



East Valley Astronomy Club

April 1998

www.goodnet.com/~rkerwin/evac/evac.html

Scottsdale, Arizona

The 'Great Debate': What Really Happened

Michael A. Hoskin

The meeting of the National Academy of Sciences in Washington on 26 April 1920, at which Harlow Shapley of Mount Wilson and Heber D. Curtis of Lick Observatory both gave talks under the title "The Scale of the Universe", has passed into the literature as "The Great Debate". It is true that the two resulting papers published in the May 1921 Bulletin of the National Research Council contain the best presentations of the opposing arguments in the current controversy over the dimensions of our Galaxy and the status of the 'spiral' nebulae. But these papers, even if read without comment or discussion, would have taken well over two hours to deliver and therefore cannot possibly represent the proceedings at 'The Great Debate', which took place at 8:15 p.m. with a *Conversazione* timed to follow at 9:30. Nevertheless, most historians persist in treating these published papers as the verbatim record of a dramatic trial of strength, and so have created an historical romance. In what follows we draw on surviving archives to compile a more accurate account of what actually took place.

The encounter grew out of a remark which George Ellery Hale, founder and Director of Mount Wilson Observatory, made at a Council Meeting of the National Academy of Sciences late in 1919. Hale suggested that an evening of the Academy meeting planned for the following April should be devoted to one of the annual lectures paid from the fund set up in memory of Hale's father, William Ellery Hale. On 3 January C. G. Abbot, the Home Secretary of the Academy, wrote to Hale:

"You mentioned the possibility of a sort of debate, either on the subject of the island universe or of relativity. From the way the English are rushing relativity in Nature and elsewhere it looks as if the subject would be

done to death long before the meeting of the Academy, and perhaps your first proposal to try to get Campbell and Shapley to discuss the island universe would be more interesting. I have a sort of fear, however, that the people care so little about island universes, notwithstanding their vast extent, that unless the speakers took pains to make the subject very engaging the thing would fall flat....Are there not other subjects—the cause of glacial periods, or some zoological or biological subject—which might make an interesting debate?"

It is a little surprising that the island universe theory of spiral nebulae—the claim that the spiral nebulae are galaxies in their own right and independent of our Milky Way star system—was to be defended, not by Curtis but by his Director at Lick Observatory, W. W. Campbell. For Curtis had been engaged for nearly a decade on the photography of nebulae with the Crossley reflector, and for much of that time had been an enthusiastic convert to the island universe theory; only that March he had dined with Hale in Washington within a week of lecturing on "Modern Theories of the Spiral Nebulae" to the Washington Academy of

EVAC & Other Events: 1998

	Mtng	Local	DS	Other
Jan	14	17	24	
Feb	11	21	28	
Mar	11	21*	28*	21: EVAC Cookout* 28: Messier Marathon*
Apr	8	18	25*	19-26: Texas Star Party 25: Sentinel Star Gaze*
May	13	16	23	2: Astronomy Day 22-25: Riverside TMC
June	10	20	27	13-20: Grand Canyon SP 27-28: Universe '98
July	8	18	25	24-25: Stellafane
Aug	12	15	22	
Sep	9	12	19	11-13: Astrofest 18-19: N AZ Star Party
Oct	14	10	17*	17: All-AZ Star Party*
Nov	11	14	21	
Dec	9	12	19	

Sciences. And on 8 October, when organizing the observing programmes for the 60-inch and the new 100-inch reflectors at Mount Wilson, Hale had written to Campbell to say "We are planning an extensive attack on spirals, with special reference to internal motion, proper motion, spectra of various regions, novae, etc., and here again I should be glad to know what Curtis has in hand, so that our work may fit in with it to advantage" (emphasis supplied). Whatever the reason for the initial selection of Campbell as speaker, by the time the question comes up again in correspondence Hale had received from Campbell a copy of the volume on nebulae published by Lick Observatory, in which "three splendid contributions" were the work of Curtis, and thereafter Curtis and not Campbell is the projected speaker. Meanwhile, however, Hale in fact favoured relativity, but on this Abbot had many misgivings:

"As to relativity, I must confess that I would rather have a subject in which there would be a half dozen members of the Academy competent enough to understand at least a few words of what the speakers were saying if we had a symposium upon it. I pray to God that the progress of science will send relativity to some region of space beyond the fourth dimension, from whence it may never return to plague us."

Evidently Abbot's views prevailed, for he cabled Hale on 18 February: "Am wiring Heber Curtis suggesting Debate him and Shapley on subject scale of universe for Academy meeting forty five minutes each suggest communicate Shapley and Curtis and wire if favorably arranged." Curtis accepted, at first with marked reluctance, then with increasing relish at the prospect of battle. Shapley likewise accepted—Hale was his 'boss' and the invitation a compliment—but with deep misgivings, for his career was now at a crossroads. In February 1919 the death of Edward C. Pickering had at last brought to a close his forty-two-year reign as Director of the Harvard College Observatory. Pickering had been an outstanding administrator. The obvious choice as successor would have been Henry Norris Russell, Shapley's sometime teacher and mentor and the only American astronomer with influence comparable to that of Hale, except that he lacked Pickering's administrative abilities. Kapteyn, writing to Hale from Groningen, thought Shapley perhaps the right candidate; but Shapley, though a brilliant and original astronomer, was as yet only in his mid-thirties.

