

WHAT IS THE ZODIAC?

by Harry Brierley
(Northants Natural History Society -
Astronomy Section)

The nursery mnemonic which begins with "The Ram, the Bull, the Heavenly Twins" reminds us that the earliest Zodiac was simply a great circle of constellations through which Sun, Moon and planets moved, and a Babylonian statement that "the Sun follows the Moon's path" shows which body was studied first and considered more important.

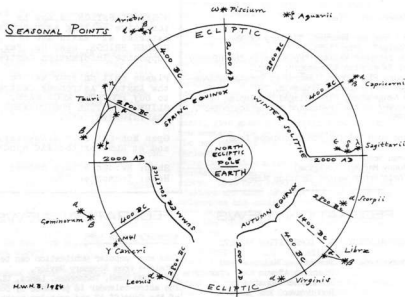
By 1,000 BC, carvings of bulls, lions, female figures carrying corn-ears, scorpions, centaur-archers, sea-goats and water-pourers could all be found in the Euphrates area, and though much later in time than the probable origin of the constellations, the iconography is the same: carvings and constellations must both have begun in the same country.

When? May we not speculate that the symbolism of the four cardinal figures is so appropriate to be coincidental? Look at the seasonal points (equinoxes and solstices) for the period 3,000-2,000 BC, with the Bull, symbol of fertility and new life, marking the Spring. The Lion in Summer with the Sun in royal power and majesty, the hot dry Autumn Scorpion, and the Water-bearer pouring out the Winter rains. The Lion was still a mid-east beast then, of course.

This Zodiac was used "for times and for seasons", the calendar had twelve months, each beginning with the first observation of the new Moon. But as this only gives a year of 354 days, an extra month was inserted by royal decree every two or three years so as to keep new year roughly in line with the Spring equinox. At first this was probably done by looking at the state of the crops, then by an approximate calculation of the Sun's position in the Zodiac - such were sometimes five days out - and finally they discovered that 19 years is very nearly equal to 235 lunations, a cycle later introduced to Greece by Meton, who had been to Babylon. The use of this cycle to correct the calendar regularly without observations probably cost the Babylonians the discovery of precession.

Despite the Moon, by 700 BC, the ecliptic was recognized as central to the zodiacal belt, it being virtually constant relative to its starry background, unlike the paths of Moon and planets. From then on lunar and planetary positional astronomy, and the prediction of eclipses, were much more accurate, and we can date historic events almost to the day. It is not that the Babylonians made frequent observations, but they had been at it a long time, and were able to erect an enormous superstructure using their sexagesimal arithmetic. We still use this today in trigonometry and the division of the hour.

To produce a precise and (they thought) permanent reference-grid on which to hang their calculations, the Zodiac was remodelled at the latest by 419 BC into twelve Signs each of 30 degrees. Ideally, the constellations would have been all of the same length, but the star-patterns did not oblige, so they wriggled the Signs round the ecliptic until they fitted the existing constellations to best advantage. Their starting-point was 26 degrees celestial longitude, (1950), which they made 0 degrees. The point is near Eta



"Seasonal Points":

The Earth is at centre, with the NEP above it.
Ecliptic and star-positions are to scale.
The stars are "laid flat" (like the tree-trunks after the 1908 Siberian meteorite), north being away from earth, south being towards it.

Pisces. If you now follow through on Norton's Atlas in 30-degree steps eastward from this point, you will see who gained and who lost in "territory". It was a good compromise, but Virgo lost her legs to Libra. The new system was sidereal, tied to stars not seasons.

In our own century, controversy has raged as to whether or not the Babylonians discovered precession, but after reading the arguments it seems most likely that they may have adjusted things to fit the facts without bothering too much about causes - a pragmatic approach. For a long time two Spring points were in use side by side, first Aries 10 degrees (our 36 degrees) and later Aries 8 (our 34), which came in without replacing the former, just as we use tables and atlases geared to 1950 and 2,000 epochs. We know what we are doing - did they? There is no direct evidence, but a detective would be suspicious!



Mesopotamian boundary stone showing a scorpion and a scaled goat 1099-1082
Item 90840 British Museum. Photo: HWHB.

