Mt. Holz Science Fiction Society
Club Notice - 7/7/95 -- Vol. 15, No. 1

MEETINGS UPCOMING:

Unless otherwise stated, all meetings are in Middletown 5T-415
Wednesdays at noon.

DATE	TOPIC
07/12/95	Book: MIRROR DANCE by Lois McMaster Bujold (Hugo Nominee)
08/02/95	Book: MOTHER OF STORMS by John Barnes (Hugo Nominee)
08/23/95	Book: TOWING JEHOVAH by James Morrow (Hugo Nominee)
09/13/95	Book: BRAIN CHILD by George Turner
10/05/95	Book: MIDSHIPMAN'S HOPE by David Feintuch (**THURSDAY**)

Outside events:
The Science Fiction Association of Bergen County meets on the second Saturday of every month in Upper Saddle River; call 201-933-2724 for details. The New Jersey Science Fiction Society meets on the third Saturday of every month in Belleville; call 201-432-5965 for details.

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1. Out next book discussion is of Lois McMaster Bujold's MIRROR DANCE. A review follows later in this issue.

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2. Our film series of last October and November was successful, so we will try it now and again as new science fiction films are released. The film SPECIES has a good cast and has already gotten positive reviews (well, two yes-votes from Lyons and Medved). The film seems to be along the lines of A FOR ANDROMEDA and/or ALIEN.

Evelyn and I will be attending the 11:45 AM matinee Saturday, July 8, at the Hazlet Multiplex. That is just about the full extent of our organization. Anyone who wants to join us for the movie and possible discussion afterwards (the Red Oak Diner, just a little north of the theater on the northbound side, might be a good lunch/coffee place for this--corner of Route 35 and Bethany Road) is free to do so. Just look for us there. (If you don't know what we look like, we can probably provide a description. I will be the handsome bearded fellow in the photographer's vest.) [-mrl]

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3. It has become quite popular of late to look back to the ante-xenogenesis period to the mystical knowledge of the Rockers. But the common interpretation of their verses is simply that they are a sort of pleasant poetry. I think, however, that a close examination of the earlier and what are often considered the enigmatic works of that small cabal referred to as The Beatles I think proves the sacredness of their pressings. One cannot closely examine the content of the old pressings without realizing that the Great Old Ones really were describing events that would happen years, often many years, after their death. Apparently many of the Rockers, and the Beatles in particular could see the future and did have a message that describes the many years since they wrote with startling accuracy. How else could the Beatles have understood with such clarity and depth the changes that were to come in the intervening 150 years?

I think we only have to look directly at the Beatles' verses to recognize the power of their prophecy and the meaning for our own times in their writings. Consider "The Sacred Lucy." How many times have we chanted it without listening to the words? But how rarely have we actually considered the meaning of "The Sacred

Lucy?"? In part this is because to understand it one must understand its arcane 20th Century symbolism. Consider "Lucy" herself. Lucy was an early Cathy broadcast program. "Lucy in the sky with diamonds" foretells the coming of TelSat Cartel. Diamonds were a form of currency for the wealthy in the 20th Century. Of course this is a prediction of the coming of the wealthy and powerful communication conglomerates of the early 21st Century, perhaps 40 years after the pressing of the song.

The Scripture then speaks of all of us traveling down a river traveling past geno-enhanced trees and in which the skys themselves yield "marmalade." This speaks of the coming of the twin eras of genetic engineering and astro-tech. We are beckoned forward in time, advanced by tech of virtual reality. Could we have a better description of the mid-21st VirtReal ad art than to describe the woman in the glasses as a "Girl with Kaleidoscope eyes?"

Next the scripture speaks of towering flowers of an artificial substance. Again this is a reference to BioTech creating plants that at first seem to have impressive characteristic, like size but, of course, as we found they were useless for practical purposes. I could, of course, go on citing how each verse reveals a knowledge of coming history whose source is unknown. We must conclude that the events foretold in the Sacred Lucy are taking place in our own times and the description is so accurate as to prove the sacredness of the texts. [-mrl]

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4. MIRROR DANCE by Lois McMaster Bujold (Baen, ISBN 0-671-87646-5, 1994, 563pp, US$5.99) (a book review by Evelyn C. Leeper):

A few bookkeeping details first: in spite of Don D'Ammassa's review quoted on the back cover calling this "One of the Best SF Novels of 1993," this is a 1994 novel, and as such was nominated for a Hugo this year. What may have helped in that regard was that Baen sent unsolicited copies out to well-known reviewers and Worldcon attendees. (Normally a reviewer must request a specific book from

Baen. But every year about Hugo nomination time, I get two or three that they feel are Hugo material or whose authors they feel are Campbell Award material.)

