Report

The public communication at the IAU GA 2006

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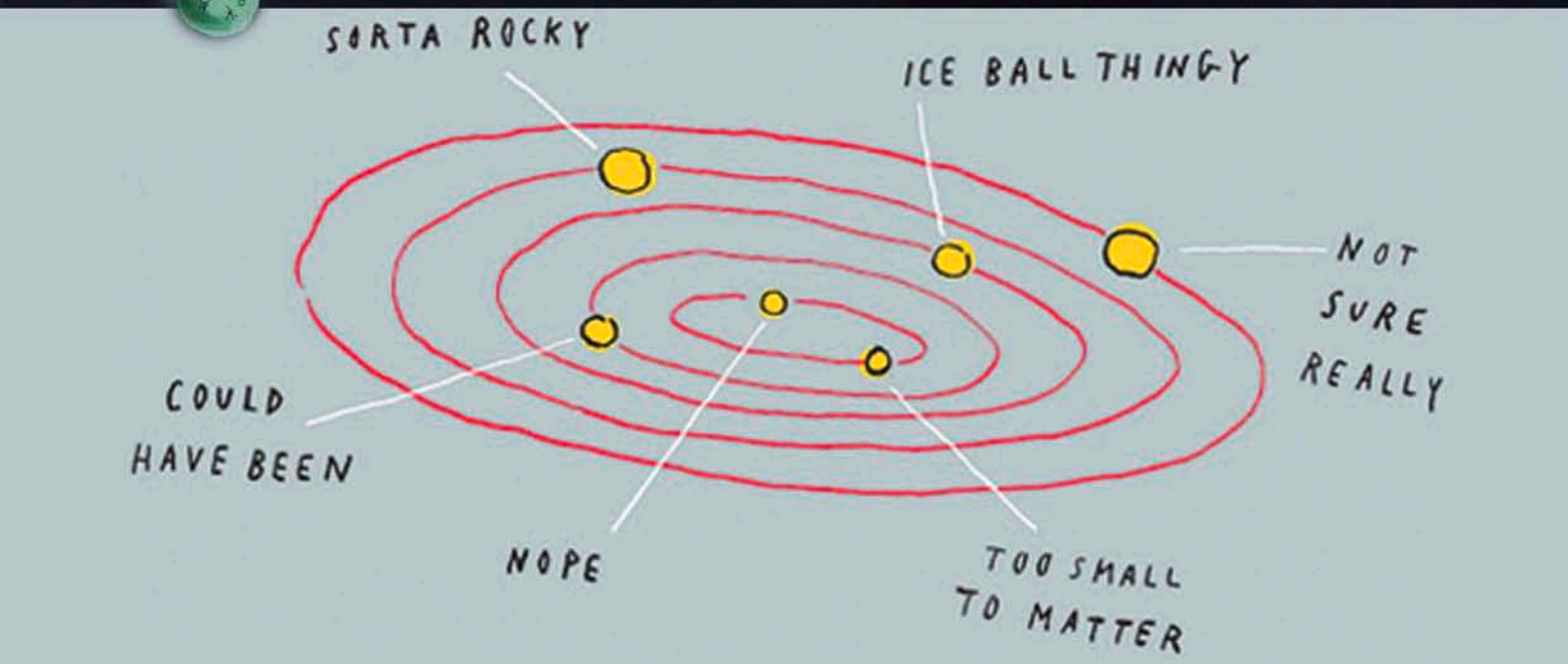

Cover:
Despite a substantial number of (more) scientifically interesting topics at the 2006 General Assembly, the planet definition process hit the significant "above-the-fold" headlines of all major newspapers in the world. The topic was so explosive that public resistance resulted in demonstrations and numerous cartoons. The second most reported story: the discovery with the Hubble Space Telescope by Harvey Richer (University of British Columbia) of the final stage of the white dwarf sequence in a globular cluster is also represented.

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Abstract

The IAU Executive Committee requested a full written report on the public communication activities at the 2006 General Assembly (GA) because of their relatively high importance. The purpose of this document is to deliver a comprehensive account of the activities in the Press Room in Prague and to address some of the implications of the unprecedented public interest in this particular General Assembly. The report will provide sufficient detail to serve as a "cookbook" for coming General Assemblies as well as for similar pressrooms at other meetings. In addition, experiences from the Press Room at GA 2003 in Sydney are included (Appendix G: Lessons learned from the GA XXV 2003 by Helen Sim, CSIRO), in order to transfer as much knowledge from this as possible.

The most important chapters in the report are the Chapters "Executive summary", "Results and deliverables" and "Lessons learned".

Executive summary

This was a General Assembly like no other.

Personally, I have only participated in three other General Assemblies but the planet definition debate that took place in 2006 was clearly the "hottest topic" in many years – both internally within the walls of the Congress Center, as well as outside in the "real world" – if not in the entire history of the IAU.

Although the planet definition debate occupied the most prominent place in the press coverage by far, it is fair to say that without it, the other stories and their corresponding media coverage would still have made for a satisfying outcome in terms of public communication. It is naturally unfortunate that the other pieces of interesting science, made public at press briefings and through press releases, drowned somewhat in the planet definition coverage, but it is – as we all know – not possible to control the media.

Many interesting lessons were learned, especially about the practicalities of setting up a well-functioning pressroom in response to a crisis, but also about the complex ways that information is transmitted from scientists to the press.

The new definition of a planet has provoked strong reactions that still persist weeks after the GA from both the public and the astronomical community. Any decision on a topic of this magnitude and importance will inevitably generate a barrage of negative reactions. The current opposition is, in other words, unavoidable, and I recommend that the EC stays firmly on the course taken and maintains its position. Judging from the ongoing public and internal communication the main part of the resistance against IAU XXVI Resolutions 5 and 6 seems to stem from a vocal minority of astronomers.

I anticipate a continuation of the debate by the public and within the community in the coming months and perhaps years, and recommend commend the establishment of a mechanism – such as a permanent or semi-permanent IAU press office – to help deal with the public communication regarding these issues. This is important and will help to maintain the image of the IAU as a serious and open organisation. Work preparing a pressroom for the GA in 2009 should start in the next few months (Chapter Lessons learned).

Before the conference we had to choose just how open to be with the press and public through the process of deciding on the new definition of a planet. I believe that we hit the right balance. In some ways, the whole issue was like two "bombs" waiting to explode. The first bomb was the public reaction to changes in the worldview – adding or subtracting planets in the Solar System – and the second was the internal tension within the community – due to difference of opinion and the appointment of selected experts to work on the definition. It was the job of the EC and the Press Officer to try to minimise the negative effects for the IAU and for astronomy, and to maximise the benefits of the two explosions. In a sense one can say that the explosions could not be prevented, but the bombs could at least be thrown in a certain direction instead of letting it explode between our hands.

With regard to the first "explosion" –the public "bomb" – damage control consisted of keeping the process as open as possible and informing the press about each step of the process as it took place – including the first Resolution draft and the ongoing debate. As many as thirty journalists had already signed up weeks before the meeting and it was well known among science journalists that the definition of a planet was going to be discussed, suggesting a strong outside interest that spoke forcibly for an open communication strategy. It would not have been possible to keep the planet definition debate out of the press. By

issuing press releases all the relevant information was delivered, and press and public speculation was minimised, although not completely eliminated for instance by NPR before the GA, and by others in between Press Releases iau0601 and iau0602 (see Appendix C: IAU Press releases issued during the GA).

It is difficult to speculate how the image of the IAU or the astronomical community might have been affected if a more "closed" form of public communication had been chosen. It is more than likely that the – not always very constructive – messages from many prominent and outspoken astronomers would have reached the press. The open communication did avert most of the potential criticism that the planet definition process took place as closed discussions among senior cigar-smoking astronomers in a "closed club".

With respect to the "second bomb", the strong reaction from the scientific community was somewhat underestimated by most of the EC and the Press Officer. The majority of us also did not anticipate the significant changes to Resolution 5 that took place during the GA. With 20-20 hindsight, the draft aspect of Resolution 5 could have been stressed more in the initial press release (although it was already fairly prominent, see Appendix C: IAU Press releases issued during the GA). The "inreach" aspect – sharing the draft Resolution earlier with the community (especially Divisions I and III) could perhaps have been given more emphasis, but this was difficult for two reasons:

1) The EC feared that the Resolution text would leak to the entire community and to the public, without the EC and DPC having a chance to add the necessary scientific context, historical background and interpretation (as was printed in GA Newspaper 2, see Appendix I: Excerpts from GA Newspaper).
2) The Resolution itself was drafted shortly before the GA, and practical considerations made it difficult to initiate discussions with Division I and III (collecting emailing lists etc).

The planet definition affair has definitely had some negative effects. Astronomers, and scientists in general, have been publicly portrayed as being in disagreement, arguing and, at times, even being childish in their discussions. The positive side of this is that astronomers and scientists have appeared as human beings and far from their usual "lab-coat" image. The IAU has also been publicly accused of being a "closed club" that only represents a fraction of astronomers.

In my opinion the positive effects, however, outweigh the negative by far. One of the most important outcomes of the public communication from the GA is that the public today has a much better knowledge of the Union and its mission as the authority on fundamental astronomical issues. This and other, less significant, results are outlined in chapter "Results and deliverables". The enormous public interest in the planet definition story is perhaps best illustrated by the large number of cartoon jokes/caricatures appearing in the international newspapers. It is the first time in many years to my knowledge that any scientific topic has penetrated so deeply into the public conscience. The effect of this is not to be underestimated. Scientific issues are usually notoriously difficult to get on the front pages (although astronomy usually stands a better chance than most other sciences). The value of this is – despite the unavoidable negative effects described above – enormous.

For once, a large fraction of the demographic segment of people inattentive to science was exposed to science. A small-scale poll among friends and family found that everyone had heard of the "Pluto story" and most even offered an opinion about it. This is an important consequence and should not be underestimated.

The reactions from our journalist colleagues have, without exception, been extremely positive towards the IAU communication strategy during this GA (see examples in Appendix K: Praise

from journalists) and I am, with the exception of negative effects mentioned above, extremely satisfied with the work. The atmosphere in the Press Room in those hours of excitement and tension was unforgettable. Colleagues, collaborators and friends came by to discuss, share opinions, enjoy the atmosphere and have a cup of coffee or water. At times there were more than twenty journalists sitting cheek by jowl, filing stories to their editors.

In closing, I would like to thank the pressroom team (see section 2.4) for their dedication, hard work and good spirits during the GA! I would also like to thank the EC and DPC, especially Richard Binzel, for the incredible amount of hard work they put into the planet definition debate and the various topics dealing with communication. ESO and the ESO Public Affairs Department deserve especial thanks as they partly sponsored the loan of a large fraction of the Press Room equipment and partly sponsored and arranged the transport of the IAU exhibition.

Lars Lindberg Christensen
IAU Press Officer
Porto, 11 September 2006

A historical moment? The passing of IAU GA XXVI Resolution 5A vote.
Image Credit: Robert Hurt (Spitzer Science Center)

1 Preparing for the 2006 IAU General Assembly

1.1 What is the International Astronomical Union?

The International Astronomical Union (IAU) is the international astronomical organisation that brings together distinguished astronomers from all nations of the world. It was founded in 1919 and is with almost 10,000 IAU members the world's largest professional body for astronomers. IAU's mission is to promote and safeguard the science of astronomy in all its aspects through international cooperation.