One "adjustment" had been made long before: the introduction of Libra. In the beginning, that constellation was simply "the Claws" of the Scorpion, and so it remained in the West down to Roman times. But in Babylon, the Claws became the Balance as early as 1,000 BC and probably much earlier. The Autumn point had shifted from the Scorpion's head to his Claws by 1,400 BC, Alpha and Beta Librae now marked the equinox - equal (balanced) day and night. There could hardly be any other reason for introducing a non-living member into the Zodiac. Both names were then used as the whim took them.

Eventually their astronomers had fine work their credit - particularly on lunar and planetary positions and on eclipses - but for our final transformation we turn to the remarkable and irrelevant people who make the mathematical Zodiac their own, and named it the Zodiacos Kúklos, the Circle of Zodiacos or little animal figures, thus reducing the majestic sky-gods to something like their version of china dogs.

The Greeks were not so much arithmeticians as geometers. And they observed the equinoxes because they wanted to establish exactly the points where equator and ecliptic cross each other. These points, and many observed star positions, they hung on the sidereal Zodiac, thus making the discovery of precession inevitable.

Thanks to that great encyclopaedist of ancient astronomy, Ptolemy, we know who and how.

Comparing his own observations with those of earlier Greeks, Hipparchus found that all the stars had moved relative to the equinoxes. So he called the Spring point of his own time 0 degrees Aries (it is near 30 degrees 1950), and that point, carrying the whole ecliptic continued on next page

since. It is perhaps easier to regard the Spring point as staying where it is while the stars flow eastward behind it, at a rate of over 1 degree every 72 years. In 2,800 BC it stood in front of Taurus, in 400 BC Aries, today it is in Pisces, and in 600 years it will be before Aquarius, whose age hasn't dawned yet.

Meanwhile it is good that we still use the Greek Zodiac, and those grandest of all mnemonics, the ancient constellations.

Papers consulted:

B L van der Waerden, "History of the Zodiac", Graz, 1953.
Christopher Walker, "Episodes in the History of Babylonian Astronomy", 1982.
Andre Florisoone, "Astrae et Constellationes des Babylonien", Brussels, 1951.
O Neugebauer, "The Alleged Babylonian Discovery of the Precession of the Equinoxes", 1950.

and much helpful correspondence from:

Jean Meeus (Belgium)
Ronny Martens (Belgium)
Christopher Walker (British Museum)

FEDERATION NEWS

HERSTMONCEUX '84 - COMPETITION RESULTS

Magazines: Braintree, Halstead and District AS won the prize of a £5 voucher donated by Ron Hebb. The Judge was Ian Ridpath.

Instruments: Peter Montgomery of Worthing AS won the prize of a book entitled "Telescopes" for his 15" Dobsonian telescope. The prize was donated by Norman Fisher who also judged the items.

Photographic: was divided into three sections; all were judged by Robin Scagell.

(a) Slides 1st prize John Ellis of Mid-Sussex AS won a book donated by Wylie & Sons.
The 2nd prize was awarded to Ray Hatt, also of Mid-Sussex AS, who was given a small Planisphere donated by Astro-Instruments.

(b) Black and White prints Alex Vincent of Worthing AS won a large Planisphere donated by Astro-Instruments.

(c) Colour prints Ron Stone of Worthing AS won "Cambridge Deep Sky Album" donated by Astro-Instruments.

Art: 1st prize to Peter Fisher (Brighton AS) for his magnificent mural. The prize was a book donated by Brohurst-Clarkson Fuller.

2nd prize of a Spaceprints calendar was awarded to June Nelson-Tomsen. The judge was Bob Marriott.

SUBSCRIPTIONS 1984/85

The current subscription year started on September 1st. Please check with your treasurer/committee that your sub has been paid. If not, renew at the long standing rate of £7.50, or, for societies with fewer than 25 members, at £4.00.

The next newsletter will be limited to paid up societies only.



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ASTRO-CALENDAR 1985

This ever popular publication can be obtained from Rosemary Naylor, 256 Recup Road, Todmorden, Lancs, OL14 7JL. The Astro-calendar is produced by Bob Owens of the Cardiff AS and contains monthly charts of stars and planets, with descriptive notes on observing them. It is very good value at the inclusive price of 60p each, £6.00 for 10, post paid. Please order in bulk and make cheques payable to the Federation of Astronomical Societies.