In any case, since Bujold has already won the Hugo twice for previous Miles Vorkosigan novels (THE VOR GAME and BARRAYAR) and once for a Miles Vorkosigan story ("The Mountains of Mourning"), it isn't surprising that MIRROR DANCE was nominated as well. The last by internal chronology, as well as by publication date, it gives the reader sufficient background to follow it on its own, with a two-page summary of events occurring in the previous novels and stories.

This is described on the cover as a "Vorkosigan Adventure" rather than a "Miles Vorkosigan Adventure," and this is good, because in this novel, the main character is not Miles Vorkosigan, but his clone-brother Mark. In fact, though much of the novel, Miles is dead. (In the odd fashion of science fiction, this is not necessarily a spoiler. He dies fairly early on, and the plan is to resurrect him through some scientific means that they have then, but his cryo-chamber goes missing and much of the novel is about trying to find it, and him.)

Frankly, that doesn't matter. Mark is an interesting enough character in his own right to keep the story going (if at times a bit too contrived in terms of factors that shaped his personality). While I wouldn't call this a Hugo-quality novel, it is certainly an enjoyable enough adventure story, and readable even by those unfamiliar with the rest of the Vorkosigan books. [-ecl]

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5. APOLLO 13 (a film review by Mark R. Leeper):

> Capsule: Ron Howard gives us a surprisingly gripping yet accurate account of this country's tensest week in space. This is an inspiring film to remind us that seemingly impossible problems can at times be solved with sufficient perseverance and determination. It also is one

of the most exciting and spectacular films of the summer. Rating: low +3 (-4 to +4). Following the review is NASA's own published account of the flight of the Apollo 13 mission. The film is a close rendering, so use discretion on reading it before seeing the film.

There were two important events in James Lovell's life in 1965. He flew the Gemini 7 with Frank Borman, rendezvousing with Gemini 6. That event got worldwide attention. There was, however, a more important event that even Lovell did not know about. That was the year that the design team on the Apollo program decided to increase the voltage on the fuel cell oxygen tank heaters from 28 to 65 volts. Only a handful of people knew about that decision and James Lovell was not one of them. It was not a bad decision in itself, but it required replacing the thermostatic switches in the tanks with ones that could handle the extra load. But that replacement was one detail that got forgotten amongst the millions and millions of details necessary in building a lunar rocket. Under the right conditions the wiring could run hot and the Teflon insulation fail, then the wiring could short, the switches could fuse open, the oxygen could ignite, and the tank could explode. It was an unlikely chain of events, however, and it did not happen to the first Apollo missions. Five missions went into space with what was essentially a bomb in their service module and each returned safely. Ron Howard brings to the screen the story of the sixth Apollo mission into space, Apollo 13.

When I go to see a historical film I like to get more than two hours worth of entertainment. I try to read all I can about the events of the film and try to picture them myself. I enjoy knowing that in BRAVEHEAR what they called the Battle of Stirling was really the Battle of Stirling Bridge and Wallace won the battle because the English army was half on each side of the bridge when he attacked. Then if I write about the film I like to tell about what it got wrong. However, I will not be pointing out much in the way of historical flaws in APOLLO 13 because I have little to say. In 1970 it was Swigert saying "Houston, we had a problem," and I think in the film it was Lovell saying it in the present tense. Big deal. There may be two or three other minor distortions. Only

GETTYSBURG has been as accurate an historical dramatization in recent years. Watching the film after reading accounts of the flight I had fewer reactions of "Hey, they did that wrong," and than of "Oh, that's what the book meant." (The book, incidentally, is A HISTORY OF MANNED SPACEFLIGHT by David Baker, a book that is fairly detailed and authoritative. NASA also has an account of the mission on the World-Wide Web and which is included below.) The film does a remarkable job of making the technical concepts comprehensible. But where it comes to a choice between understandable or accurate, the film chooses accuracy. It was the right choice. The film takes the risk of not underestimating the intelligence of its audience, and as of this writing seems to be playing to sell-out crowds. It may not have more thrills than a Sylvester Stallone film, but they are authentic.