This handicap did not deter Shapley. In later life he vividly recalled the day he heard of Pickering's death, and decided to "take a shot" at succeeding him. He promptly wrote to both Russell and Hale to state his claims. Russell was equally frank in reply: "To tell the naked truth, I would be very glad to see you in a good position at Harvard, free from executive cares...But I

would not recommend you for Pickering's place; and I believe that you would make the mistake of your life if you tried to fill it." To Hale, Russell remarked that Shapley "would not suffer if he pondered the old fairy tale about the man who got all sorts of good things from a magic fish whose life he had saved—until his wife wanted to be Pope!" Hale warned Shapley: "My advice to any candidate for a position would be never to attempt to take an active part in securing it, as this is the surest way to defeat one's end." Shapley, chastened but secretly unconvinced, wrote to both men to declare himself no longer a candidate.

On 20 December, about the time that Abbot and Hale were considering Shapley for the Washington meeting, A. Lawrence Lowell, the President of Harvard, telegraphed to Mount Wilson: "Is Shapley coming East Xmas time for some scientific meeting? If so could he visit Cambridge? If not when could he come here?" The secretary's reply that Shapley had no such plans led to a mysterious visit to Shapley from a Regent of Harvard. "He evidently sailed under sealed and secret and telegraphic orders," Shapley told Russell on 6 January with some excitement, "for he knew nothing of astronomy or physics or science, or me or anyone here. He asked about the scientific meetings here last June—that A.A.A.S. convention that I managed...I might say that I am naturally very confident that Harvard is not too big for me and that the things I could and would do there would be a credit to American astronomy." The visitor's interest in Shapley's ability as an organizer rather than as an astronomer was no doubt because he was being considered, not for the Directorship, but for a post in support of the new Director. Certainly in June Russell was to be offered the Directorship with "a second astronomer, younger, and with modern ideas, to be called, to act as the Director's right hand man" (Shapley was to Russell the obvious choice), and a third person to act as administrator; and even when Russell eventually declined, Shapley was merely offered the post of Assistant Professor and Astronomer.

Evidently believing he was nominated for the Directorship itself, and eager for the appointment, Shapley viewed the proposed encounter with Curtis with dismay. As ill-luck would have it, Curtis was an experienced and accomplished public speaker who might well put Shapley to rout, whatever the scientific merits of their respective cases, and this taking place within easy reach of Harvard, could cost Shapley the Directorship. In the ensuing flurry of correspondence between Shapley, Curtis, Hale and Abbot, Shapley tried—half-heartedly—to get an Easterner substituted for Curtis, and—tenaciously—to undermine the seriousness and length of the proposed encounter. Four distinguished and busy men repeatedly discussed whether it should be a 'debate' as originally proposed, or a 'discussion'—two talks

-continued on page 5

April/May 1998

All Times MST

"To my mind an elementary knowledge of the nature & workings of the universe is a really essential part of any artist's or thinker's background. It is the greatest clarifier of perspective I know of..."
-H.P. Lovecraft

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
5 April <i>Palm Sunday</i> Daylight time begins	6 Mercury at Inferior Conjunction with Sun	7 Moon lies SE of Regulus	8 EVAC Mtng 7:30 pm at SCC	9 Yesterday: Ceres at Conjunction with Sun	10 <i>Good Friday</i> SAC Mtng	11 <i>Passover</i> Full Moon 3:25 pm
12 <i>Easter</i>	13 Saturn at Conjunction with Sun	14 Moon rises near Crown of Scorpius	15 Julian Day 2450918.5	16	17	18 EVAC Local Star Party
19  Last Quarter 12:45 pm	20 Yesterday: Sun enters Aries	21	22 Lyrid Meteor Shower	23 Moon near Venus & Jupiter!	24 Moon near Mercury	25 Sentinel Star Gaze
26  New Moon 4:43 am	27 Tomorrow: Muslim New Year begins	28 Moon near Aldebaran	29	30 Moon NE of Alhena	1 May May Day or Beltane	2 Moon lies S of Beehive Cluster
3  First Quarter 3:04 am	4 Mercury at Greatest Western Elongation from Sun	5 η-Aquarid Meteor Shower	6	7 Moon close to Porrima PAS Mtng	8 Moon lies N of Spica SAC Mtng	9
10 <i>Mother's Day</i>	11  Full Moon 7:31 am	12 Mars at Conjunction Mercury 0.76° SSE of Saturn	13 EVAC Mtng 7:30 pm at SCC	14 Yesterday: Sun enters Taurus	15 N. de la Caille, b. 1713	16

Celestial Triumvirate

M. Aaron McNeely, Editor

Spring 1998 has become a dull time for evening planet watchers. All of the naked eye planets are either too close to the Sun to observe or present in the morning sky. The Sun overtakes Saturn and Mars on April 13 and May 12 respectively. Mercury achieves inferior conjunction on April 6 and enters the morning sky for the year's shallowest apparition. The planet achieves greatest western elongation on May 4 and lies close to Saturn on May 12.