FAS HANDBOOK 1984/85

These are now available and paid up members will be receiving a copy. Extra copies to members of FAS societies can be obtained from the secretary, the treasurer, or from Brian Jones, the Handbook editor. (Non-members of the FAS please send £3.00 per copy.) Make cheques payable to the FAS.

The Handbook has been extensively revised, listing addresses of officers, (p 22) societies and other organizations, suppliers of equipment, magazines etc, and places to visit. In addition there are articles on building telescopes, observatories and domes. Also women in space.

SECRETARIAL CHANGE OF ADDRESS


Rosemary Naylor now lives at 256 Recup Road, Todmorden, Lancashire, OL14 7JL. Please add the telephone number to the entry in the new Handbook: Todmorden (070 681) 7767.

Reaction to this newsletter is still active and seems to be increasing, but that doesn't mean you can all go back to sleep! Please keep the items flowing in - long or short it matters little, although I would say that I prefer articles to be based upon the author's personal thoughts or experience rather than paraphrased from books or magazines.

Does anyone have a suitable name for this newsletter? Your sagacious council has searched its collective brain for a name and come up with absolutely nothing (not surprising!). If anyone has any ideas I'd like to hear them.

Finally, although this may be a little early, I would like to wish all astronomers everywhere a very merry Christmas.

George Bolland (Editor)



Letters

Clive Purchase, Secretary of Plymouth AS, writes:

"I should ... like to ask the advice of any member in the Federation how to make good black and white transparencies for projection from black and white negatives. Also I would like to hear from anybody who is involved with visual or photographic supernova patrol work.

Yours sincerely ..."

(Any readers having advice or information about Clive's questions should please send their reply to me so that useful information can be published in the next newsletter - Ed.)

Dear George

I am writing to draw your readers' attention to a very important forthcoming event. On February 2nd, 1985, the Braintree, Halstead and District Astronomical Society will be holding the 2nd East Anglian Astronomical Societies Convention. The first was held in February 1984 in Clacton.

This convention will be held at The Ramsey School, Colchester Road, Halstead, Essex, and will open at 9.00am. The lectures will not begin until 10.30am, and this will give those who want to, the opportunity to have a look at the trade stands and exhibits on display. We do, of course, realize that some people will have some distance to travel and we are trying to cater for this. We have a very full day and this is why we are opening so early in the morning - the day ends at 5.30pm.

Our speakers will include Nigel Henbest, Iain Nicholson, Heather Couper, and of course, Patrick Moore. Competitions are being organized and further details will be available shortly.

Admission will be £1.50 for adults and 75p for under 16s. Food and refreshments will be available and we will be conveniently situated near four public houses.

If you would like more information about this event please send a SAE to me at 19 Belle Vue Terrace, Halstead, Essex, CO9 2DD.

Yours sincerely

Andrew Gattward
(Chairman, Braintree, Halstead and District AS)

ASTRONOMY CAMP 1985 - 9th-16th AUGUST

A camp for those interested in participating in a week of active astronomical work at various levels will be held on the above dates at the Preston Montford Field Centre in Shropshire.

The price will be approximately £75 for the week, all accommodation and meals included. A deposit of £15 is payable on booking, cheques made payable to Astro-Camp. If you are interested and would like further information and/or wish to book, please contact, enclosing SAE:

Miss A Barrowcliffe,
111 Millhouses Lane,
Sheffield, S Yorks, S7 2HD.

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DON'T FORGET

Society News Round-Up

STUART LONSDALE

Items for the next "Round-Up" should be sent to: 16 Joan Lane, Hooton Levitt, Nr Rotherham, South Yorkshire, S66 8PH.

AYLESBURY AS: Tony Balfour tells me that they now have their very own badge making machine and that they are in business!

Problems with the observatory. With difficulties encountered in finding replacement material for the "T" section of the shutters, it looks as if a new design is called for. Roller blinds have been suggested. Tarpaulin will have to be used to cover the slit as a temporary measure.

Peter Le Masurier has provided new pictures and photographs for the walls of the meeting hut and they have greatly improved its appearance.

BOSTON ASTRONOMERS: Welcome to the FAS and your first round-up. A very well produced and presented magazine called Nova contains articles on IRAS, double stars, the Moon, the AAC, a crossword and many diagrams and illustrations.

There is a great deal of enthusiasm for the AAC and members have made regular visits.