The spirit of the film as well as the subject matter makes it a logical successor to THE RIGHT STUFF. The tone could well have been a pessimistic account about the dangers of space exploration. Instead, Howard chooses to give us a much-needed reminder that the problems of space are soluble, and they would continue to be so even under incredibly short time constraints. Like DIE HARD WITH A VENGEANCE, this is a film about people solving problem quickly under extreme pressure. But the reason is not nearly so contrived and is far more believable. This is the story of the incredible no-excuses-no-failure engineering feat of taking a wrecked spacecraft that had fifteen minutes of life left in it and turning it into a lifeboat capable of bringing three men 200,000 miles to a safe landing on Earth.

The film begins with the Apollo 1 fire in 1967, a preparation for a sub-theme of the fear with which the families of all the Apollo astronauts live all the time but particularly during missions. Jim Lovell (Tom Hanks) tries to reassure his family, but still makes clear to his wife (Kathleen Quinlan) that he is going to walk on the moon. The film shows something of the training and the tricks of fate that determine the crew who will go on the ill-fated voyage. Much of this part may be interpolated and the matter of guesswork. But once the flight begins--with what is probably the most breathtaking rocket launch in any film fact or fiction--from there the NASA accounts of the flight are pretty much the scenario of the film.

Future films depicting the weightlessness of free-fall will have APOLLO 13 as a standard to live up to. There are no rotated camera effects or floating objects on wires. The weightless shots were filmed in genuine weightlessness within the atmosphere. The scenes were shot in short segments aboard Air Force KC-135s flying parabolic courses to create in actuality a zero-G set. Some roles call for actors to make special sacrifices, but having to actually act in freefall must have been particularly difficult as well as unique. It also must have made it impossible to film any one long

shot.

Having to go through this particularly difficult form of acting is Tom Hanks who is no doubt learned that a real lunar mission can have more surprises than a box of chocolates. His James Lovell, Jr., is played with a sort of quiet professional dignity that is a first for him. Kevin Bacon plays the hot shot pilot John Swigert, Jr. Playing the third Junior of three on board, Fred Haise, Jr., is Bill Paxton. None of these are particularly flashy roles. After letting Tom Cruise over-act just a little in FAR AND AWAY, Howard has much more subdued performances in this film. Kathleen Quinlan is losing some of the fragility of her earlier roles, but what she still has is useful here. And of course there is a role for Howard's favorite character actor, his brother Clint, here playing a nerdy technician. There is even a semi-comic role for Ron Howard's mother as Lovell's slightly confused mother. Howard was reluctant to cast Ed Harris as nervous, go-getting flight director Gene Krantz, since Harris is known best as John Glenn in THE RIGHT STUFF. However, the character is written thinly and the audience needs the previous characterization to flesh out the character.

James Horner provides a score lending a quiet dignity to the scientific pursuit supplemented by just a little too much rock music that really does not do all that much to capture the feel of the period. More is done by the clothing and set design, especially the occasional slide rule, which at least for a technical type (nerd) like me did much more to create an early 1970s feel. Also slightly overdone was the emphasis on urine and vomit. Special effects are first-rate and flawless.

This film is a paean to the power of perseverance to solve even the most impossible problems. This one is well worth braving the crowds to see. I give it a low +3 on the -4 to +4 scale.

What follows is NASA's own account of the flight of Apollo 13. Consider it one big spoiler:
Apollo-13 (29)
  Pad 39-A (7)
  Saturn-V AS-508 ()

High Bay 1
MLP 3
Firing Room 1

Crew:
James A. Lovell, Jr.
John L. Swigert, Jr.
Fred W. Haise, Jr.

Milestones:
06/13/69 - S-IVB ondock at KSC

06/29/69 - S-II Stage ondock at KSC
06/16/69 - S-1C Stage ondock at KSC
07/07/69 - S-IU ondock at KSC
04/11/70 - Launch

Payload:
Odyssey (CM-109) and Aquarius (LM-7)

Mission Objective:
Apollo 13 was supposed to land in the Fra Mauro area. An explosion on board forced Apollo 13 to circle the moon without landing. The Fra Mauro site was reassigned to Apollo 14.

