correlations were investigated. The surface distribution of the sample is clumpy, anisotropic, and shows that there is no significant difference in the cluster environment around radio galaxies from that around non-radio galaxies. Unlike the optical galaxies, the radio sources are not highly centrally concentrated. This is consistent with the null angular covariance over all angular scales found with the same radio sample. Radio source counts at 408 MHz, with a relatively high limiting flux density of 80 mJy are not significantly different from the non-cluster background counts, whereas the deep source count at 1380 MHz shows an excess in number in the range of ≥ 1 mJy in the cluster, suggesting that the majority of the cluster sources are weak. The sources seen near the cluster center show a slight spectral steepening in comparison with the spectral indices of those sources located farther away.

It was found from the IPC X-ray data that there is a considerable position angle twist in the isophotal contours within the central region of the Coma, implying that the structure of the gravitational potential near the core is likely to be triaxial. The velocity dispersion of the Coma galaxies shows a conspicuous anisotropy, whose principal axis was found to be along the major axis of the Coma/A1367 supercluster.

In the course of devising the Penticton (DRAO) part of the experiment, extensive antenna tests were performed in an attempt to construct a working polarimeter at 408 MHz.

The Dynamics of Open Star Clusters

Ph.D. Thesis Abstract

Peter James Toivo Leonard

A total of 360 N -body simulations of open clusters containing initial binaries, and 905 supplemental binary-binary collisions have been performed for the purpose of studying the dynamical ejection hypothesis for the OB runaway stars. It has been found that superhard binaries (i.e., binaries each having binding energies in excess of that of their parent cluster) can collide with each other even in low density clusters, producing runaway stars. These dynamically ejected runaways have a binary frequency, a maximum velocity, and a mass-velocity relation similar to those of the OB runaway stars in the sample of Gies and Bolton (1986). This lends support to the hypothesis that these stars originated from purely dynamical interactions in young star clusters. It appears that there are enough young clusters per unit surface area of our Galaxy to account for the observed number of OB runaways, but this issue is not clearly resolved. Also, it is found that physical stellar collisions can occur in any star cluster containing superhard initial binaries. These collisions should result in stellar mergers, which may account for some of the blue stragglers observed in open clusters.

In the final chapter of this thesis, the dynamical mass of the open cluster M35 has been estimated using a new technique which makes use of velocity dispersion profiles in two independent coordinates. The dynamically observed mass in M35 can be accounted for by a stellar population similar to that in the Solar neighbourhood, and therefore there is no need to invoke dark matter in the cluster.

PLEASE POST

November 1988

Preliminary Schedule
JANUARY - JUNE 1989

UNIVERSITY OF TORONTO
60-cm TELESCOPE

LAS CAMPANAS, CHILE

1989	OBSERVER (Program)	INSTRUMENT
29 Dec 88 - 5 January	JARRETT (U Mass)	CCD, BVI filters
6 - 13 January	Resident (for Madore)	CCD, R filter
14 - 15 January	Resident (for Clement)	Camera, 103a-0
16 - 19 January	OPEN	----
20 - 29 January	MATTHEWS (UBC)	Photometer UBVI
30 January - 3 February	Resident (for Madore)	CCD, R filter
4 - 5 February	Resident (for Shelton/Rogers/Witt)	CCD, UBVI
6 - 12 February	SLOAN	CCD, BVRI filters
13 - 14 February	Resident (for Clement)	Camera, 103a-0
15 - 27 February	OPEN	----
28 February - 6 March	Resident (for Madore)	CCD, R filter
7 - 8 March	Resident (for Clement)	Camera, 103a-0
9 - 14 March	GOCHERMANN (Bochum, Germany)	Spectrograph
15 - 30 March	KRZEMINSKI/KUBIAK (Poland)	CCD
31 March - 9 April	JARRETT (U Mass)	CCD, BVI filters
10 - 11 April	Resident (for Clement)	Camera, 103a-0
12 - 13 April	Resident (for Keenan, Ohio)	Spectrograph
14 - 22 April	WHITTET (York U)	IR Photometer JHK
23 - 30 April	Resident (for Fullerton/Bolton)	Photometer UBVI
1 - 10 May	Resident (for Madore)	CCD, R filter
11 - 31 May	SLAWSON (UWO)	Racine Phot. UBVI
1 - 3 June	Resident (for Clement)	Camera, 103a-0
4 - 25 June	SLAWSON (UWO)	Racine Phot. UBVI
26 June - 9 July	Resident (for Madore)	CCD, R filter

MOONS		
Full		New
21	JANUARY	7
20	FEBRUARY	6
22	MARCH	7
21	APRIL	5
20	MAY	5
19	JUNE	3
18	JULY	3

CHILEAN HOLIDAYS (Avoid travel)
25 December
1 January
Good Friday/Easter (24 - 27 March 1989)
1 May
21 May

RESIDENT (Jorge Garcia or Alternate)
29 Dec - 22 Jan
30 Jan - 16 Feb
28 Feb - 16 Mar
31 Mar - 2 Apr
10 Apr - 13 May
29 May - 4 Jun
23 Jun - 10 Jul