The IAU is also the internationally recognized authority for assigning designations to celestial bodies and any surface features on them. The IAU General Assembly is held every three years and is one of the largest and most diverse astronomical meetings.

1.2 The general need for public science communication

Today we live in an era of unprecedented scientific progress and the growing impact of technology has brought science ever more into our daily lives. Science directly influences the quality of people's lives and in order to make informed decisions, knowledge of science is increasingly important. Science communication provides this crucial information and underlines in a continuous fashion the long-lasting effects of science on our society.

The IAU has a vital role to play in science communication as a global coordinator of, and catalyst for, science communication projects such as the International Year of Astronomy 2009.

1.3 IAU's strategy for public communication

IAU's public communication has to play a coordinating and facilitating role (in contrast to a role as producer) by connecting IAU executives and scientists with media, hobbyists, educators, outreach professionals and laypeople. IAU's role as the global astronomical authority and clearing house for nomenclature and scientific standards naturally has to be visible.

IAU's efforts for the global collaboration within the public communication community fall naturally within the responsibility of the IAU Press Officer and of Commission 55 Communicating Astronomy with the Public.

1.4 Preparing for the 2006 General Assembly

The general need for public communication was clear before GA 2006. An effort had to be made to enable a flow of information from the IAU during the meeting. The question was which strategy to apply in terms of style and amount of information.

Over the past few years the media landscape has changed along with the ever-growing flatness of the world. With powerful web search engines such as Google it is today easier for curious journalists to conduct a thorough research and the access to information is easier than ever before.

Before the GA we wrote in internal working papers:
"The "planet" issue has the potential to become a historic event of epic proportions. It may become the hottest astronomy story of the year, or even the decade. It has the potential to change history. Seeing this a potential historic event, do we fulfil our "public duty" and inform

openly about the process and the decisions, or do we keep quiet to protect the slow and thoughtful scientific work process?"

It was in already then clear that we were dealing with a very special situation.

1.5 Crisis communication

Shortly thereafter the situation around the "planet definition" was declared a "crisis" due to the possible negative effects that an improper public communication could have.

In crisis communication there are some general rules (see Christensen, 2006 for more on crisis communication):
The main thing to avoid in a crisis situation is not to react and let the outside world dominate your decisions! Be proactive rather than reactive. Some guidelines apply:

- Communicate internally first to avoid internal confusion and enable all involved to work towards the global goal
- Plan ahead as early as possible
- React as quickly as possible – the timescale is usually counted in minutes and hours
- Be available via cell phones, e-mail etc.
- Be credible and fact-based in your external communication
- Apply analytic working methods
- Be transparent, open and honest
- Be ready to compromise several times along the way in order to achieve the global goal at the end of the process. This point is notoriously difficult to accept as it goes against normal management practice and what is normally preached in an operational workflow (excellence ...!)

1.5.1 Worst case scenarios

As we were planning for the "planet-crisis" we wrote a series of worst case scenarios

1. Lack of communication
   - A polarised "Them and Us" situation in the media: The press (and public) are largely held outside of the process and are not properly informed. => A public outcry over the secrecy of discussions among senior cigar-smoking astronomers in a "closed club".
   - Leading opinion-makers from cultural, art and religious backgrounds will speak publicly against "this lab-coat nonsense", and create a global surge of protests. Political intervention? Demonstrations? Violence?

2. Too simplistic communication
   - The issues around the Resolution are communicated widely, but its tentative/draft character is omitted in the public communication. In the end a Resolution is not passed and the press and public feels led astray. IAU comes out looking bad.

3. Broad disagreement
   - Majority of the community disagrees. Resentment? Demonstrations?
   - Majority of the public disagrees. Resistance to the redefinition of the "labelling" of the Solar System, and modification of geography books. Resentment? Demonstrations?

4. Pluto's status will change from "planet" to "dwarf planet" creating a feeling of anti-Americanism on the part of the US (as the IAU by some is seen as a predominantly European organisation). Read a detailed account of this scenario in that was very close to being the actual scenario that took place.
    - Under political pressure, or spontaneously, NASA or the US planetary science community may develop its own categorisation for objects in the solar system — e.g. developing the "ice dwarf" category using criteria other than those proposed by the IAU.
    - The AAS may be asked to develop policies on this and related issues that provide "American" alternatives to the "European" ones of the IAU.
    - US astronomers may be lobbied (e.g. by the Planetary Society) to withdraw from the IAU as individual members.
    - An individual member or members of Congress (e.g. from Arizona) might be lobbied to move for the US to withdraw from IAU at a national level.
    - To generate ammunition for political lobbying, the Planetary Society may conduct a poll of the US public on the status of Pluto.
    - The New Horizons team may perceive that a change in Pluto's status may weaken its funding status, and lobby the IAU Executive or members for any change in Pluto's status to be delayed (or, if it is changed, reversed).
    - The family of Clyde Tombaugh may protest against Pluto's change in status.
    - Flagstaff Observatory is likely to maintain its current displays and materials about Pluto.
    - New Mexico State University may continue to refer to Pluto as a planet and Clyde Tombaugh as its discoverer.
    - US book publishers, planetariums and generators of online content may be slow to change their current material on Pluto and its discovery, if they change it at all. They may do this spontaneously: they may also be lobbied to do so.
    - Individual schools in the US may be slow to change what they teach about Pluto and its discovery, if they change it at all.

Based on these four scenarios the following recommendations for the public communication were put forward to the IAU Executive Committee and agreed upon:

- Having a full openness (or as close to as possible) of the decision-making process that leads to the Resolution.
- Business meetings may be closed to the press if they are followed by a press briefing.
- The press will have free access to speak to all attendees, but will be provided with a comprehensive list of experts on this topic.

The implementation of these recommendations was foreseen as:

- To provide an overview of the decision-making process as early as possible, i.e. in the media invitation e-mail
- To invite the media to participate in the process
- To have press briefings as it becomes necessary
- To issue statements to non-attending media as it becomes necessary

1.5.2 Timeline

An approximate timeline of the events around the "planet decision" look as follows:

2001	AMNH decision to leave out Pluto of their scaling walk hits the news
2003-2005	Discovery of large TNOs: Sedna, Eris ..
2004-2005	First DPC committee

27.06.2006	Appointment of an IAU Press Officer
01.07 2006	Second DPC meets in Paris, decides on a definition
27.07 2006	Recommendation for public communication
01.08.2006	First Resolution draft approved by the EC
14.08.2006	GA starts
15.08 2006	Draft Resolution Press release under embargo to press
16.08.2006 8:00 am	Press release embargo is lifted. Press briefing.
18.08.2006	Division III Business Meeting
22.08.2006	EC plenary discussion
24.08.2006 08:00	Press release: Final Resolution ready for voting
24.08.2006 ~15:40	Resolution 5A is passed, 5B is not passed. Pluto is defined as a “dwarf planet”
24.08.2006 16:21	Press release: Result of the IAU Resolution votes. Press briefing
04.09.2006	A petition with almost 400 signatures protesting the decision is delivered to the IAU

2 The 2006 General Assembly Press Room

Communicating science with the public is naturally a whole topic on its own. This report will focus on the pressroom at the IAU 2006 General Assembly. A broad overview in cookbook style of science communication in general can be found in Christensen (2006).

Deputy Press Officer Helen Sim (left) and Press Officer Lars Lindberg Christensen (right) preparing a scientist for a press briefing.

2.1 Pressroom functions

A pressroom has three main functions:

1. To connect scientists and media representatives via point-to-point interviews and press briefings.
2. To provide all necessary facilities (power, Internet, coffee, tables, chairs etc) and information (facts, dates, times, locations, finding people, making appointments for interviews) for media representatives and scientists.
3. To communicate its own and external news to the press and public via its own organisational press releases and press releases from others.

In reality, there are many smaller goals and deliverables (see “Results and deliverables”). It requires a great deal of organisation and effort to carry out these functions at such a large meeting.

2.2 Planning and preparing a pressroom

2.2.1 Tactical preparations

There is no "one solution fits all" in planning a pressroom, but there are a few simple principles (Maran, 2003):

1. Offer stories that reporters want to cover, not just stories that organisations and agencies would like to publish.
2. Enlist the aid of the science public relations professionals at the home institutions of your reporting scientists.
3. Make sure that the reporting scientists know in advance:
   - what is needed in a press release;
   - how images should be formatted for the news media;
   - how to prepare for and speak at a press conference.

The GA 2006 Press Room at a quiet time. DPC member Watanabe is seen with a Japanese journalist right of centre with Steven Battersby, New Scientist(red shirt), and Raquel Yumi Shida from the Press Room staff printing press clippings.

2.2.2 Practical Preparations

A pressroom will only run smoothly if the venue and the pressroom team has been adequately prepared well in advance.

It is essential to:

1. Liaise with the local key persons per phone as early as possible.
2. Order the rooms and furniture needed at the meeting place. For the GA 2006 a Press Room, an Interview Room and a Press Conference Room were booked fairly late (some four weeks prior to the meeting). All rooms required:
   - power;

- internet access;
- telephone lines;
- projectors;
- tables and chairs;
- whiteboards;
- etc.

3. Set up contact lists with names, telephone numbers and offices of the most important people and try to contact them once before the meeting starts. Make sure that everyone, team included, can be reached during the meeting. Provide cell phones and prepaid cards to key scientists.
4. Prepare as many practical arrangements as possible before the meeting begins: for example, schedules, own releases, etc.
5. Pass on all necessary information about the meeting to all pressroom staff. This includes when and where the main topics are to be discussed and who the important persons are etc.
6. Make a packing list and ship as much as possible in advance. See: Appendix B: Press Room equipment.

The GA 2006 Press Room at a time of hectic activity. Brian Marsden is seen (blue shirt, left) advocating his idea of Plutinos to Jenny Hogan from Nature. The episode was later included in Hogan's blog on nature.com: http://www.nature.com/nature/journal/v407/n6807/full/407952a0_fs.html

2.3 Pressroom workflow

The workflow in the pressroom can be split into two categories: daily tasks and special tasks:

The daily or continuing tasks:

- answering questions from journalists and scientists per email, phone or in person;
- fixing dates and places for interviews;

- providing background information for the topics of the day: schedules, explanations to releases, press briefings, etc;
- collecting and displaying press clippings about the meeting;
- preparing press briefings, rehearsing press briefings with participants.

Special tasks:

- representation and dealing with political issues;
- releasing press releases – both your own and others;
- preparing and delivering own talks;
- organising social events to bring media and scientists together (for example dinners or excursions).

2.4 The GA 2006 Press Room staff and their time schedule

Staffing a Press Room takes a full team. The Press Room at GA 2006 was staffed by a minimum of two people at all times – and more usually three – in order to cover press requests and representative duties as well as technical and organisational work. Eight people in total worked in the Press Room for between one and ten days.