Launch:

Saturday, April 11, 1970 at 13:13 CST.

At five and a half minutes after liftoff, Swigert, Haise, and Lovell felt a little vibration. Then the center engine of the S-II stage shut down two minutes early. This caused the remaining four engines to burn 34 seconds longer than planned, and the S-IVB third stage had to burn nine seconds longer to put Apollo 13 in orbit.

Days before the mission, backup LM pilot Charlie Duke inadvertently exposed the crew to German measles. Command module pilot, Ken Mattingly, turned out to have no immunity to measles and was replaced by backup command module pilot Jack Swigert.

Ground tests before launch, indicated the possibility of a poorly insulated supercritical helium tank in the LM's descent stage so the flight plan was modified to enter the LM three hours early in order to obtain an onboard readout of helium tank pressure.

The No. 2 oxygen tank, serial number 10024X-TA0009 had been previously installed in the service module of Apollo 10, but was removed for modification (and was damaged in the process of removal). The tank was fixed, tested at the factory, installed in the Apollo 13 service module and tested again during the Countdown Demonstration Test (CDT) at the Kennedy Space Center beginning March 16, 1970. The tanks normally are emptied to about half full, and No. 1 behaved all right. But No. 2 dropped to only 92 percent of capacity. Gaseous oxygen at 80 psi was applied through the vent line to expel the liquid oxygen, but to no avail. An interim discrepancy report was written, and on March 27, two weeks before launch, detanking operations were resumed. No. 1 again emptied normally, but No. 2 did not. After a conference with contractor and NASA personnel, the test director decided to "boil off" the remaining oxygen in No. 2 by using the electrical heater within the tank. The technique worked, but it took eight hours of 65-volt DC power from the ground-support equipment to dissipate the oxygen. Due to an oversight in replacing an understated component during a

design modification, this turned out to severely damage the internal heating elements of the tank.

Orbit:
Altitude: ? miles
Inclination: ? degrees
Orbits:
Duration: 05 Days, 22 hours, 54 min, seconds
Distance: ? miles

Landing:

April 17, 1970

Mission Highlights:

Third lunar landing attempt. Mission was aborted after rupture of service module oxygen tank. Classed as "successful failure" because of experience in rescuing crew. Spent upper stage successfully impacted on the Moon.

The first two days the crew ran into a couple of minor surprises, but generally Apollo 13 was looking like the smoothest flight of the program. At 46 hours 43 minutes Joe Kerwin, the CapCom on duty, said, "The spacecraft is in real good shape as far as we are concerned. We're bored to tears down here." It was the last time anyone would mention boredom for a long time.

At 55 hours 46 minutes, as the crew finished a 49-minute TV broadcast showing how comfortably they lived and worked in weightlessness, Lovell stated: "This is the crew of Apollo 13 wishing everybody there a nice evening, and we're just about ready to close out our inspection of Aquarius (the LM) and get back for a pleasant evening in Odyssey (the CM). Good night."

Nine minutes later, Oxygen tank No. 2 blew up, causing No. 1 tank also to fail. The Apollo 13 command modules normal supply of electricity, light, and water was lost, and they were about 200,000 miles from Earth.

The message came in the form of a sharp bang and vibration. Jack Swigert saw a warning light that accompanied the bang, and said, "Houston, we've had a problem here." Lovell came on and told the ground that it was a main B bus undervolt. The time was 2108 hours on April 13.

Next, the warning lights indicated the loss of two of Apollo 13's three fuel cells, which were the spacecrafts prime source of electricity. With warning lights blinking on, One Oxygen tank

appeared to be completely empty, and there were indications that the oxygen in the second tank was rapidly being depleted.

Thirteen minutes after the explosion, Lovell happened to look out

of the left-hand window, and saw the final evidence pointing toward potential catastrophe. "We are venting something out into the- into space," he reported to Houston. Jack Lousma, the CapCom replied, "Roger, we copy you venting." Lovell said, "It's a gas of some sort." It was a gas- oxygen- escaping at a high rate from the second, and last, oxygen tank.

