NOVA

THE BLACK HOLE

NOVA takes you
where no newsletter
has gone before!!!

EDITORIAL

NOVA, like most newsletters of like nature, is run on a hair-splitting schedule. Our policy up to now has been to assemble the edition on the second Sunday before the meeting and then have it printed and mailed by about 3:00 PM the next day. That schedule usually leaves plenty of time for our loyal Post Orfice to jam your favorite newsletter through the keyhole. The Laws of Probability, however, state that sooner or later a system run so close to the wire will screw up due to outside forces. Such was the case last month. Thanks to a super-human effort by Gregg Winter most of you got your NOVA before the meeting. To those who got theirs after the meeting (we only know of one) please accept our sincere apologies and refer to Gregg's test-imonial in this edition for a further explanation.

Last month's edition brought an important issue to light. When should NOVA be put out? The reason we go to print at the last possible moment is that this newsletter's prime function is to announce the next meeting's agenda. There are times when the agenda might be significantly altered in a week's notice. We could go to print a couple weeks before the meeting. That would 'guarantee' delivery before the meeting but then NOVA could be out of date as far as centre news is concerned. The other extreme of distributing NOVA at the meeting was tried last year but that was mostly due to budget problems. The question is, therefore, whether it is better to print late with the slight possibility of NOVA not being delivered on time or print early with the possibility of incorrect announcements.

Once again its time for our monthly attempt to convince you, YES YOU, to write articles. Just think of the satisfied feel-ing you'll have when you show your friends your name neatly typed for eternity in this newsletter. You'll instantly become an honored friend of the NOVA staff. Well, now that you're rushing for the typewriter, please allow us to suggest a few topics. Do you own a telescope of an unusual nature - why not describe it? Or maybe a technical description of some tele-scopic accessory. We're always waiting for observational art-icles and there are lots of planets visible. Someone (hopefully of an unbiased inclination) could review the latest Planetarium show. Why not dive into a pile of theoretical astronomy and write a summary of your confusion? The key word is participation. Don't just be a member, be an active member and save us editors from a life of literary deprivation......

Last Month's Meeting

Last month's meeting was somewhat of a disaster, we felt.
The evening began with the auction at about 20:00 PST. The
auction started rather slowly and continued at that tempo for
the duration of the event. The quoted values for some of the
articles were astronomically high. This, combined with reports
of hostilities in Afghanistan, resulted in floor activity being
quite bearish. The unstable activity of the market created
record world prices for Japanese barlows and equally record
low prices for 10" mirrors. Rumors of a large corporate merger
between Gregg Winter and a foucault tester were quashed by
radical government intervention. The government later announced
the alotment of five free shares of the tester to every paid-up
member. The market closed at 22:30 PST and members proceeded
to the lounge to catch a glimpse telescopes only to be forcibly
removed from the premisis at 23:00 PST.

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Next Month's Meeting

As usual, the February meeting will be pre-empted by the R.A.S.C.
ANNUAL DINNER.

     DATE: Tuesday, February 12th, 1980
     PLACE: Sands Hotel, Davie St near Denman. (Same as last year)
     TIME: Bar opens 6:30 P.M., Dinner 7:00 P.M.
     MENU: Baron of Beef $7.00, Juniors under 18 $6.00.
              Vegetarian Dinner $6.00.

The guest of honour will be Ian McLennan. Kindly phone Doreen
McLeod at 926-1450 for reservations. Family groups welcome.

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Taurus Majoris

Did you know that this is the first February since the early
60's that does not contain a full moon? It is even more
remarkable in that it happens to be a leap year. This month's
prize of two complimentary Planetarium tickets goes to the
first person who tells us when the last non-full-moon-February-
of-a-leap-year occurred.

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Gregg's Testimonial

Yes, the effort was indeed super-human and above and beyond
the call of duty.

LETTERS:

Dear Editors,

It has come to my attention that Bradfeild has discovered yet
another comet. This comet discovering has got to stop.
Although I am regarded as a professional astronomer in my
country, I feel that the rest of the scientific community
should have its fair share in discoveries also.