1. Lars Lindberg Christensen: 10 days, 8:30 – 21:00 = ~125 hours.
   Duties: Coordination, management, writing of press releases, political issues, hosting of press conferences.
2. Helen Sim: 10 days, 8:45 – 20:00 = ~115 hours.
   Duties: Deputy Press Officer, press contact (phones and in person), arranging and scheduling interviews, hosting of press conferences.
3. Lars Holm Nielsen: 10 days, 8:30 – 21:00 = ~125 hours.
   Duties: Photography, accounting, technical issues, cell phones, presentation preparations, phone duty.
4. Raquel Yumi Shida: 9 days, 8:30 – 19:30 = ~100 hours.
   Duties: Updating cell phone lists, contact lists, agendas, printing and hanging the press clippings on the boards twice a day, locating interview partners and interview locations, phone, organising the Press Room (sorting, coffee, cleaning, etc.), packing and unpacking, phone duty.
5. Nadja Wolf: 8 days, 9:00 – 17:00 = ~64 hours.
   Duties: Office supplies, phone cards, phone, press dinner, assisting with press clippings, locating interview partners and interview locations, setting up the IAU exhibition stand, organising the Press Room (sorting, coffee, cleaning, etc.), assisting in writing releases and press information, assisting during press conferences, packing and unpacking, phone duty.
6. Pedro Russo: 2 days, ~8 hours.
7. Gordon Squires, Spitzer Science Center: 1 day, ~8 hours.
   Duties: Helping with press requests on the 24th August.
8. Robert Hurt, Spitzer Science Center: 1 day, ~8 hours.
   Duties: Helping with press requests on the 24th August.

3 Results and deliverables

This chapter itemises and categorises the results and technical achievements or output from the GA 2006 Press Room.

3.1.1 Public recognition

- An enormous increase in public knowledge and awareness of the IAU and its mission.
- Astronomy and science in general has penetrated more deeply into the popular consciousness than has happened in many years.

3.1.2 Media

- 194 journalists attended (Appendix F: List of participating journalists). This is as many as for the most well-attended AAS meetings.
- Hundreds of interviews were arranged, mainly with IAU-appointed scientists (DPC and EC), but also individual prominent scientists at the conference
- As an example 16 camera crews were present during the Closing Ceremony, 3 live satellite transmission trucks were parked outside the conference centre.
- 11 press briefings were arranged and held (see Appendix E: Press briefings).
- The media coverage was overwhelming. This is probably the most covered science story of 2006, possibly of the entire decade. 24 folders each with 48 random clippings have been collected, mainly from the web.
- 1 Op-Ed piece in the Washington Post 16 August (written by Dava Sobel, see p. 103) was arranged and edited.

3.1.3 Web

- 1 mirror site for iau.org (http://www.iau2006.org) was set up at ESO due to an unfortunate planned power outage at IAP for 3-4 days. To cope with the amount of traffic the system was distributed over two physical servers with a load-balancing interface.
- Web stats: the IAU mirror site had ~10 million hits, and ~228 GB of files were delivered to 310,000 visitors over the course of a few days. Just after the voting on the resolution, the website received more than 1.3 million hits in 90 minutes (the peak was around 200 requests per second). These stats do not include the main site iau.org for which we do not have web stats. We did however notice that the iau.org was so popular that it was unresponsive over a period of days (indicating that it was inundated with visitors).
- 1 special webcast site was set up for the press on a separate server to ensure stability of the connection (courtesy of CBT/mediastream.cz).
- Webcasts of several events were streamed during General Assembly (courtesy of CBT/mediastream.cz): During the General Assembly, there were 8122 live viewers in total. The most viewed webcast was General Assembly Session 2 (final planet definition vote) with 5056 viewers.
- IAU GA webcast archive (courtesy: CBT/mediastream.cz) has since the General Assembly served 21138 requests (or viewed videos) to date[1]. The "Top 10" list shows (in order of number of views):
    1. Discussion on the Definition of a Planet — 6943 views
    2. General Assembly Session 2 (Planet Definition vote) — 6102 views
    3. General Assembly Opening Ceremony — 3170 views
    4. Invited Discourse — Jill Tarter — 1483 views

[1] As of 8 September 2006

5. General Assembly Closing Ceremony — 781 views
6. General Assembly Session 1 — 590 views
7. Invited Discourse — Alan Title — 564 views
8. Invited Discourse — Shuang Nan Zhang — 439 views
9. Peter Gruber Foundation Cosmology Prize Winner Lecture — 433 views
10. Invited Discourse — Geinhard Genzel — 358 views

The webcast archive at astronomy2006.com now has a sustained rate of ~450 views per day. As agreed, the webcast archive will be available for at least 3 years. Based on current estimates, it should reach ~100 000 total views by the time of next General Assembly in Rio in 2009.

3.1.4 Press releases

- All ~2400 abstracts were read and evaluated before the meeting. All Symposia, Joint Discussion and Special Session chairs were contacted and asked for inputs about scientific results with potential public interest.
- 4 official IAU press releases were distributed (Appendix C: IAU Press releases issued during the GA). Some of these were written, edited, approved and distributed in real time
- These press releases had 14 individual illustrations and images accompanying them
- 17 other press releases were printed and distributed in the Press Room. Some of these were also distributed electronically via the normal channels.
- In total ~11,000 sheets of A4 paper was used for printouts or photocopies in the Press Room.
- An IAU mailing list of press contacts containing 150+ media organisations was constructed.

3.1.5 Miscellaneous

- One IAU exhibition stand was produced and shipped to Prague.
- Press clippings were posted on the boards outside the Internet Café on the second floor twice a day.
- ~150 digital photos were taken and published on the web during the GA.
- The Press Room was at times, due to its nice practical and technical set up, used as a kind of "mission control" by members of the DPC.
- Backdrops for the Press Interview Room were designed, printed, mounted and transported to Prague..
- Posters for prominent (non-IAU) press releases were designed, printed, mounted and transported to Prague.
- The publication and editing of several articles for the GA Newspaper was coordinated.

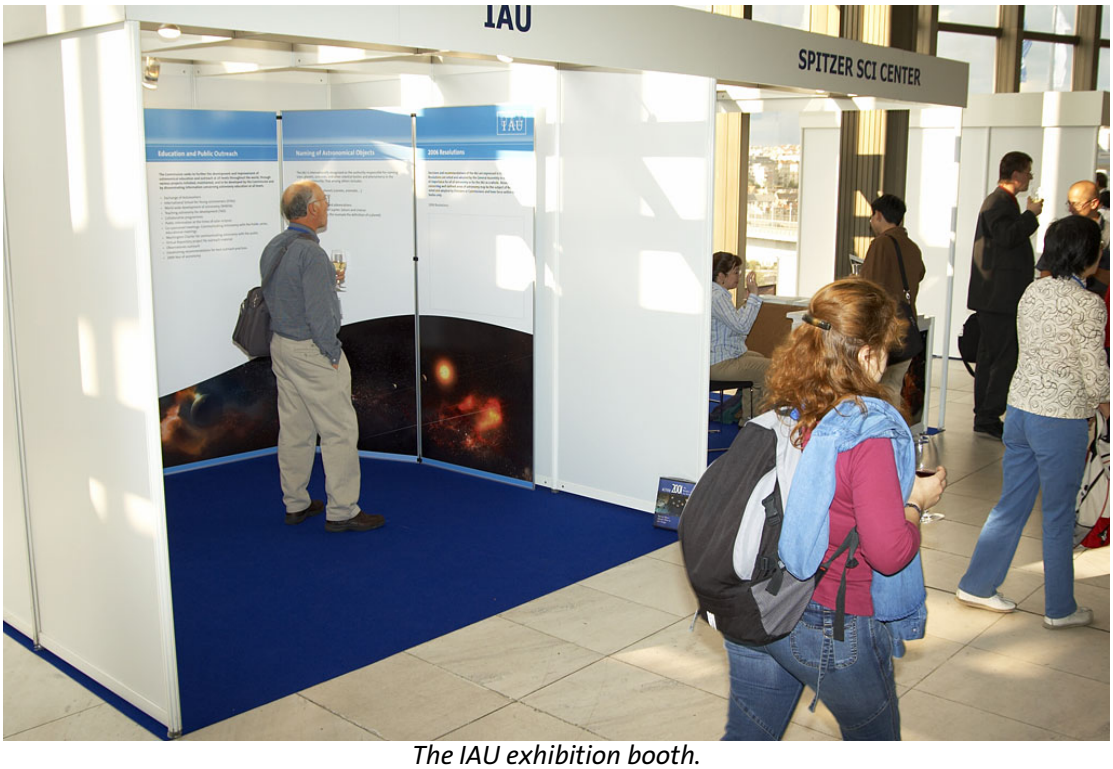
3.1.6 Requests

- Roughly 500 requests by phone were received.
- ~230 of these requests by phone were logged. Most included setting up interviews. An estimated 50% of calls were not logged (lack of time and capacity).
- ~66 public requests per email has been logged[1], answered and discussed with the IAU President.

[1] As of 15 September 2006

Three TV transmission trucks were parked outside the Prague Congress Center for the entire day of the Closing Ceremony.

The press clipping boards were updated twice a day.



The IAU exhibition booth.

4 Lessons learned

4.1.1 Interface with locals

- Due to the late appointment of the Press Officer there were (naturally) some difficulties in establishing a good working relationship with the local entities. There were no problems with CBT and all worked extremely well due to the hard work and positive attitude of Zuzana Tesařová. A good working relationship was never established with ICARIS. No major problems arose as a consequence, but, for instance, the media registration was completely decoupled from the Press Room and lists were not updated in time. Also, it was never clear whether journalists were properly informed about the Press Room and its function at the time of registration.
- Much longer planning is necessary to establish a good functioning relationship with the NOC and the companies involved. It is not too early to start early preparations at the end of the previous GA, that is, approximately 3 years in advance.
- The NOC has somewhat different public communication goals from the IAU in general: It is natural for the NOC to focus on the local and national press, whereas the IAU focuses on the international press. This situation and the special local knowledge of the NOC should be exploited to mutual advantage. One NOC appointed person should join the Press Room team to take care of the local/national issues to create a win-win situation for both the IAU and the NOC.
- The room, equipment, and staffing in the Press Room was (by divine intervention?) exactly the right size.
- Sandwich lunches should be provided for journalists and staff in the Press Room.

4.1.2 Science sessions

- The science abstracts arrived ~1 week too late. It takes ~2 weeks to read and evaluate ~2400 abstracts.
- Only about half of the session chairs responded when asked for inputs about publicly interesting results. The Symposium chairs in particular did not respond (too many abstracts to get an overview?).
- Abstracts were delivered as many individual files. One file would have been preferred and would have made the abstracts searchable.
- The Hot Topics session concept is extremely valuable both scientifically and for the press, but needs a bit of preparation to work. Hot Topics abstracts were (as far as we could see) not available, and so could not be shared with the press and public.
- The best method to find the good science is to contact the local Public Information Officers well in advance and let them oversee the interaction with the scientists locally.

4.1.3 Press releases

- The official IAU press releases were praised by journalists for being comprehensive and explaining the topics well (this kind of praise is very rare).
- The large statistical sample of press requests at this GA made it possible to gain interesting knowledge about the information flow and the workings of the whole scientist-Public Information Officer – journalist system. The experience at the GA emphasised that:
  1. For journalists a press release is a collection of facts: Numbers, descriptions, statements, answers to the “six golden questions” (What? When? Where? Who? Why? How?)

2. Journalists only contact a press office when they need something that is not delivered in the press release.
3. The main lesson learned is that the faster a press release can be issued and distributed and the more factual it is, the less overall work will be incurred.