(by James A. Lovell, from Apollo Expeditions to the Moon, edited by Edgar M. Cortright, NASA SP; 350, Washington, DC, 1975)

The first thing the crew did, even before discovering the oxygen leak, was to try to close the hatch between the CM and the LM. They reacted spontaneously, like submarine crews, closing the hatches to limit the amount of flooding. First Jack and then Lovell tried to lock the reluctant hatch, but the stubborn lid wouldn't stay shut' Exasperated, and realizing that there wasn't a cabin leak, they strapped the hatch to the CM couch.

The pressure in the No. 1 oxygen tank continued to drift downward; passing 300 psi, now heading toward 200 psi. Months later, after the accident investigation was complete, it was determined that, when No. 2 tank blew up, it either ruptured a line on the No. 1 tank, or caused one of the valves to leak. When the pressure reached 200 psi, the crew and ground controllers knew that they would lose all oxygen, which meant that the last fuel cell would also die.

At 1 hour and 29 seconds after the bang, Jack Lousma, then CapCom, said after instructions from Flight Director Glynn Lunney: "It is slowly going to zero, and we are starting to think about the LM lifeboat." Swigert replied, "That's what we have been thinking about too."

Ground controllers in Houston faced a formidable task. Completely new procedures had to be written and tested in the simulator before being passed up to the crew. The navigation problem had to be solved; essentially how, when, and in what attitude to burn the LM descent engine to provide a quick return home.

With only 15 minutes of power left in the CM, CapCom told the crew to make their way into the LM. Fred and Jim Lovell quickly floated through the tunnel, leaving Jack to perform the last chores in the Command Module. The first concern was to determine if there were enough consumables to get home? The LM was built for only a 45-hour lifetime, and it needed to be stretch to 90. Oxygen wasn't a problem. The full LM descent tank alone would suffice, and in addition, there were two ascent-engine oxygen tanks, and two

backpacks whose oxygen supply would never be used on the lunar surface. Two emergency bottles on top of those packs had six or seven pounds each in them. (At LM jettison, just before reentry, 28.5 pounds of oxygen remained, more than half of what was available after the explosion).

Power was also a concern. There were 2181 ampere hours in the LM batteries, Ground controllers carefully worked out a procedure where the CM batteries were charged with LM power. All non-critical systems were turned off and energy consumption was reduced to a fifth of normal which resulted in having 20 percent of our LM electrical power left when Aquarius was jettisoned. There was one electrical close call during the mission. One of the CM batteries vented with such force that it momentarily dropped off the line. Had the battery failed, there would be insufficient power to return the ship to Earth.

Water was the main consumable concern. It was estimated that the crew would run out of water about five hours before Earth reentry, which was calculated at around 151 hours. However, data from Apollo 11 (which had not sent its LM ascent stage crashing into the Moon as in subsequent missions) showed that its mechanisms could survive seven or eight hours in space without water cooling. The crew conserved water. They cut down to six ounces each per day, a fifth of normal intake, and used fruit juices; they ate hot dogs and other wet-pack foods when they ate at all. The crew became dehydrated throughout the flight and set a record that stood up throughout Apollo: Lovell lost fourteen pounds, and the crew lost a total of 31.5 pounds, nearly 50 percent more than any other crew. Those stringent measures resulted in our finishing with 28.2 pounds of water, about 9 percent of the total.

Removal of Carbon Dioxide was also a concern. There were enough lithium hydroxide canisters, which remove carbon dioxide from the spacecraft, but the square canisters from the Command Module were not compatible with the round openings in the Lunar Module environmental system. There were four cartridge from the LM, and four from the backpacks, counting backups. However, the LM was designed to support two men for two days and was being asked to care for three men nearly four days. After a day and a half in the LM a warning light showed that the carbon dioxide had built up to a dangerous level. Mission Control devised a way to attach the CM canisters to the LM system by using plastic bags, cardboard, and tape- all materials carried on board.

One of the big questions was, "How to get back safely to Earth?"