The "triumvirate" refers to Venus, Jupiter, and the Moon. Jupiter, since it appeared in the morning sky in late March, has been gradually approaching Venus. The two meet on April 23 along with a guest appearance by the Moon. Needless to say, this will be a beautiful appearance of solar system bodies in conjunction.

Lunar Almanac: 1998

	FQ	Full	LQ	New
Jan	5	12	20	27
Feb	3	11	19	26
Mar	5	12	21	27
Apr	3	11	19	26
May	3	11	18	25
June	1	9	17	23
July	1	9	16	23
	31			
	Full	LQ	New	FQ
Aug	7	14	21	30
Sep	6	12	20	28
Oct	5	12	20	28
Nov	3	10	18	26
Dec	3	10	18	26

Be sure to get up early on the day before the appearance of the "triumvirate" to observe the **Lyrid meteor shower** on April 22. Get in a good view before the Moon, just past Last Quarter, rises later in the morning. You can also attempt to observe some **Eta (η) Aquarid** meteors early on May 5 after the waxing gibbous Moon sets.

The Christian celebration of **Easter** traditionally is scheduled by the observation of astronomical events: It usually falls on the first Sunday after the first Full Moon after the Spring Equinox. This year Easter falls on the day after the April 11 Full Moon. This Full Moon also marks the night of the Jewish celebration of **Passover**. Passover is scheduled a bit more prosaically. Since the Jewish faith utilizes a lunar calendar with each new month beginning with a New Moon, the middle of each lunar month is marked by a Full Moon. The religious authorities establish the new year by the first New Moon after the spring equinox. Nisan is this first "moonth" of the year, and Passover is scheduled for the 14th of Nisan, or the night of the Full Moon.

Another bit of folklore concerns May 1st or **May Day**. This day is one of the four **cross-quarter days**, days positioned halfway between the solstices and equinoxes, of pagan European tradition.

Midnight Culminations

Date	Constellation	Star
7 Apr	Canes Venatici	
11 Apr	Virgo	Spica
2 May	Boötes	Arcturus
9 May	Libra	
9 May	Lupus	
13 May	Ursa Minor	

Midnight culmination marks the time of the greatest visibility of an object or constellation, they are at "opposition" with respect to the Sun.

In Astronomical History

April 5-30

- Apr 14, 1629: Christian Huygens, b.
- Apr 23, 1858: Max Planck, b.
- Apr 26, 1803: Meteorite shower at L'Aigle, France.
- Apr 26, 1920: "Shapley-Curtis debate" on the nature of spiral nebulae (galaxies).

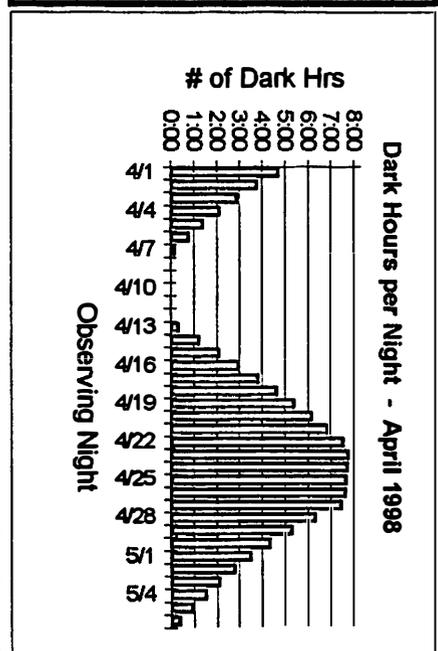
May 1-16

- May 1, 1949: Gerard Kuiper discovers Nereid, a satellite of Neptune.
- May 15, 1713: Nicholas de la Caille, b.