The main reasons that journalists contacted the Press Room in Prague were:

1. To get an interview with people involved.
2. To get additional facts that had not been delivered, most notably:
   - The exact time of the important votes? (which was not known)
   - Who are eligible voters? (not known until after the Opening Ceremony)
   - How exactly will the voting be done?
   - How to interpret the result of the votes (as outlined in iau0603).
   - A statement on "Why Pluto was demoted?"
   - The exact results of the vote counts. (The counts were not made in most cases)
   - Uncertainty regarding the media registration procedure (as ICARIS did not manage to answer people and several times lost media registrations).
   - To get specific technical details for camera crews.

4.1.4 Press briefings

- Almost all the press briefings were worthwhile and fairly well attended.
- All press briefings need to be rehearsed as well as possible well in advance.
- Written guidelines need to be handed out before the conference.

4.1.5 IAU Branding

- The IAU brand was very invisible on most of the GA2006 material (print, web, conference venue – conference rooms, signs). An agreement on using the official IAU logo and other branding on all material should be built into the contract with the NOC.
- Large "flags" with IAU branding should be present in the most important rooms. (Press Conference Room, Press Room, Press Interview Room).
- The IAU logo should also be present on the sponsor boards that are placed in all rooms.

4.1.6 Web

- As the iau.org website was down due to a power outage we had to make a mirror site. This arrangement naturally caused some confusion.
- The Press Officer needs live access to iau.org updating during the GA.
- The IAU webmaster should not go on vacation during the GA.
- There were some interesting problems relating to strictly "press-only information" in press releases that were also later are publicly available on the web (EC/DPC emails, phone numbers, press web cast URLs etc.)
- The press webcast during the Closing Ceremony was a great help in the Press Room as the enormous pressure made it necessary to have two people at the Press Room at all times.

4.1.7 Technical

- The high bandwidth internet connection at the Congress Center was mission critical for the Press Room work and worked flawlessly. Technical note: Due to the lack of a proper local filer where the various files could be stored, our usual filer at ESO in Munich was used. Access was via VPN tunnels from pre-selected pre-installed files. A stable wire (not WLAN) high bandwidth Internet connection is needed for this.

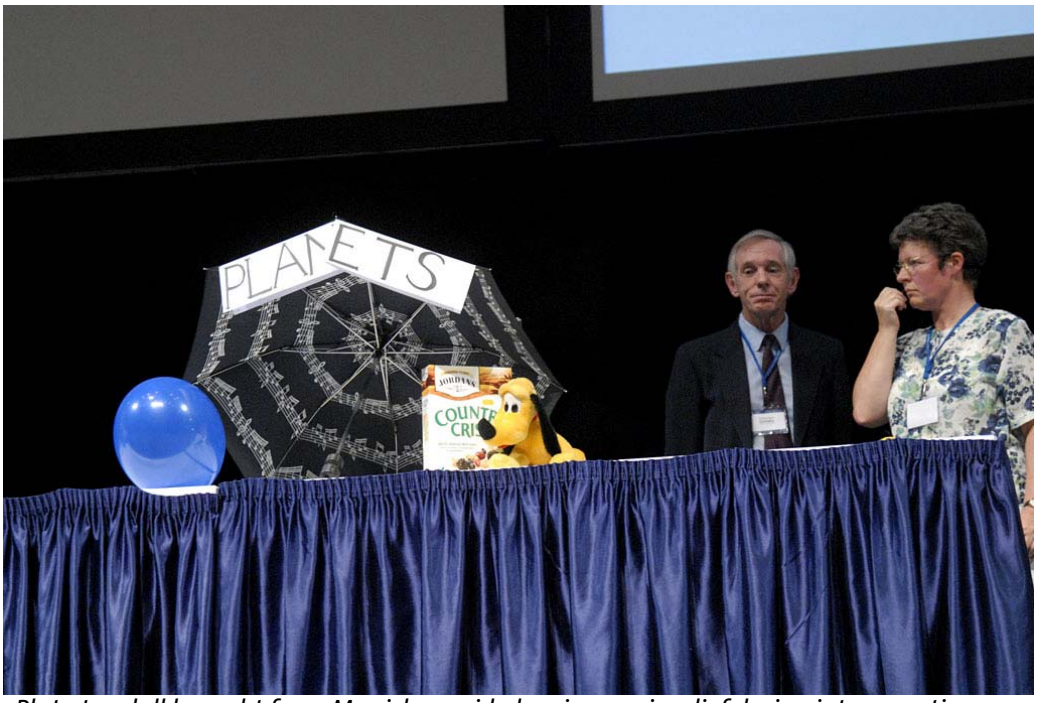
- As a result the main computers had IP addresses from outside the Congress Center (ESO IP addresses) and could therefore not access the Press Room printer. A solution for how to share common files and access a printer on the local network needs to be thought out in advance for future cases. Perhaps a web-based WIKI would be the right thing, but this has to be investigated so as to be able to import/export word files with simple formatting (incl. tables such as phone lists).
- A technical person is a necessity on the Press Room staff to take care of audio-visual equipment (computer set-up, internet set-up etc).
- Some menus of printers and copy machines were not in English. Even the slightest problem took local service staff to resolve (which they did reasonably quickly).
- Conference technical support staff must be able to speak English. This was not always the case in Prague.
- Laser printers (fast) were important. One colour and one B&W were enough.
- An ISDN line (not necessarily including the expensive special ISDN phone) should be ordered in advance and its existence and phone number should be announced to radio journalists who want to bring their own ISDN phone and file with that. This line should be placed in the Press Interview Room.
- An outgoing international call phone line with a known number needs to be in place at least 4 weeks prior to the GA. The expenses for this need to be built into the NOC budget.
- We had 10 (loan) cell phones with Czech prepaid phone cards (20 Euro). Five were taken by the Press Room staff and five given to prominent scientists (mostly DPC). We could have used five more phones, but managed.
- As soon as a scientist is deemed “interesting” (to the press) a local prepaid phone number should be allocated to him, and put in all the external communication.
- A fax machine would have been a plus, but we managed without.
- The Internet connection in the Press Room should be preserved right through the meeting. It was switched off in Prague at 14:00 on Friday 25th August leaving us only with WLAN which did not work for the real Press Room work.

4.1.8 Miscellaneous

- It was difficult to get in contact with individuals during the conference. Pigeonholes are slow and old-fashioned, but are still the best way to reach individuals. Single point remedies like local pre-paid card cell phones work, but only for those people who have been identified in advance and have received a cell phone.
- Guidelines for scientists have to be updated: How to write a draft of a press release, How to participate in a press conference. It would be good to send these guidelines out before the General Assembly.
- Guidelines in the Terms of Reference for future IAU committees on how to interact with the press would be useful.
- The IAU Press Officer should try to limit his/her other commitments such as business meetings (at this GA it was WGCAP business meeting and talks, IYA meetings and talks etc.)
- Getting access to international press clippings is extremely difficult and time consuming even with access to Google News. Physical copies of international newspapers need to be purchased the day after, and in Prague this was not practically possible. At this GA one fulltime person was needed to survey Google News and make printouts for the press clippings walls.
- The press wanted much more interaction with the EC (for interviews etc.), but this was naturally very difficult as the EC schedule had very little “space” built in. Perhaps it would be possible to consider this in the future.

- Conversations in the pressroom are public, and both talent (eg the planet definition team, or people rehearsing their press conferences) and pressroom staff need to be mindful of that.
- Our interactions with the GA newspaper were sparse, and this might be helped in future by having one person on the LOC at least nominally in charge of interacting with both. A lot of potential stories spring out of the work in the Press Room.
- The following information on the GA participants would have made our lives easier if we had had access to it:
    - The list of IAU National Representatives (IAU website down).
    - Where (which hotels) the participants were staying (those booked through the GA organisers).
    - The arrival and departure dates of the participants (from GA organisers).
    - The science sessions that participants had expressed interest in when they registered (from GA organisers).
- Binzel's Play Doh models were appealing.
- The Pluto toy doll we brought from Munich was a nice comic relief in the Press Room and also happened to be used in the Closing Ceremony by Jocelyn Bell-Burnell.
- The press dinner was enjoyable. It is necessary to emphasise that "no host" means "you have to pay" (3 locals left without paying).

It was difficult to get in contact with individuals during the conference. Pigeonholes are slow and old-fashioned, but still the best way to reach individuals.



The Pluto toy doll brought from Munich provided a nice comic relief during intense voting process.

5 Conclusions

Any event that is as loaded with cultural, scientific issues as the "planet definition" is bound to create a strong response from the community and the public. This response would have occurred no matter what the final outcome of the Resolution vote would have been.

There were indeed negative effects of the "Pluto affair". Scientists were portrayed in a less than dignified way and the discussions in the community was often portrayed as less factual and more like bickering.

The positive effects however outweigh the negative by far. A large fraction of the demographic segment of people inattentive to science was during and after the GA exposed to science! When asked "on the street" laypeople now even offer their own opinion on the "Pluto issue", which is very rarely seen. It is the first time in many years to my knowledge that any scientific topic has penetrated so deeply into the public conscience! The enormous public interest in the planet definition story is perhaps best illustrated by the large number of cartoon jokes/caricatures appearing in the media. One of the main results for the IAU is that the public today has a much better knowledge of the Union and its mission as the authority on fundamental astronomical issues.

The discussions between the fractions respectively supporting and opposing the final votes will continue for a while longer. In terms of public communication it is vital that the current great awareness of the Solar System is used to promote scientific issues. The main thing to avoid are sentiments of the sort *"If Pluto does not remain a planet I'm gonna hold my breath until I turn blue"*. There is a large potential in this "affair" to teach about the Solar System that is still in formation, about debris, about asteroids, about dwarf planets, KPOs, TNOs, planets and more. This is a great opportunity to teach that science is not static, and that when new discoveries are made, science must change!

In the longer term the increased awareness of the IAU due to the "Pluto Affair" can be used to further the interest in the International Year of Astronomy 2009. This situation can also further IAU's efforts to create a global forum for astronomy communicators that will enable global standards for outreach metadata to interconnect outreach databases, and ultimately perhaps help create a "Google Universe"-type application that will help visualise the treasures hidden in astronomical databases all over the world. This project is far too big for any nation to take on by its own and must be a global undertaking. The IAU is now perfectly placed to lead and coordinate this work.

References

Christensen, L.L, *The Hands-on Guide for Science Communicators*, Springer New York, 2006

Maran, S.P, *Communicating Astronomy to the Media*, in *Astronomy Communication* Astrophysics and Space Science Library , Vol. 290, eds. Heck, A.; Madsen, C., 2003

Appendix A: IAU press office 2006-2009 budget proposals

Below follow budget estimates for the IAU press office in 2006 and 2007.
Note that:

a) The costs for GA 2006 have already been incurred.
b) The costs listed do not include labour, website hosting, production of printed material, press officer travel costs for GA 2006, loan equipment, overheads etc. These can be seen as sponsorship by the European Space Agency (ESA/ST-ECF) and the European Southern Observatory (ESO).