Our institution is the finest in the country with three major
domes, the largest housing a 63.5 mm refractor with auxiliary
equipment such as a 50 mm camera and a 30 mm guide scope.
With all this equipment and 5 days of intensive comet search-
ing we did not find one comet! WE are now waiting for the
full moon in hopes of discovering our first comet. If any
of your readers are interested in discovering 'their own'
comet, we recomend our new fortified comet pills, regarded
by the best to be the best.

Send for your pills today.   COMET PILLS
                                              c/o Prof. E.Centric
                                              Slabovia

The Editors, NOVA

I have a complaint to file. Your January issued NOVA reached
me only today (January 10). As a result, I had totally missed
the great instrument night. Being a new member, I didn't quite
know your regular meeting date.

                    Sincerely, Tony O. Myo-Lwin

Dear Dr. Myo-Lwin: Sorry your NOVA was **late**. We've been
members for six years, and we still don't quite know the
regular meeting date.   Ed.

Dear Sir:

Thank you very much for your reply. I am still very much
interested in the parts if they are still left over, and I
would be glad if I recieved the list of the remaining parts
after the sale has taken place.

I am delighted that you have put me on your mailing list,
and if needed I will pay the postage and the printing cost.
I very much enjoyed reading NOVA and am looking foreward to
the next issue. The article "Below the Clouds" was very
informative and I am thinking of aquiring a wet and dry bulb
thermometer myself. You have a great newsletter.

Yours Sincerely, Alister Ling, Montreal, Quebec.

Referring to the multiplier telescope arrangement shown in last month's NOVA, let us assume that the "binocular" shown is a "10 X 50" (i.e. 10 "power" with objectives of 50 mm. diameter). Coupled to the 3.75 power multiplier telescope, we have a total magnification of 10 X 3.75 = 37.5; this is equivalent to a 2 inch refractor with a "power" of approximately 40 (the light intensity is down by a factor of 14).

At this magnification level the moon's craters, Jupiter's major cloudbands, as well as its four Galileian moons, double stars, Venus crescent, sunspots (with neutral density filters!) are a joy to behold. Keep in mind that a multiplier telescope results in upside-down images, just like any other astronomical telescope.

The combinations camera-binoculars, or multiplier telescope-binoculars have their uses; the primary appeal of binoculars themselves, however, lies in their immediate availability for observation, portability, and the fact that they are what has lately been called a "richest field telescope", abbreviated RFT. As stated in the December issue of NOVA, they are literally everybody's window to the universe. They excel at showing faint extended nebulosities, clusters of stars, and all those beautiful astronomical images of the sky which require a large field of view. No telescceope can come near the 6 to 10 degree view encompassed by commonly available binoculars.

On clear, moonless nights it is possible to perceive stars of magnitude 9.5 with 6 X 30 binoculars (if you are away from the city, somewhere in the countryside!). "7 X 50's" or "10 X 50's" will show stars down to 11^m, or so. In order to enable you to check just what magnitude of star you can "reach" on any particular night, the enclosed illustration shows the "north polar sequence"; this is a list of stars of accurately measured brightness. Chart (a) contains stars within 5 degrees of the pole down to about magnitude 9. Chart (b) contains stars to approx. magnitude 12, within 2° of the pole. For those with larger telescopes, chart (c) shows stars down to magnitude 17, located within 0.5° of the pole (I'm sure that's sufficient even for G.W.!). A phototripod or other means of support for your binoculars is necessary to catch the faintest stars.

The astronomical capabilities of binoculars are fully utilized only in areas where city lights do not "drown" the faint stars and nebulosities. This "drowning" effect is quite obvious even in our justly famous planetarium. Whenever the planetarium projector is turned on, you can literally see thousands of "stars". As the background lights are slowly turned up at the end of one of the excellent shows, faint stars are quickly washed out, and only the brighter ones are still visible. In the planetarium, this effect can be controlled. Unfortunately, there is no such possibility "on the outside."

All is not lost. We are fortunate to live in this beautiful city which is still surrounded by many "dark sky" areas (Delta, Richmond, Lanley, Maple Ridge, etc.) These are all within easy reach, and very much worth a short trip. Anybody with an interest in astronomy living in those areas should be thankful, and should take advantage of this circumstance.