Dark of the Moon Table -- April 1998

OBSERVING NIGHT	START OF DARK		END OF DARK		TOTAL DARK		OBSERVING NIGHT	START OF DARK		END OF DARK		TOTAL DARK	
	MOONRISE	SUNSET	MOONRISE	SUNSET	HRS	MIN		MOONRISE	SUNSET	MOONRISE	SUNSET	HRS	MIN
WED/THURS	4/2 12:09 AM	MS	4/2 4:50 AM	SOT	4:42	...	SUN/MON	4/19 8:30 PM	EOT	4/20 1:33 AM	MR	5:23	...
THURS/FRI	4/3 1:04 AM	MS	4/3 4:49 AM	SOT	4:43	...	MON/TUES	4/20 8:31 PM	EOT	4/21 2:39 AM	MR	6:07	...
FRISAT	4/4 1:55 AM	MS	4/4 4:47 AM	SOT	4:44	...	TUES/WED	4/21 8:32 PM	EOT	4/22 3:21 AM	MR	6:49	...
SATSUN	4/5 2:40 AM	MS	4/5 4:46 AM	SOT	4:45	...	WED/THURS	4/22 8:33 PM	EOT	4/23 4:03 AM	MR	7:30	...
SUN/MON	4/6 3:21 AM	MS	4/6 4:44 AM	SOT	4:46	...	THURS/FRI	4/23 8:34 PM	EOT	4/24 4:18 AM	MR	7:44	...
MON/TUES	4/7 3:59 AM	MS	4/7 4:43 AM	SOT	4:45	...	FRISAT	4/24 8:35 PM	EOT	4/25 4:17 AM	MR	7:42	...
TUES/WED	4/8 4:32 AM	MS	4/8 4:41 AM	SOT	4:45	...	SATSUN	4/25 8:36 PM	EOT	4/26 4:15 AM	MR	7:39	...
WED/THURS	none	---	none	---	0:09	...	SUN/MON	4/26 8:37 PM	EOT	4/27 4:14 AM	MR	7:37	...
THURS/FRI	none	---	none	---	---	...	MON/TUES	4/27 8:47 PM	MS	4/28 4:13 AM	SOT	7:28	...
FRISAT	none	---	none	---	---	...	TUES/WED	4/28 8:53 PM	MS	4/29 4:11 AM	SOT	6:18	...
SATSUN	none	---	none	---	---	...	WED/THURS	4/29 10:53 PM	MS	4/30 4:10 AM	SOT	5:17	...
SUN/MON	none	---	none	---	---	...	THURS/FRI	4/30 11:48 PM	MS	5/1 4:09 AM	SOT	4:21	...
MON/TUES	4/13 8:24 PM	EOT	4/13 8:43 PM	MR	0:19	...	FRISAT	5/2 12:37 AM	MS	5/2 4:07 AM	SOT	3:30	...
TUES/WED	4/14 8:25 PM	EOT	4/14 8:37 PM	MR	0:12	...	SATSUN	5/3 1:20 AM	MS	5/3 4:06 AM	SOT	2:48	...
WED/THURS	4/15 8:26 PM	EOT	4/15 10:31 PM	MR	2:05	...	SUN/MON	5/4 1:59 AM	MS	5/4 4:05 AM	SOT	2:06	...
THURS/FRI	4/16 8:27 PM	EOT	4/16 11:24 PM	MR	2:57	...	MON/TUES	5/5 2:34 AM	MS	5/5 4:04 AM	SOT	1:30	...
FRISAT	4/17 8:28 PM	EOT	4/18 12:16 AM	MR	3:48	...	TUES/WED	5/6 3:07 AM	MS	5/6 4:02 AM	SOT	0:55	...
SATSUN	4/18 8:29 PM	EOT	4/19 1:09 AM	MR	4:37	...	WED/THURS	5/7 3:39 AM	MS	5/7 4:01 AM	SOT	0:22	...

EO = End of Astronomical Twilight MR = Moonrise SOT = Start of Twilight MS = Moonset NOTE: Applies to Phoenix area (Mtn Std Time)



Bernie Sanden 1/97

-continued from page 2 on the same subject from our different standpoints", as Shapley wished. No sooner had Hale been won round by Shapley to a 'discussion' than the latter received from Curtis a letter which reawakened all his anxieties:

"I agree with you that it should not be made a formal "debate", but I am sure that we could be just as good friends if we did go at each other "hammer and tongs"...A good friendly "scrap" is an excellent thing once in a while; sort of clears up the atmosphere. It might be far more interesting both for us and our jury, to shake hands, metaphorically speaking, at the beginning and conclusion of our talks, but use our shillelahs in the interim to the best of our ability."

Curtis sent a copy of the letter to Hale. It was 3 March before Hale could talk with Shapley and formulate his reply: "I do not think that the discussion should be called a 'debate', or that Shapley, who is perfectly willing to speak first, should have time allotted him for 'rebuttal'. If you or he wish to answer points made by the other, you can do so in the general discussion." Each should be manifestly a seeker after truth, "willing to point out the weak places in his argument and the need for more results." Not only had Shapley persuaded Hale away from the original concept of a debate, but he had convinced Hale that the proposed 45 minutes for each speaker was too long (on the grounds that this would tax the patience of the audience), and that 35 would be better. Curtis was aghast. The Lick Observatory Journal Club had recently devoted several meetings to the size of the Galaxy and the problem of external galaxies, and Curtis had prepared a paper on the subject which he was circulating to friends for comment. He knew how long he needed to make a serious scientific case. "We could scarcely get warmed up in 35 minutes", he protested to Hale. Again the letters passed back and forth, and eventually a compromise of 40 minutes was imposed.

