



Science-Fiction Fanzine

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The Israeli Society for Science Fiction and Fantasy

המפגש הבא בסדרת **ההרצאות ע"ש עמוס גפן** יתקיים בבית-אריאלה, שד' שאול המלך 25, תל-אביב האגודה הישראלית למדע בדיוני ולפנטסיה, בשיתוף עם בית אריאלה מרכז תרבות ועם "מסלול" – פורום סטודנטים לקידום חקר החלל בישראל, מזמינך למפגש הבא בסדרת ההרצאות ע"ש עמוס גפן. המפגש יתקיים ביום רביעי 26.2.03, בשעה 20:00 הכניסה חופשית

נושא ההרצאה: מעבורת החלל "קולומביה" – המשימה והצוות

המרצה: סא"ל (מיל.) יצחק מאיר

יצחק מאיר נמנה עם צוות הניסוי של המעבורת ועבר הכשרה ב-NASA כדי לשמש כמחליפו של אילן רמון ז"ל במקרה הצורך.

2. אסתיקון - מסיבת פורים ברחובות

הנכם מוזמנים למסיבת פורים שתתקיים ביום ג' 18/3/2003 החל מהשעה שבע בערב ועד חמש בבוקר, בבניין ה"עירונוער" (המתנ"ס) רח' בנימין 4 רחובות. במסיבה יתקיימו שלל פעילויות - תחרות תחפושות נושאת פרסים, שעשועונים, שירת פילקים, הקרנות סרטים, הרצאות ופאנלים, משחקי תפקידים והפתעות נוספות. מחיר הכניסה לחברי אגודה - 35 ש"ח לכל הלילה. האירוע מאורגן ע"י תא המד"ב של רחובות (SFIR), בשיתוף עם האגודה, מועדון סטארבייס 972 והעמותה למשחקי תפקידים. **בואו מחופשים!**

More information is available (in Hebrew) at the Society's site: <http://www.sf-f.org.il>

Comments on the Shuttle Disaster

THE TROUBLED PAST AND PRESENT OF THE SPACE SHUTTLE

by Yaakov Macales

The recent tragedy involving the destruction of the space shuttle Columbia has called into question once again the original decision by NASA and the United States government to invest in the Space Shuttle as the follow-on space vehicle to the expensive Apollo spacecraft that successfully brought astronauts both to the moon as well as to the first American space station which was called Skylab. Whereas each Apollo spacecraft and associated Saturn V booster was used only once, it was decided to design a new space vehicle that would be reusable and which would presumably be cheaper to operate.

The decision to go ahead with the Shuttle was made in 1972. One of the original designs of the shuttle had a reusable manned vehicle launched on top of the existing, proven Saturn V moon rocket. However, since the early 1970's was the heyday of the "ecology" movement and "recycling" became the watchword of the day, it was decided that the booster rocket propelling the

Shuttle into orbit should itself be reusable, the thinking being that Congress would be more inclined to fund the program if it was more politically "attractive". This led to the idea of having the booster rocket also being manned and using liquid fueled rocket engines. After the booster pushed the vehicle to a high enough velocity, the booster would separate and would be piloted back to the launch center and be landed like an airplane while the orbiter would continue into space under its own power. However, it soon became apparent that the level of funding Congress was willing to invest required the Shuttle to be less expensive so it was decided to replace the liquid-fuelled manned booster with two unmanned solid-fuelled rocket motor boosters (SRM). SRM's were considered to be less desirable because liquid-fuelled engines can be shut down in an emergency whereas an SRM can not be stopped once it is ignited. Here we see the first compromise on the level of safety of the Shuttle.