Member Robert Renton built an observatory in 1981 which is used from time to time by the other members for "Star Watches". It houses an 8½-inch reflector and is some 10-feet above the ground so as not to be affected by ground mist which is common in the Boston Area and indeed in many parts of Lincolnshire. Ask any fisherman!

Anyone interested in the Boston Astronomers' should contact their secretary, Bryne Tongue South View, Fen Road, Stickford, Boston,incs, PE22 8HD.

COTSWOLD AS: Writes Anthony Ireland, "As a relatively new society member of the FAS I thought you would like to know more of the recent exploits of the Cotswold AS which is based in Cheltenham. We have 20 in our group ... have been actively involved in deep sky and planetary work and in experimenting with the new fast films. Two members gave a talk to an area meeting of Girls Brigade leaders ... we survived the daunting prospect of facing nearly 40 ladies of varying ages! On October 20th we joined with other societies for a Convention at Bristol University. It was a great success. A branch of our society has just been opened in Gloucester which means that we can now hold fortnightly meetings alternating between there and Cheltenham." Contact for Cotswold AS is Anthony Ireland, Hon Treasurer and Membership Secretary, 8 Merestones Drive, Cheltenham, Glos GL50 2SS.

COVENTRY & WARWICKSHIRE AS: The Goodacre Medal and Gift, the highest award of the BAA, was presented to the society's Vice-President, Howard Miles.

Their quarterly bulletin "Mira" contains some excellent sketches of Aristarchus and surrounding area by Tim Goldstone, Rob Moseley and Bob Marriott.

Subscriptions have had to be increased but will be partly offset by the introduction of a subscription to Astronomy magazine.

Regular Thursday evening observing sessions are held at the observatory of Coventry Technical College which houses a Cooke 6½-inch refractor.

CRAWLEY AS: Members had a successful time at the annual Astro-Camp in the Ashdown Forest. The highlight being the four-day Grand Meridian Walk in which five members took part. Alan Drummond says that the last leg was the hardest, some 15 miles non-stop.

but it was worthwhile especially as they raised money for the Chailley Heritage Charity for handicapped children.

During July, a visit was made to Herschel's House in Bath, the organising being done by Brighton.

A WEA class on Astronomy has been started in Crawley by Kenneth Hartley of the RGO.

HUDDESFIELD AS: The latest open week at the observatory produced around 200 visitors, who looked at the Moon, paid £20 in donations and increased membership by four.

It would seem that membership is somewhat low at the moment but I think most societies are suffering.

The annual grant from Kirklees Council this year has a slight twist to it. They will grant them £150 if Huddersfield match this with £150 of their own and if they spend it on instruments! £300 worth of telescopes is a bit much according to Philip Heppenstall and it will take some thinking out what to do.

The observatory has been well used and has undergone a facelift, including a new carpet. It is now in "tip-top" condition ready for the winter.

Publicity wise, they are hoping for regular slots in the Huddersfield Examiner.

ORWELL AS: The 2nd East Anglian Astronomical Societies Convention is to be held on 2nd February 1985. Further details contact: R Gooding, 168 Ashcroft Road, Ipswich, tel: Ipswich 462977.

The open weekend during September contributed about £170 to society funds.

Customer cash discount cards are available for members who shop at a local retailer.

PLYMOUTH AS: The first report for the Newsletter! Writes Clive Purchase, "We are a small society of about 18 members. However, we do have some excellent observers and equipment. We are engaged in Deep Sky, Meteor and Solar observations and Astro-photography. Instruments include a 10½-inch reflector driven by a kidney machine motor, 10-inch Dobsonian, two 8½-inch reflectors, various clock and Scotch mount drives and extensive darkroom facilities."

At the moment they are constructing an altazimuth 24-inch reflector of an experimental design. Using an 8-foot tube with the 24-inch mirror at one end, a 1.73-inch flat at the other. Between these is mounted a 50mm six-element camera lens to correct the focus. Clive continues, "Although the telescope with this design cannot be used on the Moon or planets, it is really a light grasper to study faint galaxies and nebulae. Of course, some would be very sceptical as to whether or not the system would work. Our maths show that this is a very feasible project."

Well, what do you think of it? Will it work? Keep us informed please, Plymouth.