The next problem concerned the subject matter. In Shapley's view, "The Scale of the Universe" made Curtis's main concern, the island universe theory, an incident to a general discussion of the "present guesses as to galactic dimensions and arrangement". On the other hand, both men recognized that if, as Shapley maintained, the Galaxy was much larger than had previously been thought, it would be more difficult for Curtis to sustain the claim that the spiral nebulae were independent island universes; and it was clear from the pictorial slides Curtis proposed to use that he would indeed concentrate on the island universe theory. Shapley welcomed their different but interrelated approaches as offering scope for a partnership instead of the dreaded confrontation: "I shall not be able to get

as far as details of nebulae in my half of the talk, but I shall get some of the explanatory, introductory, illustrative requisites out of the way so that you can probably go farther into the details." But he knew that Curtis planned to present a serious scientific argument, summarized on type-written slides which he would show to the audience. Shapley decided to appeal to Russell, his powerful ally, for vocal support, though putting the suggestion as usual into the mouth of a senior colleague:

"I lead off (with pictures), then Curtis presents his views, and then follows general discussion. Mr. Hale is anxious that you lead that discussion in whatever way you see fit, and I believe he plans to ask the presiding officer to call upon you as a starter..."

"Curtis swears by Newcomb and other patriarchs, and will show (?) that my distances are some ten times too big. Now that ten times, as Mr. Hale realizes, is as bad on your hypotheses as on mine; it is a violation of nearly all recent astrophysical theory. So unless Curtis actually bowls us over with the only true truth in these celestial matters, you will be interested in this general assault from the self-styled conservatives."

"Professor Brown is here at the observatory; also Professor Frost. They, as well as the people at Lick and at Mount Wilson, seem to regard that coming discussion as a crisis for the newer astrophysical theories...But, crisis or not, I am requested to talk to the general public of non-scientists that may happen to drop in. Consequently, whatever answer must be made to Curtis and his school must be made in the discussion."

"I write you this because you may be interested in knowing what the situation is, and so that you may be ready to defend your own views if they are imposed upon by either of us. To make matters worse for me, Mr. Agassiz of the Harvard Obs. Visiting Committee is coming down to the lecture and to eat a lunch with me; and A.L.L. himself has written for an appointment in Washington."

In fact Russell made so substantial a contribution in support of Shapley that the question arose of whether he should be a third author of the published version, for in July Shapley told Curtis: "Russell is probably not coming in the published discussion, according to Hale, so either I should have the come-back or I should know what you are going to do and rebut in advance."

There remained the crucial question of the content and level of Shapley's presentation in Washington. His decision was to treat the National Academy of Sciences to an address so elementary that much of it was necessarily uncontroversial. The typescript he used—covered with penciled emendations, some in shorthand—runs to some 19 pages. Of these, the last three pages are devoted to the intensifier he had developed to permit the photography of very faint stars—irrelevant to the theoretical argument, but perhaps directed in part to those members of the audience responsible for the future development of Harvard College Observatory. Of the first 16, it takes him more than six to reach the definition of a light year! The remaining ten pages are published below (see the Internet site mentioned at the end of this article); this, and not the technical paper which appeared over a year later, was what Shapley actually said in Washington.

Although Curtis intended to present his case through a series of typewritten slides, he also had a script of sorts, no longer extant. It was probably by way of introduction to the more technical material on the slides, for he wrote to Shapley the following August: "I am sending with this a copy of my talk at Washington. This will recall to you the general lines of the arguments used...Unfortunately, most of my actual argument was shown in the form of typewritten slides; I have no copy of these to send on to you at present..." These slides (or some of them) have survived and are reprinted below (see Internet site). They relate closely to the published account, and at Washington must have formed an odd contrast to the elementary talk by Shapley which had preceded. The contrast is echoed in Shapley's letter to Curtis on 9 June, telling him that Hale thought that "in a slightly different form the papers would go to the Proceedings—he favors that, in fact, even if the papers are long, providing the material is suitable in being not too popular (like mine?) or too tabular or technical (like yours?)". Curtis modestly accepted the criticism: "Yes, I guess mine was too technical. I thought yours would be along the same line, but you surprised me by making it far more general in character than I had expected. Had some thoughts of changing entire character of my presentation about five minutes before close of your part, but decided at last minute to go ahead with program as planned."