Budget proposal for IAU press office 2006

GA 2006 pressroom on-site costs	
Cellphones	280 EUR
Transport on site	60 EUR
Representation (food)	160 EUR
Misc.	100 EUR
Sub Total	**600 EUR**

GA 2006 pressroom staff travel	
Travel Expenses (3 persons)	500 EUR
Hotel (3 persons)	2.400 EUR
Per diem (3 persons)	1.200 EUR
Sub Total	**4.100 EUR**

Running expenses 2006	
Press release distribution	2.000 EUR
Misc. other expenses	2.300 EUR
Total	**9.000 EUR**

Budget estimate for the IAU press office 2007-2009

Running expenses 2007	
Travel expenses press officer	3.000 EUR
Press release distribution	2.000 EUR
Web maintenance	13.500 EUR
Web , technical	4.500 EUR
Misc. other expenses	3.000 EUR
Total	**26.000 EUR**

Running expenses 2008	
Travel expenses press officer	1.500 EUR
Press release distribution	1.500 EUR
Web maintenance	13.500 EUR
Web , technical	4.500 EUR
Misc. other expenses	3.000 EUR
Total	**24.000 EUR**

Running expenses 2009	
GA 2009 pressroom + staff	8.000 EUR

Travel expenses press officer	3.000 EUR
Press release distribution	2.500 EUR
Web maintenance	13.500 EUR
Web , technical	4.500 EUR
Misc. other expenses	3.000 EUR
Total	**33.500 EUR**

Appendix B: Press Room equipment

Packing list: From ESO/Munich

Office equipment:

- Laserprinter paper
- In-trays
- A4 folders
- Pens, paper, etc.
- Desk lamps
- Stapler + staples
- Punch holing machine
- Label printer
- Label printer tape
- Batteries (8 AA for the label printer)
- Tape
- Gaffa tape, 3 roles
- 10 notepads
- 5 blue in-trays
- Scissors
- 20 Press clippings folders
- Money box with key

Technical equipment:

- Computer beamer
- DVD player, cables
- Lars Laptop
- 3 loan laptops – 2 is OK – need 1
- Power cables
- Loudspeakers
- B/ W printer
- Small screen for projection
- 4 Laptop locks
- USB Sticks
- 10 Mobile phones
- Printer toner
- 3 Mice, keyboards
- Ethernet cables
- 3 TFT Monitors
- 2 extra Ethernet hubs for contingency

Catering stuff:

- Coffee-machine
- Coffee
- Cups
- Sugar
- Sticks to mix the coffee

- Water
- Kitchen roll

Informative literature and give-away articles:

- Euro-VO brochures
- DVDs with animation, PP viewable
- HST postcards, posters etc.
- HST books
- HST brochures
- Advertising Scicomm book, order form
- Hubble DVDs
- 1 Scicomm book printouts

Work material:

- ESA/Hubble releases — 2
- Agenda printouts + background docs (ie. IYA report etc.)

Others:

- Business cards
- Photo flash (Hennes) NIKON D90
- Money – VISA card

Interview room

- Posters for backdrops — e.g. IAU logo, astronomical images
- water, glasses, flowers

Press Room set up

- printer — colour
- printer — B/W
- paper and toner for both
- ideally printers should be networked so that all machines can reach either printer
- Ethernet connections: 2 x 6 plus 4 plus 1 = 17
- 22 Power outlets: Need at least one for each computer, plus one for each printer and copier
- photocopier (with English translation, ideally!)
- wireless connection + connection instructions
- mobiles for staff — five
- chargers for phones
- local SIM cards for phones
- 2-m tables with tablecloths:
    - 6 for one side of the room (journalist use)
    - 6 for other side
    - 1 for printer + monitor
    - 2 for staff use
    - 2 for water, food, coffee
    - if space permits, would have been good to have had another table or equivalent shelf space for distributing releases

- chairs: 19 or 20. Need chairs for people who have dropped in to discuss issues or wait by the phone for an interview, etc.
- whiteboard + markers and cleaner
- a fax machine would have been useful — some people asked for faxes to be sent
- easel for displaying posters / sponsorship information
- stack of document trays
- security cables for laptops
- petty cash tin
- folders for archive of press clippings
- [for display elsewhere in the building] – 4 boards for displaying press clippings
- cupboards — 2 lockable, for office supplies
- [see also packing list for consumables + other small items]
- 2 phones — international dial out must be possible

Appendix C: IAU Press releases issued during the GA

1. IAU0601: The IAU draft definition of "planet" and "plutons
2. IAU0602: IAU 2006 General Assembly: Result of the IAU Resolution votes
3. IAU0603: IAU 2006 General Assembly: Result of the IAU Resolution votes
4. IAU0604: The International Astronomical Union elects Catherine Cesarsky as new President

********** IAU0601: EMBARGOED UNTIL 16 August 2006, 8:00 CEST **********

http://www.iau2006.org/mirror/www.iau.org/iau0601/index.html

The IAU draft definition of "planet" and "plutons"

16-August-2006, Prague The world's astronomers, under the auspices of the International Astronomical Union (IAU), have concluded two years of work defining the difference between "planets" and the smaller "solar system bodies" such as comets and asteroids. If the definition is approved by the astronomers gathered 14-25 August 2006 at the IAU General Assembly in Prague, our Solar System will include 12 planets, with more to come: eight classical planets that dominate the system, three planets in a new and growing category of "plutons" – Pluto-like objects – and Ceres. Pluto remains a planet and is the prototype for the new category of "plutons."

With the advent of powerful new telescopes on the ground and in space, planetary astronomy has gone though an exciting development over the past decade. For thousands of years very little was known about the planets other than they were objects that moved in the sky with respect to the background of fixed stars. In fact the word "planet" comes from the Greek word for "wanderer". But today hosts of newly discovered large objects in the outer regions of our Solar System present a challenge to our historically based definition of a "planet".

At first glance one should think that it is easy to define what a planet is – a large and round body. On second thought difficulties arise, as one could ask "where is the lower limit?" – *how* large, and *how* round should an asteroid be before it becomes a planet – as well as "where is the upper limit?" – *how* large can a planet be before it becomes a brown dwarf or a star?

IAU President Ron Ekers explains the rational behind a planet definition: "*Modern science provides much more knowledge than the simple fact that objects orbiting the Sun appear to move with respect to the background of fixed stars. For example, recent new discoveries have been made of objects in the outer regions of our Solar System that have sizes comparable to and larger than Pluto. These discoveries have rightfully called into question whether or not they should be considered as new 'planets.'* "

The International Astronomical Union has been the arbiter of planetary and satellite nomenclature since its inception in 1919. The world's astronomers, under the auspices of the IAU, have had official deliberations on a new definition for the word "planet"

for nearly two years. IAU's top, the so-called Executive Committee, led by Ekers, formed a Planet Definition Committee (DPC) comprised by seven persons who were astronomers, writers, and historians with broad international representation. This group of seven convened in Paris in late June and early July 2006. They culminated the two year process by reaching a unanimous consensus for a proposed new definition of the word "planet."

Owen Gingerich, the Chair of the Planet Definition Committee says: *"In July we had vigorous discussions of both the scientific and the cultural/historical issues, and on the second morning several members admitted that they had not slept well, worrying that we would not be able to reach a consensus. But by the end of a long day, the miracle had happened: we had reached a unanimous agreement."*

The part of "IAU Resolution 5 for GA-XXVI" that describes the planet definition, states *"A planet is a celestial body that (a) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape, and (b) is in orbit around a star, and is neither a star nor a satellite of a planet."* Member of the Planet Definition Committee, Richard Binzel says: "*Our goal was to find a scientific basis for a new definition of planet and we chose gravity as the determining factor. Nature decides whether or not an object is a planet."*

According to the new draft definition, two conditions must be satisfied for an object to be called a "planet." First, the object must be in orbit around a star, while not being itself a star. Second, the object must be large enough (or more technically correct, massive enough) for its own gravity to pull it into a nearly spherical shape. The shape of objects with mass above 5 x 10^{20} kg and diameter greater than 800 km would normally be determined by self-gravity, but all borderline cases would have to be established by observation.

If the proposed Resolution is passed, the 12 planets in our Solar System will be Mercury, Venus, Earth, Mars, Ceres, Jupiter, Saturn, Uranus, Neptune, Pluto, Charon and 2003 UB_{313}. The name 2003 UB_{313} is provisional, as a "real" name has not yet been assigned to this object. A decision and announcement of a new name are likely not to be made during the IAU General Assembly in Prague, but at a later time. The naming procedures depend on the outcome of the Resolution vote. There will most likely be more planets announced by the IAU in the future. Currently a dozen "candidate planets" are listed on IAU's "watchlist" which keeps changing as new objects are found and the physics of the existing candidates becomes better known.

The IAU draft Resolution also defines a new category of planet for official use: "pluton". Plutons are distinguished from classical planets in that they reside in orbits around the Sun that take longer than 200 years to complete (i.e. they orbit beyond Neptune). Plutons typically have orbits that are highly tilted with respect to the classical planets (technically referred to as a large orbital inclination). Plutons also typically have orbits that are far from being perfectly circular (technically referred to as having a large orbital eccentricity). All of these distinguishing characteristics for plutons are scientifically interesting in that they suggest a different origin from the classical planets.

The draft "Planet Definition" Resolution will be discussed and refined during the General Assembly and then it (plus four other Resolutions) will be presented for voting at the 2nd session of the GA 24 August between 14:00 and 17:30 CEST.

Notes for editors
More detailed information about the implications of the draft Resolution can be found in the other documents accompanying this press release (at http://www.iau2006.org/):

- "Questions and Answers about the Planet Definition"
- Composition of the Planet Definition Committee and bios
- Miscellaneous high-res graphics illustrating the 12 planets and current planet candidates are also available.
- Three articles for the General Assembly newspaper written by Ron Ekers, Owen Gingerich and Roberts Williams

The IAU is the international astronomical organisation that brings together distinguished astronomers from all nations of the world. IAU's mission is to promote and safeguard the science of astronomy in all its aspects through international cooperation. Founded in 1919, the IAU is the world's largest professional body for astronomers. The IAU General Assembly is held every three years and is one of the largest and most diverse meetings in the astronomical community's calendar.