What else might be useful for binocular observations? Well, an accurate watch (digital or otherwise), set correctly, will aid in timing shortlived events (such as bright meteors). Also, you will find it useful and stimulating to maintain a

simple observations notebook. Here you might note the date, object, time, type of binoculars (used with or without multiplier-telescope), peculiarities noticed, and any other worthwhile comments. In addition, a star atlas, such as "Norton's Star Atlas", or the field edition of the "Skalnate Pleso Atlas of the Heavens" is a great help in locating objects in the sky. (Both are available at the planetarium gift shop). For predictions of star occultations, planetary positions, positions of Jupiter's moons, and a host of other facts and phenomena, the"RASC Handbook" is probably the best in the world (many professional observers use it). A small flashlight filtered with red paper, will aid in using all the above.

Well, that's all you need. As your interest grows, you may want to step up to larger telescopes (they do have their uses, you know!). This will not consign your binoculars to the slagheap; on the contrary, you will find them more useful than ever.

You can start your travels into the realm of astronomy without any of these aids, however. Observation of the sun needs no atlases; either direct observation (use the aforementioned light-reducing filters!), or the projection method will show you one obvious aspect of the sun right away: It is brighter in the centre. This is already an important observation. The apparently darker edge results from the fact the light from the sun's edge has to travel through more of the sun's atmosphere in order to reach us. At the present time (Jan. 1980) you will also see a multitude of sunspots. We are very near one of the most active sunspot "maxima". (If ever you can see a sunspot through the appropriate filter with the naked eye (i.e. not with binoculars), it has to be at least four times the size of the earth. This means something like 50,000 Km. diameter. At the moment, there may be at least one of these in view). Another interesting aspect is the apparent daily displacement and the change in appearance of any given sunspot; the former is due to the sun's rotation, the latter to actual physical changes.

The sun's period of rotation is approx. $25\frac{1}{2}$ days. Because of the earth's motion in its orbit, add an apparent 1 3/4 days (this time is needed for any given spot on the sun to "catch up" with the earth). Therefore, it takes roughly $27\frac{1}{4}$ days for a sunspot to return to a given place on the sun's disk, provided the spot has not disappeared altogether.

Drawing the sunspots is a relatively simple matter. An example of what can be done by the projection method is shown in the three sunspot drawings. I made these drawings in November, 1956, using a pair of 7 X 50 binoculars (that was two maxima ago -- I'm getting along!). Note the overall daily displacement of the various sunspot groups, due to the sun's rotation; a closer inspection also shows that some physical changes have taken place. These drawings were made by "tracing" the projected image; frequent "adjustment" of binocular position was necessary to compensate for the motion of the sun's image (at that time I had not learned how to keep the earth from rotating - I'm still working on it!).