SCOTTISH ASTRONOMICAL GROUP (SAG):

Neil Bone writes, "Weather over the summer noctilucent cloud 'season' was generally quite poor, many nights having been lost to fog and low cloud. One very large display was seen by several observers - not just in Scotland - on the night of June 28-29, and several members of SAG societies apparently obtained spectacular photographs."

Now that the darker nights are back, Neil hopes that it's back to work for their active observers up there in the North. Aurorae, meteors, variable stars or whatever else proves observable.

SHEFFIELD AS: The commencement of regular observing sessions meant of course a complete change in the weather. Rain and cloud greeted a visit to the observatory by the competition winners of our 50th Anniversary

A new duplicator has been purchased after the old one could only produce invisible ink!

The August open evening was very poorly attended. What a job we all have trying to convince the public we are NOT bespectacled old gentlemen sitting behind closed doors. (A comment once made by a local radio station.)

Slides are to be purchased for use by members at the Junior and Informal meetings.

The library is now so heavily stocked that it is falling apart at the seams. If there were more books borrowed it would lighten the load somewhat - members note!

SAGAS: Crawley AS - Chairman Peter Stanley has been featured in the local press complaining about the introduction of new and more powerful sodium lighting near his home. Mid-Sussex AS - Several members have been working at the society's observatory building and telescope. Meetings are now being held in premises they used to occupy several years ago. The new venue, it is hoped, will reduce costs, give greater flexibility and attract new members from around Haywards Heath. The new venue is the Sixth Form College, Harlands Road.

South Downs AS - A lot of work has been necessary to renovate the Trundle Observatory. Open days recently produced over 200 visitors and much interest was shown in the telescopes and society work. Slide shows were very popular and nearly £12 was raised from the "Black Hole" fabricated by member Bob Porter.

SOUTH WEST HERTS AS: The attendance of members at the High Top Observatory has been very good. Increased use however, has meant increase in possible accidental damage. The RA drive of the Cooke refractor was damaged by being slewed without the clamping screws being slackened off.

At the retirement of member Jon Wronska, on the teaching staff of the Royal Masonic School for Girls, the society presented her with a beautifully home-constructed planisphere.

Horace Dall, at the October meeting, reminisced about his early life in London and his move to Luton in 1911. His first serious telescope was an 8½-inch Calver on an equatorial mount, which he bought for £12 in 1920. In 1925 he made his first mirror, a 6-inch f8. A remarkable man.

WEST OF LONDON AS: A team of WOLAS members are preparing to face up to a quiz against Croydon AS in December. They will also have to face up to someone else, Heather Couper, she will be presenting it! By the way, we all wish Heather success as the new President of the BAA.

Observing sessions continue at the Northwood Golf Course.

Ideas for National Astronomy Week are being welcomed by the committee.

WEST MIDLAND AS: The link with Spain continues and the group send regular news. Although it's all in Spanish they say a lot of useful ideas can be taken from their publications.

Chairman Alan Wells has been trying to improve his astrophotography techniques, which he admits to being "not very good at it but I have decided to have another go". Anyway he must be going on okay as he is to build a wide field sky brightness detector which he hopes will enable him to work out correct exposures to reduce sky fogging.

Good coverage of the recent partial eclipse was given by the local radio station, ERWD Radio, and Alan Wells gave a last-minute live broadcast during the event. The short notice proved worthwhile and a good general interest was shown by the public and sound advice given on the safety aspect.

by Nazim Rajan
(Mid-Kent AS)

Once again, the Southern Area Group of Astronomical Societies (SAGAS) enjoyed its annual Astro-camp. This event, organized by Croydon AS, was held in August, on the 11th to the 25th to coincide with the Perseid meteor shower, the maximum being on the evening of 12th/13th.

The Moon was not particularly favourable for the first week, waning over the trees and the mist and fog did not help matters. This fortunately did not hinder the enthusiasm of the campers and we strived for astronomical stimulation. The Mid-Kent AS Celestron-14 was active; enjoyed and appreciated by all. Other scopes present included two beautiful Donsons made by Peter Montgomery from Worthing AS, a Meade 8 from Mid-Kent member Tony Smith, Norman Fisher's excellent 100mm Fluorite by Takahashi, a Fullerscope-12 from Orpington member Simon Gidden and other varied scopes, ranging from the Brighton AS 4-inch Irving refractor to an 8½-inch reflector.