Another political decision that affected the design of the shuttle was the requirement that all US satellites be launched on the Shuttle. This came as a result of the Shuttle being designated a "space truck" which would supposedly be cheaper to operate than the existing single-use expendable boosters. No one seemed to ask the question of whether it was worth endangering peoples' lives in order to carry out routine launches of satellites. The organization most strongly impacted by this decision was the US Air Force which launches many classified payloads into space such as surveillance satellites. The USAF strongly opposed this decision. Finally they acquiesced on condition that the vehicle be redesigned to allow the vehicle to be maneuvered cross-range (i.e. sideways) in the event of an abort of the mission and the consequent danger of the orbiter having to make an emergency landing in a possible hostile country while carrying a classified payload. This resulted in the former short, stubby wings of the orbiter being enlarged considerably. In the end, the USAF managed to get the government to cancel the decision requiring them to launch their satellites on the Shuttle, which was now stuck with being forced to launch a lot of dead weight in the form of the larger wings which were now not needed.

Many new technologies had to be developed in order to build the shuttle. Most public attention focused on the permanent heat-resistant tiles making up the heat shield needed to protect the vehicle from the extremely high temperatures encountered during re-entry to the atmosphere. However, the most difficult part of the Shuttle to develop and which caused many delays in the construction of the spacecraft was the reusable, throttleable liquid-fuelled main engine (SSME). The fuel and oxidizer used by the SSME is stored in the large "External Tank" attached to the belly of the orbiter. The fuel, consisting of liquid hydrogen, is extremely cold (close to absolute zero which is -273 degrees Celsius), requiring a lot of insulation. It is this insulation and a possible coating of ice created by the extremely low temperatures that is believed to have broken off and damaged the wing of the Columbia.

Finally, in April 1981, several years behind schedule, Columbia, the first of the fleet of four orbiters blasted off. Whereas NASA had first talked about there being something like 25 launches of the Shuttle every year (!), it soon became apparent that it was a very delicate, complex machine and that it was far more expensive to launch payloads into space than was

first estimated. The destruction during launch of the Challenger orbiter in January 1986 due to a faulty design of the infamous "O-ring" in the SRM's and faulty launch procedures (launching at lower temperatures than was recommended) led to a decision not to use the Shuttle to launch regular satellites into low-Earth orbit. This, in turn, led to a major decrease in the number of launches. The Shuttle was used to successfully launch the Hubble Space Telescope and then to subsequently repair it more than once as well as to carry out various science research missions and also to launch the fabulously successful Galileo spacecraft into orbit around Jupiter. The main mission of the Shuttle today is to transport up various components of the International Space Station as well as its crews and to reboost the station into a higher orbit to prevent it from slowly falling back into the atmosphere. Recent years have seen only about four launches of the Shuttle each year. Ilan Ramon's ill-fated mission STS-107 was the first science mission flown in several years.

This brief history of the Shuttle shows that the spacecraft was basically a compromise design that no one really wanted and it did not live up to the high expectations pinned on it by its original proponents. This leads us to the question of whether it is worthwhile to keep flying it. Many people accuse it of being simply a high-tech form of "leaf raking", giving the people at NASA something to keep them busy at taxpayers' expense and dangerous to boot. In spite of the negative things I wrote about the vehicle above, I, on the other hand, still believe that it is a good spacecraft and it is in America's interest to keep it flying until a new, better and more economical spacecraft can be built. The orbiters have been upgraded over the years and this has driven technologies that have been used by the commercial and military aviation industries.

While it is true that the various pharmaceutical and industrial uses of microgravity for developing medicines and various products have not lived up to what was promised years ago, this is primarily due the high cost of the Shuttle and in the future it may be possible to use space for these things if they can be done more economically. It is not possible to know in advance what discoveries will be made, so if manned spaceflight is ended, we can't know what possible scientific and industrial breakthroughs will be lost. Most importantly, in my opinion, is that space remains the ultimate frontier of the 21st century. The United States, as the leading power in the world, has no choice but to remain committed to manned spaceflight, both for reasons

of prestige, but for also firing the imaginations and dreams of its young people to reach out for that frontier. History has proven over and over that societies that lose interest in exploration and increasing pure knowledge end up degenerating and ultimately collapsing (e.g. the Roman Empire from the 2nd to 5th centuries, and China in the 15th

century) so there is really no choice but to continue. The important point is to learn from the mistakes of the Space Shuttle program and to apply the lessons learned to the next generation of space vehicles, in order to make them safer and more economical.