If you feel inspired to make a similar series of drawings (at present a worthwhile undertaking - we're near a maximum) use a compass to draw some circles, one circle per sheet of paper. The diameter is up to you; however, if you make the circles too big you'll have to keep the binoculars too far away from the"projection screen". The drawings shown required a distance of approx. 1.75 meters (about 6 feet) and were made with the binoculars tied to one end of a "2 X 4". The "drawing" platform was fixed to the other end. Adjust this distance so that the projected image just fills the predrawn circles and let your artistic talents take over.
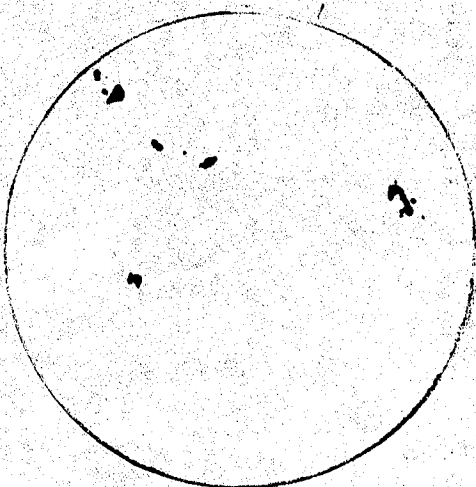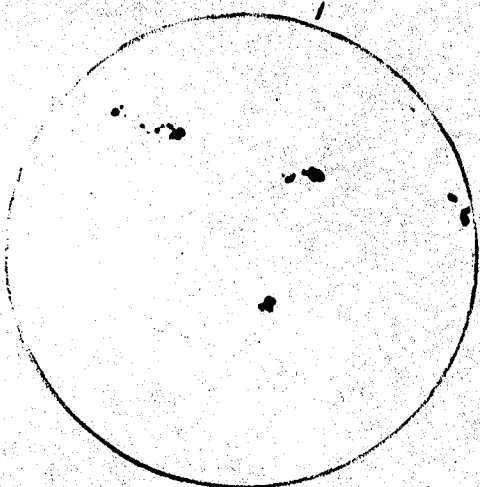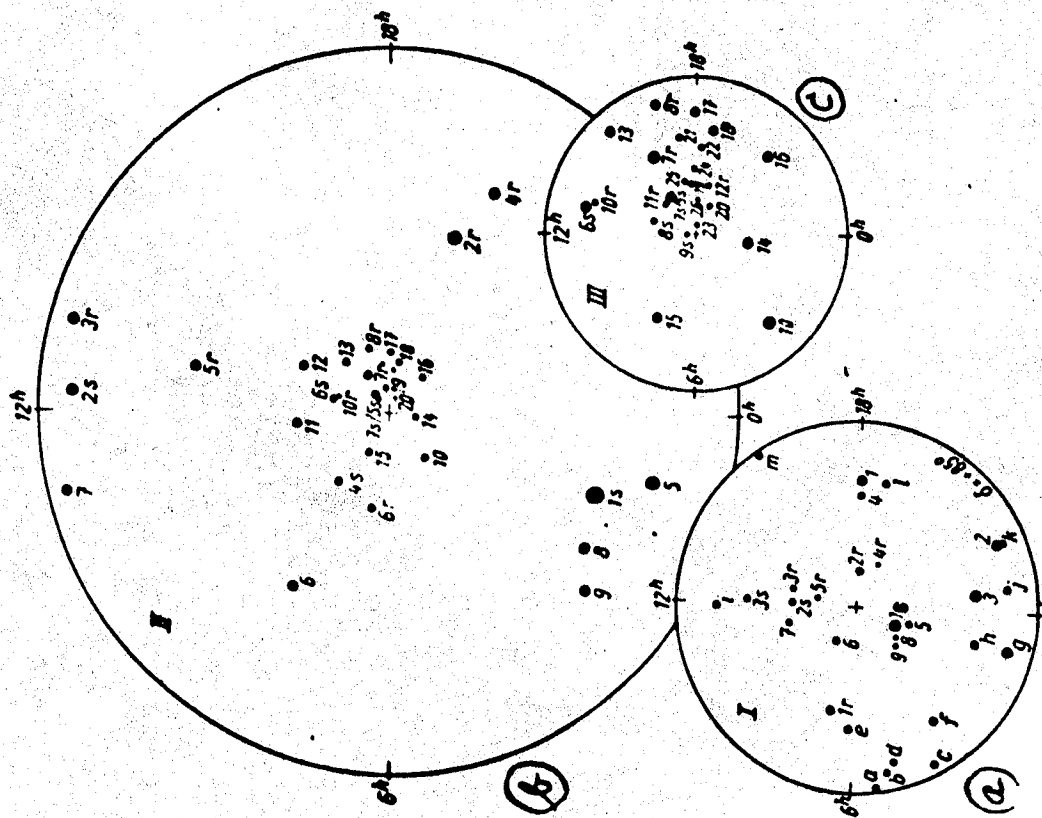
Date: Nov. 19, 1956
Time: $13^h 20^m$ PST
Groups: 6
Spots: 33
Instr: 7 X 50
Remarks: Air unsteady
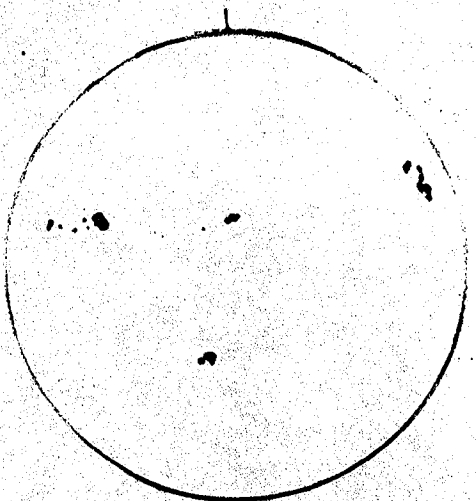
Date: Nov 20, 1956
Time: $14^h 00^m$
Groups: 6
Spots: 25
Instr: 7 X 50
Remarks: Cirrus clouds, hazy