A referee might have declared 'no contest', but insofar as there was a contest, Curtis was the winner. Shapley in old age recalled: "Now I would know how to dodge things a little better...As I remember it, I read my paper and Curtis presented his paper, probably not reading much because he was an articulate person and was not scared. Curtis, writing to his family on 15 May, reported "Debate went off fine in Washington, and I

have been assured that I came out considerably in front". Russell, writing to Hale in June about his invitation to become Director at Harvard, declared: "Shapley couldn't swing the thing alone. I am convinced of this after trying to measure myself with the job, and observing Shapley at Washington"—but if Shapley joined Russell there as his 'second' he ought to offer a lecture course for this "cultivates the gift of the gab, which he needs. In spite of the disparate performances, the occasion lived in the memory of those directly or peripherally involved. For Curtis it was the climax of his decade of research on the nebulae; by July he was at Allegheny Observatory as Director and his creative years as an observer were over. For Shapley it was the occasion when he (and Mrs. Shapley!) were vetted for the Harvard appointment. For the staff of the two great Californian observatories, it was something of a duel between champions. Above all, the time was ripe for an appraisal of conflicting evidence and opposed interpretations on the fundamental question of the nature of the universe in the large; as R. G. Aitken of Lick remarked,

"I would like to hear the debate between Curtis and Shapley. I have read Curtis' paper—a very good one—and have had long talks with Shapley also, and each one has many very good arguments to present. For my own part, I am still "on the fence" on the question. I very greatly doubt the visibility of half-a-million or more 'island universes' on the one hand, and, on the other, I am not ready to accept Shapley's conclusions on the basis of his measuring-rod. It seems to me that its value is not yet sufficiently demonstrated. I am open to conviction."

Curtis went prepared for the fur to fly; his contribution was by common consent well presented and, as the slides show, at a high technical level. Russell, a talker of legendary capacity and an outstanding astronomer, made a substantial reply from the floor, and we may be sure the rest of the session was hard fought. No wonder it was a memorable occasion. But the scientific argument and counterargument between Shapley and Curtis enshrined in the Bulletin papers belong, not to the verbal fisticuffs of Washington, but to their ensuing and protracted correspondence; and that is another story.

Michael A. Hoskin of Churchill College is the editor of the Journal for the History of Astronomy. This article first appeared in the Journal, issue 7, pp. 169-182. Consult the following Internet site for the complete text of the article, including references: http://antwrp.gsfc.nasa.gov/diamond_jubilee/debate20.html. Reprinted with permission.

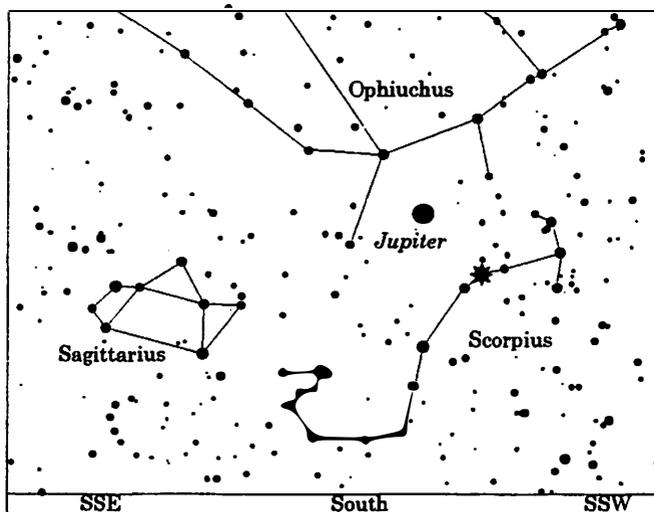
The Titanic and the Moon

By Joe Orman, EVAC

I have recently seen the movie "Titanic," which graphically depicts the nighttime sinking of that great ocean liner. During the scenes that show the ship sinking, and afterward when the actors are clinging to floating debris, the movie set is illuminated by a pale light which reflects off the water. While the moon itself is never shown, one gets the impression that the event occurred under a full moon. After seeing the movie, I was curious to find out if this was really the case.

The Titanic struck an iceberg at 11:40 pm on April 14, 1912 and sank at 2:20 am on the 15th (in the North Atlantic, at the coordinates 41°44' N, 49°57' W). Using the astronomical software RedShift 2, I have calculated that the phase of the moon was a waning crescent of 8% illumination, being only 2 days before new. The moon set at 4:00 pm on the 14th (3 hours before sunset), and did not rise until 5:00 am on the 15th, in morning twilight only a half-hour before sunrise. So there was no moon in the sky that night. Venus was also not up, rising at the same time as the moon. The brightest thing in the night sky was Jupiter, low in the SE at the time of the sinking.

No doubt the makers of the movie lit the scene this way for artistic and technical reasons, but the sinking of the ship actually took place in what must have been terrifying near-total darkness.



View from the Sinking Titanic
April 14, 1912
2:20 am
North Atlantic Ocean
41°44' N, 49°57' W

EVAC Meeting Highlights

Robert Kerwin, EVAC
March 11, 1998

Don Wrigley called the meeting to order at 7:40 pm. Don invited guests and new members to introduce themselves and although there were several new faces in the crowd, they all chose to remain anonymous.