Manned space flight will not become safer if it is suspended

By Prof. Benjamin Svetitsky, School of Physics and Astronomy, Tel Aviv University

A scientist opposed to the Space Shuttle program stated recently that, since two shuttle flights out of 113 have ended in disaster, we can infer a failure rate of 2%, which is unacceptably high and calls for the suspension of manned space flight. This use of statistics is plain wrong, because each flight benefits from the lessons of earlier flights. Each tragic accident makes future flights safer!

Consider the O-ring problem that caused the Challenger explosion on the 25th shuttle mission. We can guess that the probability of an O-ring problem at the time was around 1 in 25, or 4%. But after Challenger, the O-ring problem was eliminated by project engineers - which made future flights safer. Then whatever caused the loss of the Columbia - let's say it's the thermal tiles - had a failure rate of perhaps 1 in 100. Now this problem will be eliminated from the list. We have no way of knowing the probability of future accidents, but we can be assured that it will be lower than it was at the beginning of the shuttle program.

Manned space flight will not become safer if it is suspended. Quite the contrary - it can only become safer if it is continued. The sacrifice made by Ilan Ramon and his crewmates is the sacrifice made by every explorer of the unknown, who makes the path safer for his successors.

Should We Put People into Space?

By Dr. Amnon Stupp, Scientific Manager of the Israeli NASA node (<http://nasa.proj.ac.il>)

My response to the tragedy isn't, of course, that we shouldn't put people in space. There is a long-standing debate amongst scientists about this subject. Many say that everything people do in space instruments/robots can do better, cheaper, and of course with less risk to people.

I do not say this is my opinion. By the way, in a recent article in *Ha'aretz* against the experiment Ilan Ramon was to operate, I think I detected the spirit of this claim in the words of some of the objectors (especially Giora Shaviv). I happen to think they're wrong, and that there are things people can do better. This should not blind us to the fact that there are many occasions when automatics are better.

An obvious example is communication satellites. In old-time S.F. you would have operators sitting in space stations and switching calls. Seems ridiculous now, right?

I think, for example, that a mission to Mars is worthwhile. It would be a vast expenditure, but certainly people on-site could do much more than the really quite pathetic robots sent there so far. Of-course, the "other side" would say that for the effort and expense involved in sending a person to Mars you could design and build a robot which would be amazing and do everything the astronaut could do -- better.

The Shuttles are OLD

By Steve Davis

Very sad about the Columbia. I have heard for several years about the flightworthiness of the shuttles. They are OLD. Sad for the Israeli and others. But particularly for the Israelis, since they so much needed a morale boost.

I remember with the Challenger, that the O rings were all screwed up, but the launch was ordered on political grounds, and anyone who had tried to bring up the O ring failures, and the warnings of the engineers, was ungraciously fired. The engineers had warned that the shuttle could not tolerate the cold. They were rapidly shut up by the project administrator. The only persons disciplined were the engineers who made the warning, and their supporters.

Flying in Space is Dangerous, and Always Will Be

By Aharon Sheer - Here's a quote -- from 1996:

Before Challenger fell from the sky, NASA claimed the likelihood of a catastrophic shuttle accident was 1-in-100,000.

NASA's current (1996) risk assessment: 1-in-148.

Senior astronaut Story Musgrave believes it's probably more like 1-in-70 or 1-in-80, a personal assessment that contributes to his fright every time he takes off in a shuttle. He expresses that fear, openly and often.

What Richard Feynman Had to Say

The late Richard Feynman, physicist and Nobel-prize winner, was on the panel which was asked to explain the Challenger explosion in 1986. Here is my summary of his presentation of the basic problem: On almost every shuttle flight, new and unexpected problems are discovered. Some of the many parts of the shuttle do not behave according to their design criteria. If "safety is NASA's primary concern", then every time such an unexpected event occurs, all shuttle flights should be stopped until the event has been completely analyzed and an engineering solution is developed to guarantee that such a thing will not occur again. For example, the O-rings did not behave as designed and unexpected problems with the O-rings were observed on several flights that took place *before* the Challenger explosion. NASA did not stop all flights in order to fix the O-ring problem before the explosion. Instead NASA management said that since the shuttles successfully went up and came back *despite* the

O-ring misbehavior, there was nothing to worry about. NASA management really has no choice. There are many unexpected problems with the shuttles, and each such problem could take months or years to solve. If NASA wants to continue to fly shuttles, it does not have time to fix these problems.