The days were very good and sunny and campers spent the time indulging in the many activities in an around the camp. These included intrepid expeditions into the unknown depths of Ashdown Forest (Pooh Bridge is very nearby), visits to the shops, cinema and pubs of Forest Row and East Grinstead, even a trip to Greenwich or Herstmonceux. In the camp games of frisbee, cricket and rounders were among the zany pursuits, when not swimming (or should I say getting the Astrocampers clean and the pool dirty) and cooking that is! In the late afternoons and early evenings, on almost every night, the camp fire would become the focal point of interest, where potatoes, toast or anything else you can think of could be cooked.



"The CAMP FIRE" - Astrocamp

A competition was held to make a spectroscopic out of bits and pieces as well as a paper aeroplane competition, which Norman Fisher won - he also organized the event! Also, an Astroquiz took place which (again) Norman Fisher and his team won by ten points.

One of the main spectacles of the Astrocamp this year, however, was the Peacehaven to Greenwich Meridian Walk, in which some of the campers took part; the camp site was used as a base and stopover point and each evening as the walkers arrived back to the camp they were applauded by the other campers, creating a wonderful atmosphere and sense of achievement for them. They carried on their journey a copper painted wooden symbol which was burnt on the last day at Greenwich and the ashes were collected as a prize for the winners of the SAGAS v RGO Cricket match. (RGO won, incidentally.)

During the second week, the Astrocampers enjoyed very good skies, especially on the night of the 23rd, when the sky was clear down to the horizon, until dawn. The Celestron-14 produced remarkable clarity and many saw the best view of M13 that they had ever witnessed. Meteor watching was not

so good either, and the alternative artificial satellite count took place on many nights. There were only a few fireballs but none were of the calibre that had been marvelled at in the 1983 Astrocamp.

The Astrocamp is one of the great events of the year and makes a wonderful and very enjoyable cheap holiday for those that participate. There are many good reasons for the Astrocamp; these include dark skies, use of other instruments, chatting with interested astronomers, camping, flora and fauna, a swimming pool and a wonderful social event. I am sure that all who went this year will not hesitate to go again next year. The real enthusiasts will participate in the winter Astrocamp on Ice this December (or should I say masochists?). I hope you will be able to enjoy it too. The next Summer Astrocamp will take place from 10th to 24th August 1985. I hope to see you there.



Norman Fisher arrives at the site of the 1984 Astro-Camp with his hastily-constructed multi-mirror telescope.

SMALL AD

WANTED by Orwell AS: used 8mm or 16mm fish-eye lens to fit Pentax screw or Minolta. Contact Alan Smith on Ipswich (0473) 686103.

PRO-AM CRICKET AT HERSTMONCEUX

by Our Man in the Long Room
Ian Ridpath

It dawned wet and windy on September 23 when a party of SAGAS stalwarts visited Herstmonceux to play the Great Equinoctial Pro-Am Cricket Match against the RGO team for the Meridian Ashes. Such was the enthusiasm of the opposition for this historic event that twelve members of the RGO team turned up, all expecting a place in the team, so the game became an unusual 12-a-side fixture.

The amateurs, ably captained by Brian van de Peer of Mid-Kent AS, won the toss and batted on a damp wicket. After initial break-taking by the RGO attack of Max "Whirlwind" White and Ron "Bonecrusher" Argyle who dismissed the amateur openers cheaply (won't mention the duck, Greg), the visitors grafted their way to a total of 83, thanks largely to a top score of 24 by batsman/wicketkeeper Barry Moppet of Brighton AS, the only visitor to outscore Extras.

In the field the SAGAS side proved nimble but were unable to contain the superior batting of the home team. At one stage, when the heavens opened, it looked as though the amateurs might get away with a weather-induced draw, but the RGO team unspontaneously insisted on batting through a rainstorm to knock off the winning runs. How unfair!

At the FAS Convention on October 6 the victorious RGO team were presented with their trophy, the Meridian Ashes. These ashes are the remains of a sculpture (?) carried by SAGAS representatives from Peacehaven to Greenwich on the Meridian Walk. The sculpture was burned with full honours at the end of the walk and the ashes were stored in a glass coffee jar. It is now up to the RGO team to avoid losing them before the return match next year.

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