Don then highlighted several of the upcoming events including the EVAC cookout/star party on March 21 at Lost Dutchman Park. A.J. Crayon from Saguaro Astronomy Club talked about the Messier Marathon on March 28th at the Arizona City site. Weather permitting, all 110 objects should be visible this year. Forms will be available at the site. Completed observing forms must be turned in to A.J. before leaving the site.

Don also mentioned the upcoming meeting on April 8th and the Adopt-A-Highway cleanup scheduled for April 11th. Details will be in the April newsletter. The cleanup takes approximately 4-5 hours depending on the participation. On April 18th, Don will be giving a planetarium show using the Starlab. This is a good opportunity for beginners to learn their way around the sky. Since this is a local star party night, participants can head out to the site for some observing after the show. Another date to keep in mind is Astronomy Day, which is on May 2nd this year.

For the remainder of the Spring semester, the EVAC meeting will be held in PS172 (the big room). The instructor who had the other room complained that it was too big for his class!

Those who attend the deep sky star party at Vekol road might want to drive a bit slower on the last mile before the site. The road has been graded, but there are now several huge berms in the road, the first one after the fork being the largest.

Don Wrigley continued to check into prices for a slide projector and was quoted \$720 for everything. He will continue to look for a better price.

Next, several members showed slides of the February 26th eclipse, including Joe Orman, Rick Scott, Tom Polakis and Bernie Sanden. All photos were interesting and each gave a different perspective on the event.

Tony Ortega, a writer for the New Times, has been busy again, this time debunking the UFO explanation of the March 1997 lights seen over Phoenix. According to Tony, the local media sensationalized the event and drew upon unqualified sources to support the idea that

the lights were alien spacecraft. In his article, Tony concludes that the lights were simply high-flying airplanes.

Our main speaker was Warren Kutok, proprietor of Photon Instruments in Mesa. Warren specializes in telescope repair and the restoration of antique telescopes. He has done much work for various universities across the country. He gave a brief history of the telescope, with an emphasis on refractors. Following this, Warren fielded many questions from the audience regarding all aspects of telescope optics and design.

The meeting concluded at about 9:30 with refreshments.

Sentinel Star Gaze

April's deep sky observing event is sponsored by the Saguaro Astronomy Club. Sentinel is a remote area located about 30 miles southwest of Gila Bend on Interstate-8. Driving time from central Phoenix is approximately 2 hours. After reaching I-8, leave the highway at exit 87 and drive south along the dirt road for about 2.2 miles. The observing area will be on the left. Please be sure to arrive before dark. If you need more directions please contact Aaron McNeely at amcneely@primenet.com or 602/954-3971.

April's Guest Speaker

Tom Polakis of EVAC will talk about his experiences in his first year of backyard CCD imaging. Tom is an aerospace engineer and author of numerous astronomy articles published in Sky & Telescope and Astronomy magazine.

Spring Adopt-A-Highway

Sam Herchak, EVAC

EVAC members will conduct a cleanup of Highway 60 Mile 211-212 on Saturday, April 11th at 8:00 am. I am looking for 8 NEW volunteers to help with this community service that the Club has committed to. If each member took a turn, an individual would only participate once every five years, so let's see some new faces out there!

Our task is to pick up trash from the shoulder of the highway to the right-of-way fence. The median separating this divided highway is OFF LIMITS! State crews are responsible for that. Here is what else you need to know:

Participants must be at least 12 years old. Work in groups facing oncoming traffic.

Dress appropriately—long sleeves and pants, sunblock, sturdy shoes or boots, a hat, and sturdy GLOVES. The state provides safety vests that must be worn. Please have lots of water on hand also.

Pick up bags and other litter with caution—they can contain needles or be hiding a snake. A stick with a nail or hook is strongly recommended to use instead of your hands. Buckets make for fewer trips to the trash bags. Few large objects are found out there, but if lifting one, keep your back as straight as possible, the object close to your body, and let your legs and arms do the work.

Most of the garbage we collect is alcohol related; beer cans and bottles, with Budweiser topping the list. But guns and toxic waste also get dumped along our roadsides, so if anything looks odd or is really heavy, LEAVE IT ALONE! Note it's location and we'll notify the State about it afterwards. When a trash bag becomes full, place it on the very edge of the pavement, not in the pullout lane.

As with any government program, there are a few requirements to complete before participation. One is a briefing from the cleanup coordinator. The second is to sign the usual waiver for the State saying participants won't sue if something happens. The forms are kept on file so one signature covers you for all future cleanups. Look for the sign up sheet and waivers at the April Club meeting.

We will meet at Florence Junction (intersection of Highway 60 and 89) on the north side in the far west corner of the parking lot (closest to the radio tower). Plan on finishing about lunchtime. If you can help or have questions, please contact Sam at 924-5981. Thank you.