Date: Nov. 21, 1956
Time: $13^h 00^m$
Groups: 4
Spots: 32
Instr: 7 X 50
Remarks: -

1s	2^{m}08	6r	9^{m}24	25	13^{m}58
1	4.37	13	10.37	8s	13.77
2	5.28	7r	9.87	26	13.69
3	5.56	14	10.56	9s	13.74
4	5.84	6s	10.08	27	14.25
5	6.45	15	10.88	28	14.54
2s	6.30	6a	10.72	10s	14.52
1r	5.09	8r	10.46	11s	14.35
3s	6.35	16	11.22	12s	14.67
6	7.06	17	11.30	13s	14.54
7	7.55	18	11.90	29	15.21
2r	0.32	10r	12.03	14s	15.05
8	8.13	7s	12.04	30	15.44
9	8.83	19	12.24	31	15.62
3r	7.57	20	12.52	15s	15.71
10	9.08	11r	12.07	32	15.58
4r	8.27	21	12.49	16s	15.50
11	9.56	22	12.84	33	15.97
12	9.77	23	13.00	34	16.29
5r	8.63	12r	12.47	35	16.94
4s	9.83	24	13.31		

On your drawing sheet you should note the date, time, type of binoculars, number of sunspot groups, number of sunspots and that this drawing was a "projected" image. A projected image is the <u>mirror image</u> of the sun (i.e. left and right are reversed). If you want to have the proper image, you may want to use translucent onionskin-type paper which will let you "retrace" your drawing on the back side. This type of solar observation can be enjoyed by a group of people; due to, of course, the use of the projection method.

An excellent reference for solar observing (as well as all other astronomical activities) can be found in the book by James Muirden: "Astronomy With Binoculars" recently reprinted (1979). Statistical data regarding the sun can be found on page 6 of the "Observer's Handbook", published by the RASC.

The foregoing involved what might be called "daytime" astronomy. Many people have also used binoculars to look at Venus, Mercury and Jupiter while the sun is still above the horizon. This requires fairly exact knowledge of position, as well as an extremely clear sky. For me, it has only novelty value; the only real use of this that I can see is as an adjunct to daytime observation of these objects by means of telescopes (this is my own opinion, probably not shared by many).

Binoculars really come into their own when applied to "night-time" astronomy. The areas most applicable to binocular observation are "comet hunting" and "variable stars". Here, really useful scientific observations can still be made, notwithstanding the impressive amount of optical and other instrumentation available to professional astronomers. There are simply not enough professionals around to keep track of all the variable stars known, even those, or especially those, which are accessible to binoculars. Whatever "heavy caliber" equipment is around must perforce be reserved for the kind of observations which can only be made by this type of equipment. Routine surveillance of brighter variables, or the hunting for new comets must simply be left to amateur astronomers.

It is true to say that many important discoveries have been made with binoculars. In 1924, for instance, comet Finsler was found with a pair of 8 X 24 binoculars; many "novae" were also first noticed by amateur astronomers using binoculars. As well, amateurs can be called the "watch dogs" of the sky (no offense, I hope) who will often point out to the professional astronomer where application of professional techniques and expertise is needed.

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As I sit here think'n
My eyes just keep on blink'n
It's much too late
I can't stay awake
So I'll put down NOVA
And rest in clova.
And try it again
To reach my fame
When I am sane.

The deadline for the March issue of NOVA is February 29, 1980.

Have you ever tried guiding a one hour exposure, or for that matter
a fifteen minute exposure? If you have then you obviously realize
the cramped positions and the (usual) physical discomforts (not to
mention the 100% concentration) are needed to obtain a good clean
negative with round, neat star images.

The product I am reviewing is Astro-Physics #7002 automatic star
tracker. At first hearing about these star trackers several years
ago, my first impression was how could a couple of light sensitive
devices do a better job of detecting the tiny movement of a guide
star than the human eye? Well, as I am not too well versed in the
field of electronics, it was only a matter of plugging it in and
finding out that it really works. It was as simple as that.