Science contacts (the persons below can all be reached via the IAU GA Press Office, see bottom)
Owen Gingerich
IAU Planet Definition Committee Chair
Tel: via the Press Room +420-261-177-075

Iwan Williams
President, IAU Division III Planetary Systems Sciences
Tel: via the Press Room +420-261-177-075

Ron Ekers
IAU President
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Catherine Cesarsky
IAU President-Elect and member of the Planet Definition Committee
Tel: via the Press Room +420-261-177-075

Richard Binzel
Member of the Planet Definition Committee
Tel: via the Press Room +420-261-177-075

Dava Sobel
Author and historian, member of the Planet Definition Committee
via the IAU Press Office
Tel: via the Press Room +420-261-177-075

Mike Brown
Discoverer of 2003 UB_{313} and a host of other planet candidates
Via Caltech Media Relations
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Cellular: +49-173-3872-621
E-mail: lars@eso.org

Links
Additional material in this release package may be found in:
http://www.iau2006.org/

- Draft Resolution
- Question and Answer sheet
- General Assembly Newspaper articles
- Committee composition

The IAU Web page: http://www.iau.org

IAU News during the 2006 General Assembly: http://www.iau2006.org

IAU General Assembly: http://www.astronomy2006.com

Free registration for the media: http://www.astronomy2006.com/media-accreditation.php

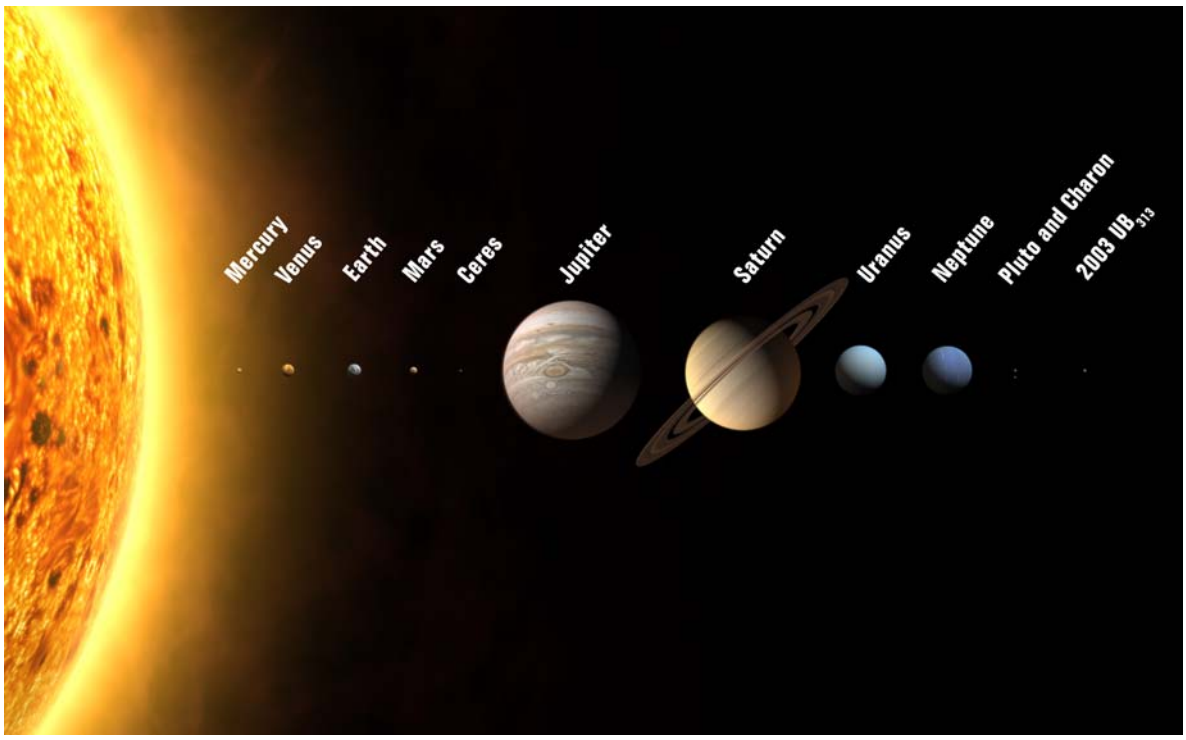
Images of the Pluto system:
http://hubblesite.org/gallery/album/search.php?method=and&format=normal&sort=score&config=picturealbum&restrict=entire_collection%2Fpr&exclude=&words=pluto&Submit=Search+site&page=1

Image of 2003 UB_{313}:
http://hubblesite.org/gallery/album/search.php?method=and&format=normal&sort=score&config=picturealbum&restrict=entire_collection%2Fpr&exclude=&words=ub313&Submit=Search+site

Image of Ceres:
http://hubblesite.org/gallery/album/search.php?method=and&format=normal&sort=score&config=picturealbum&restrict=entire_collection%2Fpr&exclude=&words=ceres&Submit=Search+site

Images

iau0601a: **The new Solar System?** [artist's impression]



The world's astronomers, under the auspices of the International Astronomical Union (IAU), have concluded two years of work defining the lower end of the planet scale – what defines the difference between "planets" and "solar system bodies". If the definition is approved by the astronomers gathered 14-25 August 2006 at the IAU General Assembly in Prague, our Solar System will consist of 12 planets: Mercury, Venus, Earth, Mars, Ceres, Jupiter, Saturn, Uranus, Neptune, Pluto, Charon and 2003 UB_{313}. The three new proposed planets are Ceres, Charon (Pluto's companion) and 2003 UB_{313}. There is no change in the planetary status of Pluto.

In this artist's impression the planets are drawn to scale, but without correct relative distances.

Credit: The International Astronomical Union/Martin Kornmesser

iau0601b: **Three new planets?** [artist's impression]

The world's astronomers, under the auspices of the International Astronomical Union (IAU), have concluded two years of work defining the lower end of the planet scale – what defines the difference between "planets" and "solar system bodies". If the definition is approved by the astronomers gathered 14-25 August 2006 at the IAU General Assembly in Prague, three of the bodies in the Solar System will be assigned new status as planets: Ceres, Charon (Pluto's companion) and 2003 UB_{313}. There is no change in the planetary status of Pluto.

In this artist's impression the planets are drawn to scale, but without correct relative distances.

Credit: The International Astronomical Union/Martin Kornmesser

iau0601c: **Planet candidates in the Solar System** [artist's impression]

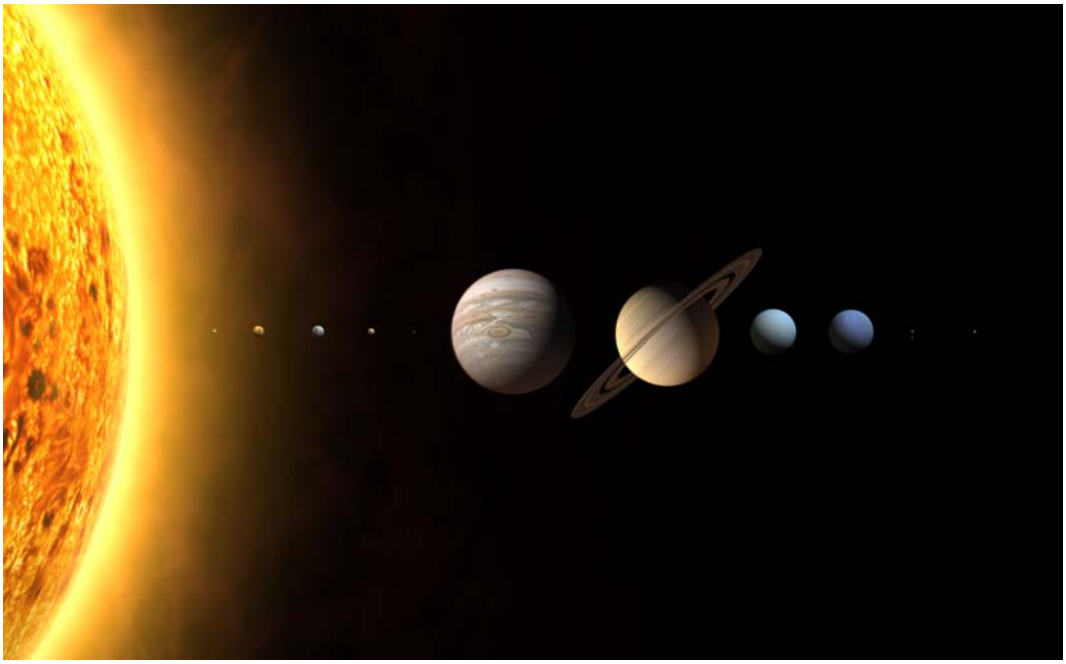
The world's astronomers, under the auspices of the International Astronomical Union (IAU), have concluded two years of work defining the lower end of the planet scale – what defines the difference between "planets" and "solar system bodies". If the definition is approved by the astronomers gathered 14-25 August 2006 at the IAU General Assembly in Prague, our Solar System will consist of 12 planets: Mercury, Venus, Earth, Mars, Ceres, Jupiter, Saturn, Uranus, Neptune, Pluto, Charon and 2003 UB313.

There will most likely be more planets announced by the IAU in the future. Currently a dozen "candidate planets" are listed on IAU's "watchlist" which keeps changing as new objects are found and the physics of the existing candidates becomes better known. A number of these planet candidates are shown here.

In this artist's impression the planet candidates are drawn to scale, but without correct relative distances.

Credit: The International Astronomical Union/Martin Kornmesser

Iau0601d: **The new Solar System?** [unannotated]



As iau0601a but without annotations.
Credit: The International Astronomical Union/Martin Kornmesser

iau0601e: **Three new planets?** [artist's impression]

As iau0601b but without annotations.
Credit: The International Astronomical Union/Martin Kornmesser

iau0601f: **Planet candidates in the Solar System** [artist's impression]

As iau0601c but without annotations.
Credit: The International Astronomical Union/Martin Kornmesser

Iau0601g: **Members of the Planet Definition Committee**

From Upper Left:

Dr. Andre Brahic is Professor at Universite Denis Diderot (Paris VII) and is Director of the Laboratory Gamma-gravitation of the Commissariat a l'Energie Atomique. He specializes in planetary rings, and has co-discovered the rings and arcs of Neptune. For the French-speaking public, Andre Brahic is one of the best known popularisers of science and astronomy, having authored a number of books.

Dr. Iwan Williams, Queen Mary University of London, is an expert on the dynamics and physical properties of Solar System objects. He is the current President of IAU Division III (Planetary Systems Sciences).

Dr. Junichi Watanabe is an Associate Professor and also Director of the Outreach Division of NAOJ. He is a solar system astronomer and highly appreciated in Japan as interpreter and writer of astronomy for the public and students. He has strong connections with amateur astronomers, science editors, school teachers and journalists.

Dr. Richard Binzel is Professor of Earth, Atmospheric and Planetary Science at MIT and a specialist in asteroids and outer solar system small bodies, and is also a well known and respected educator and science writer.

Dr. Catherine Cesarsky, Director General of ESO and President-Elect of the IAU, took part in the work of the committee, bringing in the perspective of the IAU Executive as well as that of an astronomer at large.

Dava Sobel is the author of the very successful books Longitude, The Planets, and Galileo's Daughter. She has a solid background in, and knowledge of, the history of science, astronomy in particular.

Dr. Owen Gingerich, Professor of Astronomy and History of Science Emeritus at the Harvard-Smithsonian Center for Astrophysics, is an esteemed historian of astronomy with a broad perspective, and a prize-winning educator.

Credit: The International Astronomical Union

"Planet Definition" Questions & Answers Sheet

The following Question and Answer sheet may help to interpret the "*IAU Resolution 5 for GA-XXVI*" provided this is passed during the 2nd Session of the 2006 IAU General Assembly.

Q: What is the origin of the word "planet"?
A: The word "planet" comes from the Greek word for "wanderer", meaning that planets were originally defined as objects that moved in the sky with respect to the background of fixed stars.

Q: Why is there a need for a new definition for the word "planet"?
A: Modern science provides much more knowledge than the simple fact that objects orbiting the Sun appear to move with respect to the background of fixed stars. For example, recent new discoveries have been made of objects in the outer regions of our Solar System that have sizes comparable to and larger than Pluto. (Noting that historically Pluto has been recognized as "the ninth planet.") Thus these discoveries have rightfully called into question whether or not they should be considered as new "planets."