Editor's Corner

M. Aaron McNeely, Editor
amcneely@primenet.com

I would like to thank Michael A. Hoskin for permission to reprint his article about the Shapley-Curtis debate. I would also like express my appreciation to the following EVAC members for their contributions and help in the preparation of this newsletter: Kathy Doyle, Sam Herchak, Robert Kerwin, Joe Orman, Bernie Sanden, Bill Smith, and Kathy Woodford. Lastly, and certainly not least, I want to thank my wife Wendy for all of her assistance with the various minutia of publishing.



East Valley Astronomy Club

Membership Form

Please complete the information on the form and return to the address below along with a check payable to EVAC for the appropriate dues amount. See below:

Kathy Woodford, EVAC Treasurer
PO Box 213
Apache Junction, AZ 85217
Call: 857-3438 evenings

Enclosed:
___ \$20 annual
___ \$15 April -Dec.
___ \$10 July - Dec.
___ \$ 5 Sept.-Dec.

Please Print

Indicate any information you want kept confidential.

Name _____

Address _____

Zip _____

Phone # _____

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Renewal

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If you have a web page or URL, please indicate address _____

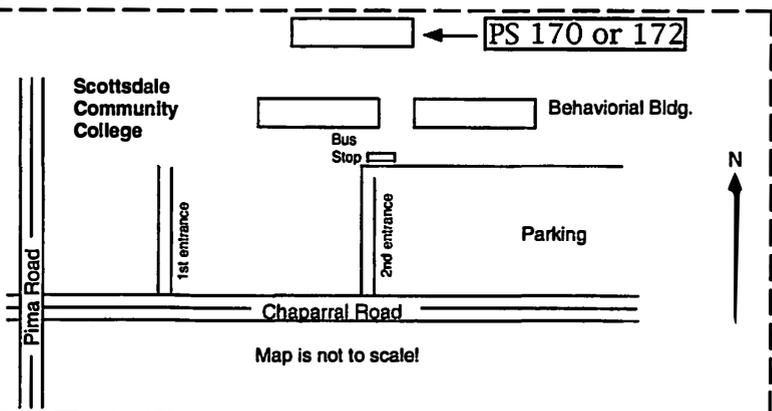
How did you hear about the East Valley Astronomy Club? _____

Major area(s) of interest:

- General observing
- Lunar observing
- Planetary observing
- Telescope Making
- Astrophotography
- Deep Sky
- CCD/Computer
- Other _____

CLIP AND SAVE

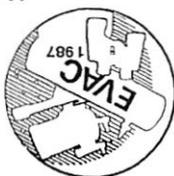
Monthly business meetings
are on the 2nd Wednesday of
each month at 7:30pm.



Don't Forget: Be sure to attend the April 8 EVAC Meeting, 7:30 pm at SCCI

- Contents:**
- The "Great Debate"
 - Celestial Trumvirate
 - Titanic & the Moon
 - Adopt-A-Highway: April 11
 - Sentinel Star Gaze: April 25

Valued member since 1/17/92
Next EVAC Meeting — April 8 7:30 pm



East Valley Astronomy Club
M. Aaron McNeely, Editor
4402 North 36th Street, #22
Phoenix, AZ 85018

East Valley Astronomy Club—1998

Scottsdale, Arizona

EVAC Homepage—<http://www.goodnet.com/~rkerwin/evac/evac.html>

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Sheri Cahn
602/841-7034

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Enrico Alvarez
602/837-0486

MEMBERSHIP & SUBSCRIPTIONS: \$20 per year, renewed in December. Reduced rates to *Sky & Telescope* and *Astronomy* available. Contact Kathy Woodford, P.O. Box 213, Apache Junction. AZ 85217, 602/857-3438. Email—ariz.kat@juno.com

CLUB MEETINGS: Second Wednesday of every month at the Scottsdale Community College, 7:30 pm. Normally Room PS 170 or 172 in the Physical Sciences Building. See map below.

NEWSLETTER: Mailed out the week before the monthly Club meeting. Send contributions to M. Aaron McNeely, 4402 North 36th Street, #22, Phoenix, AZ 85018, 602/954-3971. Email—amcneely@primenet.com

ADDRESS CHANGES: Contact Bill Smith, 1663 South Sycamore, Mesa, AZ 85202, 602/831-1520. Email—bsmithaz@aol.com

EVAC LIBRARY: The library contains a good assortment of books, downloaded imagery, and helpful guides. Contact Enrico Alvarez for complete details, 602/837-0486.

BOOK DISCOUNTS: Great savings through Kalmbach and Sky Publishing. Contact Don Wrigley, 423 West 5th Avenue, Apache Junction, AZ, 602/982-2428. Email—donwrig@juno.com

EVAC PARTY LINE: Let other members know in advance if you plan to attend a scheduled observing session. Contact Robert Kerwin, 602/837-3971. Email—p24493@email.mot.com