Lance Olkovick (of Astro Technics Ltd.) and myself tested the
tracker in my back yard in Richmond using a C-14. The results
were most interesting.

When using a C-90 as a guide scope (only 1000 mm f.l.) to guide
the C-14 (a rather large 4000 mm f.l.) the star images were round
neat and sharp in a 30 minute exposure.* When using the C-90 as
a guide scope the faintest guide star that is usable is about 6.
It was also found that the use of a guide scope was far superior
to that of an off-axis guiding system as when using the latter
with a C-8, the amount of light that enters the system is equiva-
lent to a one inch guide scope. The larger the apeture, the
fainter the usable guide star.

Lance has since tried the tracker with a C-8 (with the addition
of a dec. drive) using the C-90 as a guide scope; the result?
Lance set the system up Sunday night (Jan 27/80) and went inside
to watch The Martian Chronicles on TV only to come out 2 hours
later and found the tracker still guiding perfectly. Now, how
many did you say you wanted?

More about the trackers at a later date when more tests have
been completed.

*Ed. It was rather a cold night so we stayed inside and drank
some hot chocolate during the exposures.

Predicting the Position of Mars   as above

The easiest way to predict the position of Mars is to start off
with the inclination of the equator to the orbit (in degrees)
which is 25.20. Then multiply this number by its inclination of
the orbit to the ecliptic, also in degrees, which is 1850.00.
Your answer should be 46620.00 degrees. Now divide 46620.00 by
6.74, the average synodic period, to obtain the number 6916.91.
(Always use two digits behind the decimal point). After doing
all that, take 6916.91 and multiply it by 0.15, the albedo of
Mars, to obtain 1037.54. By the way, these calculations should

only be done with the use of a pocket calculator to achieve the required results. You're almost there, but not quite. Take the number 1037.54 and divide it by 1.03, the period of rotation to obtain 1007.32. Now add 1.88, the period of revolution, to 1007.32 and divide by 319, the average equilibrium temperature in degrees Kelvin to obtain 3.16. This last step is very important to obtain the utmost in accuracy: subtract 3.1266, the correction factor, from 3.16 - notice the four decimal points. Now multiply the answer by 10 (another correcting factor) and turn the calculator upside down to read the correct position of Mars.

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For Sale

Complete Celestron 8" telescope including fine latitude wedge, pier, and head, off-axis guider, tele-extender, tele-compressor, variable frequency drive, full aperture solar filter, 2" diagonal, 2" Erfle (aprox. 2" f.l.), complete eyepiece filters, counter-weights, and much, much more.(everything in fact!)

This must be sold as a package. Total Canadian retail cost is over $3,400.00. The package is offered to R.A.S.C. members for $2,000.00. If it is not sold to an R.A.S.C. member, it will be offered to the public for at least $2,500.00. For further information on the telescope call Dave Hurd at 736-4431, local 264. This telescope is presently owned by the R.A.S.C., Vancouver and is part of the McKelvay bequest.

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RAIN TOO: A Science Fiction Weekend   Jim W. Pook

I would like to tell you about the RAIN TOO SCIENCE FICTION CONVENTION to be held February 15,16, & 17, 1980 at the Hotel Rembrandt (1160 Davie St.) in Vancouver. Activities over the weekend will include parties, interesting panels, a Costume Ball, workshops, a do-it-yourself art show and auction, various video presentations, a dance, a Science Fiction Pinball Contest on a new TALKING pinball machine, and will wind up with a Sunday Brunch.

The Party Guest of Honour will be Nebula and Hugo Award winning author John Varley. Mr. Varley has written "The Ophiuchi Hotline", "The Persistence of Vision", and "Titan".

All this fun is to help us in our bid to bring Vancouver a World Science Fiction Convention in 1987.

Anyone who would like to attend RAIN TOO, or would like more information, may call me at home (278-1655) or write to: RAIN TOO, P.O. Box 48478, Bentall Centre, Vancouver, B. C., V7X 1A2. Memberships are $6. advance till Feb. 12, and $7. at the door, for all three days. See you there.