The LM navigation system wasn't designed to help us in this situation. Before the explosion, at 30 hours and 40 minutes, Apollo 13 had made the normal midcourse correction, which would take it out of a free-return-to-Earth trajectory and put it on a lunar landing course. Now the task was to get back on a free-

return course. The ground computed a 35-second burn and fired it 5 hours after the explosion. As they approached the Moon, another burn was computed; this time a long 5-minute burn to speed up the return home. It took place 2 hours after rounding the far side of the Moon,

The Command Module navigational platform alignment was transferred to the LM but verifying alignment was difficult. Ordinarily the alignment procedure uses an onboard sextant device, called the Alignment Optical Telescope, to find a suitable navigation star. Then with the help of the onboard computer verify the guidance platform's alignment. However, due to the explosion, a swarm of debris from the ruptured service module made it impossible to sight real stars. An alternate procedure was developed to use the sun as an alignment star. Lovell rotated the spacecraft to the attitude Houston had requested and when he looked through the AOT, the Sun was just where it was expected. The alignment with the Sun proved to be less than a half a degree off. The ground and crew then knew they could do the 5-minute P.C. + 2 burn with assurance, and that would cut the total time of our voyage to about 142 hours. At 73:46 hours the air-to-ground transcript describes the event:

Lovell: O.K. We got it. I think we got it. What diameter was it?

Haise: Yes. It's coming back in. Just a second.

Lovell: Yes, yaw's coming back in. Just about it.

Haise: Yaw is in....

Lovell: What have you got?

Haise: Upper right corner of the Sun....

Lovell: We've got it!

If we raised our voices, I submit it was justified.

"I'm told the cheer of the year went up in Mission Control. Flight Director Gerald Griffin, a man not easily shaken, recalls: "Some years later I went back to the log and looked up that mission. My writing was almost illegible I was so damned nervous. And I remember the exhilaration running through me: My God, that's kinds the last hurdle -- if we can do that, I know we can make it. It was funny, because only the people involved knew how important it was to have that platform properly aligned." Yet Gerry Griffin barely mentioned the alignment in his change-of- shift briefing -- "That check turned out real well" is all he said an hour after his penmanship failed him Neither did we, as crew members, refer to it as a crisis in our press conference nor in later articles."

James A. Lovell (Apollo Expeditions to the Moon, edited by Edgar M. Cortright, NASA SP; 350, Washington, DC, 1975)

The trip was marked by discomfort beyond the lack of food and water. Sleep was almost impossible because of the cold. When the electrical systems were turned off, the spacecraft lost and important source of heat. The temperature dropped to 38 F and condensation formed on all the walls.

A most remarkable achievement of Mission Control was quickly developing procedures for powering up the CM after its long cold sleep. They wrote the documents for this innovation in three days, instead of the usual three months. The Command Module was cold and clammy at the start of power up. The walls, ceiling, floor, wire harnesses, and panels were all covered with droplets of water. It was suspected conditions were the same behind the panels. The chances of short circuits caused apprehension, but thanks to the safeguards built into the command module after the disastrous Apollo-1 fire in January 1967, no arcing took place. The droplets furnished one sensation as we decelerated in the atmosphere: it rained inside the CM.

Four hours before landing, the crew shed the service module; Mission Control had insisted on retaining it until then because everyone feared what the cold of space might do to the unsheltered CM heat shield. Photos of the Service Module showed one whole panel missing, and wreckage hanging out, it was a sorry mess as it drifted away. Three hours later the crew left the Lunar Module Aquarius and then splashed down gently in the Pacific Ocean near Samoa,

After an intensive investigation, the Apollo 13 Accident Review Board identified the cause of the explosion. In 1965 the CM had undergone many improvements, which included raising the permissible voltage to the heaters in the oxygen tanks from 28 to 65 volts DC. Unfortunately, the thermostatic switches on these heaters weren't modified to suit the change. During one final test on the launch pad, the heaters were on for a long period of time. "This subjected the wiring in the vicinity of the heaters to very high temperatures (1000 F), which have been subsequently shown to severely degrade Teflon insulation . . . the thermostatic switches started to open while powered by 65 volts DC and were probably welded shut." Furthermore, other warning signs during testing went unheeded and the tank, damaged from 8 hours overheating, was a potential bomb the next time it was filled with oxygen. That bomb exploded on April 13, 1970 -- 200,000 miles from Earth.

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Journalism is the ability to meet the challenge to fill space.

-- Rebecca West