Q: How did astronomers reach a consensus for a new definition of "planet"?
A: The world's astronomers, under the auspices of the International Astronomical Union, have had official deliberations on a new definition for the word "planet" for nearly two years. The results of these deliberations were channelled to a Planet Definition Committee comprising seven persons who were astronomers, writers, and historians with broad international representation. This group of seven convened in Paris in late June and early July 2006. They culminated the two year process by reaching a unanimous consensus for a proposed new definition of the word "planet."

Q: What new terms are proposed as official IAU definitions?
A: There are two new terms being proposed for use as official definitions of the IAU. The terms are: "planet" and "pluton".

Q: What is the proposed new definition of "planet"?
A: The new definition of "planet" recognizes and utilizes the capabilities of modern science. The new definition is based on the principle that we no longer need to rely on the simple definition from past millennia that an object is a "planet" if it moves against the background of fixed stars. Instead we can utilize our modern ability to measure the *physical properties* of an object to determine its true nature. An object is thus defined as a planet based on its *intrinsic physical nature*. Two conditions must be satisfied for an object to be called a "planet." First, the object must be in orbit around a star, while not being itself a star. Second, the object must be large enough (or more technically correct, massive enough) for its own gravity to pull it into a nearly spherical shape. The shape of objects with mass above 5 x 1020 kg and diameter greater than 800 km would normally be determined by self-gravity, but all borderline cases would have to be established by observation.

Q: What is the exact wording of the official IAU proposed definition of "planet" in "Resolution 5 for GA-XXVI"?
A:

"A planet is a celestial body that (a) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape, and (b) is in orbit around a star, and is neither a star nor a satellite of a planet."

Q: Does an object have to be in orbit around a star in order to be called a "planet"?
A: Yes.

Q: Does a body have to be perfectly spherical to be called a "planet"?
A: No. For example, the rotation of a body can slightly distort the shape so that it is not perfectly spherical. Earth, for example, has a slightly greater diameter measured at the equator than measured from pole to pole.

Q: Based on this new definition, how many planets are there in our Solar System?
A: There are currently 12. Eight are the classical planets Mercury through Neptune. Three are in a newly defined (and growing in number) category called "plutons", for which Pluto is the prototype. One is Ceres, which may be described as a dwarf planet.

Q: What are the 12 planets?
A: Mercury, Venus, Earth, Mars, Ceres, Jupiter, Saturn, Uranus, Neptune, Pluto, Charon and 2003 UB_{313} (provisional name).

Q: How are these 12 planets categorized?
A: There are eight "classical planets": Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. Ceres is a planet, but because it is smaller than Mercury, one may describe it as a "dwarf planet". A new category of planet is now defined: "plutons". Pluto, Charon, and 2003 UB_{313} fall into the growing category of planets called "plutons".

Q: What are the classical planets?
A: The classical planets are those recognized by sky watchers and astronomers starting from the beginning of human history until the year 1900 A.D. The classical planets are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. Note that the term "classical planet" is only a historical reference and not an IAU definition.

Q: What is a dwarf planet?
A: A dwarf planet is a term generally used to describe any planet that is smaller than Mercury. Note that the term "dwarf planet" is simply a descriptive category and not an IAU definition. Terms such as "terrestrial planets" and "giant planets" are additional examples of descriptive categories that are not IAU definitions.

Q: What is a "pluton"?
A: A pluton is a new category of planet now being defined by the IAU. A "pluton" is an object satisfying the technical (hydrostatic equilibrium shape in the presence of self-gravity) definition of "planet." Plutons are distinguished from classical planets in that they reside in orbits around the Sun that take longer than 200 years to complete (i.e. they orbit beyond Neptune). Plutons typically have orbits that are highly tilted with respect to the classical planets (technically referred to as a large orbital inclination). Plutons also typically have orbits that are far from being perfectly circular (technically referred to as having a large orbital eccentricity). All of these distinguishing characteristics for plutons are scientifically interesting in that they suggest a different origin from the classical planets.

Q: Where does the name "pluton" come from?
A: The name "pluton" comes from Pluto itself. Pluto is the first object discovered that is a large spherical body, and therefore a planet, orbiting beyond Neptune.

Q: Is a "pluton" a planet?
A: Yes.

Q: Is Pluto a "pluton"?
A: Yes.

Q: Is Pluto a planet?
A: Yes. In fact, Pluto's large companion named Charon is also large enough and massive enough to satisfy the definition of "planet". Because Pluto and Charon are gravitationally bound together, they are actually now considered to be a "double planet."

Q: Is Pluto a dwarf planet?
A: If one describes any planet smaller than Mercury as a "dwarf planet", then Pluto could be called a dwarf planet. Note that in terms of an IAU definition, Pluto is a "pluton." "Dwarf planet" is simply a descriptive category like "terrestrial planet" and "giant planet." None of these descriptive categories are formally defined by the IAU.

Q: What is a "double planet"?
A: A pair of objects, which each independently satisfy the definition of "planet" are considered a "double planet" if they orbit each other around a common point in space that is technically known as the "barycentre". In addition, the definition of "double planet" requires that this "barycentre" point must not be located within the interior of either body.

Q: What is a "satellite" of a planet?
A: For a body that is large enough (massive enough) to satisfy the definition of "planet", an object in orbit around the planet is called a "satellite" of the planet if the point that represents their common centre of gravity (called the "barycentre") is located inside the surface of the planet.

Q: The Earth's moon is spherical. Is the Moon now eligible to be called a "planet"?
A: No. The Moon is a satellite of the Earth. The reason the Moon is called a "satellite" instead of a "planet" is because the common centre of gravity between the Earth and Moon (called the "barycentre") resides below the surface of the Earth.

Q: Jupiter and Saturn, for example, have large spherical satellites in orbit around them. Are these large spherical satellites now to be called planets?
A: No. All of the large satellites of Jupiter (for example, Europa) and Saturn (for example, Titan) orbit around a common centre of gravity (called the "barycentre") that is deep inside of their massive planet. Regardless of the large size and shapes of these orbiting bodies, the location of the barycentre inside the massive planet is what defines large orbiting bodies such as Europa, Titan, etc. to be "satellites" rather than planets.

Q: Why is Pluto-Charon a "double planet" and not a "planet with a satellite"?

A: Both Pluto and Charon each are large enough (massive enough) to be spherical. Both bodies independently satisfy the definition of "planet". The reason they are called a "double planet" is that their common centre of gravity is a point that is located in free space outside the surface of Pluto. Because *both* conditions are met: each body is "planet-like" and each body orbits around a point in free space that is not inside one of them, the system qualifies to be called a "double planet."

Q: Pluto has at least two recently discovered additional satellites that are smaller than Charon. If these smaller satellites also orbit the "barycentre", does this make Pluto a "quadruple planet"?
A: No. The two newly discovered smaller bodies in orbit around Pluto are too small and not massive enough for their self-gravity to force them in to a spherical shape. Therefore neither of these bodies independently satisfies the definition of "planet." The fact that their size (mass) and shapes does not qualify them as planets implies that they must be called satellites, even though the center of gravity (called the "barycentre") about which they orbit is located outside the surface of Pluto.

Q: Can there be triple planets or quadruple planets?
A: Yes, but none are currently known.

Q: Is Ceres a planet?
A: Yes.

Q: Didn't Ceres used to be called an asteroid or minor planet?
A: Historically, Ceres was called a "planet" when it was first discovered (in 1801) orbiting in what is known as the asteroid belt between Mars and Jupiter. Because 19th century astronomers could not resolve the size and shape of Ceres, and because numerous other bodies were discovered in the same region, Ceres lost its planetary status. For more than a century, Ceres has been referred to as an asteroid or minor planet.

Q: Why is Ceres now being called a "planet"?
A: An object in orbit around a star is now being called a "planet" if it is large enough (or more technically, massive enough) for its own gravity to pull it into a nearly spherical shape. Recent Hubble Space Telescope images that resolve the size and shape of Ceres show it to be nearly spherical. More technically, Ceres is found to have a shape that is in a state of hydrostatic equilibrium under self-gravity. Therefore Ceres is a planet because it satisfies the IAU definition of "planet." [Published reference for shape of Ceres: P. Thomas et al. (2005), Nature **437**, 224-227. Dr. Peter Thomas is at Cornell University.]

Q: Is Ceres a dwarf planet?
A: If one describes any planet smaller than Mercury as a "dwarf planet", then Ceres could be called a dwarf planet. Note that "dwarf planet" is simply a descriptive category like "terrestrial planet" and "giant planet." None of these descriptive categories are formally defined by the IAU.

Q: Is Ceres a "pluton"?
A: No.

Q: What is 2003 UB_{313}?

A: "2003 UB_{313}" is a provisional name given to a large object discovered in 2003 that resides in an orbit around the Sun beyond Neptune.

Q: Is 2003 UB_{313} a planet?
A: Yes.

Q: Why is 2003 UB_{313} a planet?
A: Recent Hubble Space Telescope images have resolved the size of 2003 UB_{313} showing it to be as large as, or larger than Pluto. Any object having this size, and any reasonable estimate of density, is understood to have sufficient mass that its own gravity will pull it into a nearly spherical shape determined by hydrostatic equilibrium. Therefore, 2003 UB_{313} is a planet because it satisfies the IAU definition of "planet." [Published reference: M. Brown et al. (2006). Astrophysical Journal **643**, L61-L63. Dr. Michael Brown is at the California Institute of Technology.]

Q: Will the new planet 2003 UB_{313} receive a name? When?
A: Yes. The International Astronomical Union has the official authority to assign names to objects in space. This object has been popularly called "Xena", but this is not an official IAU name. A decision and announcement of the new name are likely not to be made during the IAU General Assembly in Prague, but at a later time.

Q: Has the IAU ever named a planet?
A: No, so far not.

Q: Is 2003 UB_{313} a "pluton"?
A: Yes.

Q: Is 2003 UB_{313} a dwarf planet?
A: If one describes any planet smaller than Mercury as a "dwarf planet", then 2003 UB_{313} could be called a dwarf planet. Note that "dwarf planet" is simply a descriptive category like "terrestrial planet" and "giant planet." None of these descriptive categories are formally defined by the IAU.

Q: What is an object called that is too small to be a "planet"?
A: All objects that orbit the Sun, which are too small (not massive enough) for their own gravity to pull them into a nearly spherical shape are now collectively referred to as "small Solar System bodies." This collection includes the category of objects we continue to call asteroids and comets. This collection also currently includes, near-Earth objects (NEOs), Mars- and Jupiter-Trojan asteroids, most Centaurs and most Trans-Neptunian Objects (TNOs). In the new system of IAU definitions, the term "minor planet" is no longer used.

Q: Is the term "minor planet" still to be used?
A: No. The term "minor planet" is no longer to be used for official IAU purposes. The term will be replaced by "small Solar System bodies."

Q: Why is the term "minor planet" being replaced by "small Solar System bodies"?
A: Under the new definition of "planet", nearly all objects currently called "minor planets" are not planets. For IAU purposes, a definition and name is needed that clearly distinguishes between objects that are officially recognized as planets and those that are not.

Q: For any newly discovered object, how will a decision be reached on whether or not to officially call it a "planet."
A: The decision on whether or not an object is officially a "planet" will be made by a review committee within the IAU. The review process will be an evaluation, based on the best available data, of whether or not the physical properties of the object satisfy the definition of "planet." It is likely that for many objects, a period of time of several years may be required in order for sufficient data to be gathered.