Here is Feynman's conclusion then (1986):

Actual Feynman Quote (Appendix F of Challenger report, after discussing many shuttle safety problems besides the O-Ring problem): **"Conclusions** - If a reasonable launch schedule is to be maintained, engineering often cannot be done fast enough to keep up with the expectations of the originally conservative certification criteria designed to guarantee a very safe vehicle. In such situations, safety criteria are altered subtly -- so that flights can still be certified on time. The shuttle therefore flies in a relatively unsafe condition, with a chance of failure on the order of a percent. (It is difficult to be more accurate.)"

Recommended Fantasy -- Amnon Stupp

Since Sarah opened the way by reviewing **Tim Powers** (whom I don't like) and **Diana Wynne Jones** (whom I like very much) in **CyberCozen** (see "**Sara Beck Svetitsky** Discusses Two of her Favorite Fantasy Authors", **CyberCozen**, January 2003), I would like to add my fantasy recommendation.

I wish to recommend the trilogy **His Dark Materials** (or **Northern Lights**) by an author who was new to me, **David Pullman**. This trilogy was apparently so successful that it is now being translated into Hebrew.

The trilogy books can not unfortunately be read separately, except perhaps the first book.

I was most taken with the first book, **Northern Lights** or **The Golden Compass**, less so by the second, **The Subtle Knife**, and I least liked the third, **The Amber Spyglass**.

The books describe the ultimate war between good, represented by rational and free thinking beings, and evil, represented by the priesthood and organized religion.

At first sight it might seem that Pullman is against any religion, but actually the books become progressively more mystical. It is true that "God", or a being who once claimed to be God, is killed at the end, but the reader is as much as told outright that there is a real Higher Power pulling the strings.

I must caution that my interpretation is less than firm, since I liked the 3rd book least and more or less skipped through it.

The 1st book can be read as a more or less familiar fantasy, with a girl heroine who is special for some unknown reason, parallel worlds, magic, strange beings, etc.

The 2nd book is already out of the ordinary fantasy rut, though there too we have boy-from-one-parallel-universe meets girl-from-another, in a third. There is a magical knife capable of opening doors between worlds, a war between alien races, and so forth.

The 3rd book is the truly mystical and strange one, and also the thickest.

It seems to me that people looking for a different kind of fantasy would enjoy the 3rd book the most, but I admit I jumped to the end, which isn't "they lived happily ever after". However, I really liked the last sentence. You might say that this is the punch line of the entire series.

I tried some other Pullman books after the trilogy, and found some quite interesting, but none on the same level as **Northern Lights / His Dark Materials**.

Final word: recommended for lovers of fantasy whose love isn't limited to the hero-slays-evil beast genre.

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Help! A Reader is Looking for American sf Magazines

Do any readers know how I can purchase American science fiction magazines here in Israel (short of getting a year's subscription)? Does any book store here sell these magazines? I'm particularly looking for the latest copies of **Fantasy & Science Fiction** and **Asimov's**. Thanks!

Yisrael Gerstenfeld - Bet Shemesh Yisrael_Gerstenfeld@icomverse.com

Quote of the Month:

"Dinosaurs are the ultimate icon for an evolutionary fact which we generally ignore, and definitely find uncomfortable to think about: *nearly all species that have ever existed are extinct*. As soon as we realize that, we are forced to look at conservation of animal species in new ways. Does it really matter that the lesser spotted pogo-bird is down to its last hundred specimens, or that a hundred species of tree-snail on a Pacific island have been eaten out of existence by predators introduced by human activity?"

From **The Science of Discworld** by **Terry Pratchett, Ian Stewart and Jack Cohen**, p. 275