Q: Are there additional "planet" candidates currently being considered?
A: Yes.

Q: Does this mean there will be more than 12 planets in our Solar System?
A: Almost certainly yes.

Q: When will additional new planets likely be announced?
A: When the responsible committee has had time to work on the issues after the resolution has been voted upon. Most likely any further new planet announcements will not be made until after the General Assembly in Prague.

Q: How many more new planets are there likely to be?
A: Perhaps as many as a dozen or two new planets in the IAU category called "plutons" remain to be discovered. We estimate this number based on our understanding of the current discovery statistics. This understanding is subject to change as new data continue to be gathered.

Q: When is an object too large to be called a "planet"?
A: The new definitions proposed by the IAU seek only to define the lower boundary between an object that is a "planet" or a "small Solar System body." At this time there is no official IAU definition in place or proposed that defines the upper limit for when an object is, for example a "planet" or a "brown dwarf." This limit is generally thought to be about 13 times more massive than Jupiter, but is subject to discussion.

Q: Is the new definition for "planet" intended to apply also to objects discovered in orbit around other stars?
A: Yes.

Q: Are objects that have planetary sizes and masses, but which are free floating in space (and not orbit a star) officially "planets" by the IAU definition?
A: No. At this time there is no official IAU definition in place that addresses this class of objects.

Q: Is a "pluton" a dwarf planet?
A: If one describes any planet smaller than Mercury as a "dwarf planet", then any pluton smaller than Mercury could be called a dwarf planet. Note that "dwarf planet" is simply a descriptive category like "terrestrial planet" and "giant planet." None of these descriptive categories are formally defined by the IAU.

Q: What is the difference between a "pluton" and a "plutino"?
A: A "plutino" is a small body that has a similar orbit to Pluto, that is, it has the same 248 year orbital period as Pluto. Plutino is not an official IAU description. All currently known plutinos are too small to be planets. Plutinos are not plutons.

Q: Is Pluto the ninth planet?
A: Historically it was indeed the ninth planet to be discovered, but now Pluto is also known as the first pluton, with its moon Charon being the second pluton. The classical planets can be numbered by their distance from the Sun, and there is no change in their order. Plutons, on the other hand, may due to their high eccentricity change their relative distances from the Sun with time (and hence their order).

Q: In summary how will the Solar System look if the Resolution is passed?
A: If the Resolution is successfully passed, there will be 12 currently known planets in our Solar System:
Table 1: Overview of the planets in the Solar System as per 24 August 2006 if "*Resolution 5 for GA-XXVI*" is passed.

Object	IAU definition	IAU planet category	Descriptive category	Unofficial mean diameter estimate[3]
Mercury	Planet		Classical	4,879 km
Venus	Planet		Classical	12,104 km
Earth	Planet		Classical	12,746 km
Mars	Planet		Classical	6,780 km
Jupiter	Planet		Classical	138,346 km
Saturn	Planet		Classical	114,632 km
Uranus	Planet		Classical	50,532 km
Neptune	Planet		Classical	49,105 km
Ceres	Planet		Dwarf	952 km
Pluto	Planet	Pluton	Dwarf	2306±20 km
Charon	Planet	Pluton	Dwarf	1205±2 km
2003 UB_{313}	Planet	Pluton	Dwarf	2400±100 km[4]

Other objects that appear large enough so that their shape satisfies the definition of "planet" will be further considered on a case by case basis. Examples of these are listed below.

[3] Brown, Binzel, private communication (2006)
[4] Reference: Brown et al. (2006). Astrophys. J. 643, L61-L63.

Table 2: Planet *candidates* as per 24 August 2006 to be given future consideration if *"Resolution 5 for GA-XXVI"* is passed.

Object	**Unofficial diameter estimate**
2003 EL_{61}	2000×1000×1200 km[5]
2005 FY_9	1500±300 km[6]
(90377) Sedna	1200-1800 km[7]
(90482) Orcus	1000±200 km[8]
(50000) Quaoar	~1000 km[9]
(20000) Varuna	600±150 km[10]
(55636) 2002 TX_{300}	<700 km[11]
(28978) Ixion	500±100 km[12]
(55565) 2002 AW_{197}	700±100 km[13]
(4) Vesta	578×560×458 km[14]
(2) Pallas	570×525×500 km[15,16]
(10) Hygiea	500×400×350 km[17]

[5] Rabinowitz et al. (2006), Astrophys. J. 639, 1238-1251.
[6] Based on Spitzer results
[7] Based on Spitzer and Hubble results
[8] Brown, Binzel, private communication (2006)
[9] Mean of Spitzer and Hubble results
[10] Stansberry et al. (2005), BAAS 37, 737
[11] Upper limit from Spitzer results
[12] Stansberry et al. (2005), BAAS 37, 737
[13] Stansberry et al. (2005), BAAS 37, 737.
[14] Thomas et al. (1997), Science 277, 1492.
[15] Drummond and Cooke (1989), Icarus 78, 323.
[16] Dunham et al. (1990), Astron J. 99, 1636.
[17] Tedesco et al. (1992). IRAS Minor Planet Survey and Kaasalainen et al. (2002), Icarus 159, 369.

********** IAU0602: FOR IMMEDIATE RELEASE **********

http://www.iau2006.org/mirror/www.iau.org/iau0602/index.html

The Final IAU Resolution on the definition of "planet" ready for voting

24-August-2006, Prague At the second session of the 2006 International Astronomical Union (IAU) General Assembly, which will be held 14:00 Thursday 24 August, members of the IAU will vote on the Resolutions presented below. There will be separate sequential votes on Resolution 5A and Resolution 5B. Similarly, there will be separate votes on Resolutions 6A and 6B.

Following active discussion among IAU scientists at the IAU 2006 General Assembly in Prague, draft Resolution 6b (issued 16 August 2006) has been updated and amended.

IAU President Ron Ekers says: *"IAU's rules for proposing resolutions are based on an open democratic process and it is a great pleasure for the IAU Executive Committee to see the level of engagement of so many astronomers here. We want to engage as broad a part of the IAU community as possible in the decision-making process to give this Resolution the best chance to be passed."*

Below are the full texts of "IAU Resolution 5a for GA-XXVI", "IAU Resolution 5b for GA-XXVI" and "IAU Resolution 6a for GA-XXVI" and "IAU Resolution 6b for GA-XXVI". The voting will take place in four steps.

The voting on these Resolutions is expected to end today (Thursday 24 August 2006) between 15:30 and 16:00 CEST. This is a rough estimate.

According to the revised Statutes approved at the First Session of the General Assembly last week, scientific issues such as Resolutions are decided by majority of those IAU members present and voting at the business meeting. Thus the scientific resolutions, including those on the definition of solar system bodies, will be presented and decided by voting of the individual members. Yellow ballots will be handed out to all IAU members at the entrance. Members will vote by raising these ballots in the air; the number of raised ballots will be counted. The result of the vote should be known shortly thereafter and will be communicated in a public statement.

Notes for editors
A press conference about the Closing Ceremony of the General Assembly, including the results of the planet-definition vote, will be held at 18:00, in Meeting Room 3.3 of the Prague Congress Center. (It will NOT be possible for journalists to ring in to this conference: they must be there in person.)

The panel for the press conference will be:

- Ron Ekers (outgoing IAU President)
- Catherine Cesarsky (incoming IAU President, Member of the Planet Definition Committee)
- Jan Palous (Chair of the National Organising Committee)

- Richard Binzel (Member of the Planet Definition Committee)
- Karel van der Hucht (incoming Secretary General)

This press conference will conclude around 18:30 CEST.

The IAU is the international astronomical organisation that brings together distinguished astronomers from all nations of the world. Its mission is to promote and safeguard the science of astronomy in all its aspects through international cooperation. Founded in 1919, the IAU is the world's largest professional body for astronomers. The IAU General Assembly is held every three years and is one of the largest and most diverse meetings on the astronomical community's calendar.

Contacts
Following the vote, some of the members of the planet definition committee will be available for interviews (after the final vote):

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Links

- Programme for the Closing Ceremony: http://www.astronomy2006.com/second-session-and-closing-ceremony.php
- Live public webcast of the Closing Ceremony: http://astronomy2006.com/tv/
- Live press webcast of the Closing Ceremony (press only, please do not distribute): http://www.astronomy2006.com/tv-press
- The IAU Web page: http://www.iau.org
- IAU News during the 2006 General Assembly: http://www.iau2006.org
- IAU General Assembly: http://www.astronomy2006.com
- Free registration for the media: http://www.astronomy2006.com/media-accreditation.php

RESOLUTIONS

Resolution 5A is the principal definition for the IAU usage of "planet" and related terms. Resolution 5B adds the word "classical" to the collective name of the eight planets Mercury through Neptune.

Resolution 6A creates for IAU usage a new class of objects, for which Pluto is the prototype. Resolution 6B introduces the name "plutonian objects" for this class. The Merriam-Webster dictionary defines "plutonian" as:

> Main Entry: plu•to•ni•an
> Pronunciation: plü-'tO-nE-&n
> Function: *adjective*
> Usage: *often capitalized*
> : of, relating to, or characteristic of Pluto or the lower world

After having received inputs from many sides — especially the geological community — the term "Pluton" is no longer being considered.

IAU Resolution: Definition of a Planet in the Solar System

Contemporary observations are changing our understanding of planetary systems, and it is important that our nomenclature for objects reflect our current understanding. This applies, in particular, to the designation 'planets'. The word 'planet' originally described 'wanderers' that were known only as moving lights in the sky. Recent discoveries lead us to create a new definition, which we can make using currently available scientific information.

RESOLUTION 5A

The IAU therefore resolves that planets and other bodies in our Solar System be defined into three distinct categories in the following way:

(1) A planet[18] is a celestial body that (a) is in orbit around the Sun, (b) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape, and (c) has cleared the neighbourhood around its orbit.

(2) A dwarf planet is a celestial body that (a) is in orbit around the Sun, (b) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape[19], (c) has not cleared the neighbourhood around its orbit, and
(d) is not a satellite.

(3) All other objects[20] orbiting the Sun shall be referred to collectively as "Small Solar System Bodies".

RESOLUTION 5B

Insert the word "classical" before the word "planet" in Resolution 5A, Section (1), and footnote 1. Thus reading:

(1) A classical planet[21] is a celestial body . . .

and

IAU Resolution: Pluto

RESOLUTION 6A

The IAU further resolves:

Pluto is a dwarf planet by the above definition and is recognized as the prototype of a new category of trans-Neptunian objects.

RESOLUTION 6B

The following sentence is added to Resolution 6A:

This category is to be called "plutonian objects."

[18] The eight planets are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.
[19] An IAU process will be established to assign borderline objects into either dwarf planet and other categories.
[20] These currently include most of the Solar System asteroids, most Trans-Neptunian Objects (TNOs), comets, and other small bodies.
[21] The eight classical planets are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.

********** IAU0603: FOR IMMEDIATE RELEASE **********

http://www.iau2006.org/mirror/www.iau.org/iau0603/index.html

IAU 2006 General Assembly: Result of the IAU Resolution votes

24-August-2006, Prague: The first half of the Closing Ceremony of the 2006 International Astronomical Union (IAU) General Assembly has just concluded. The results of the Resolution votes are outlined here.

It is official: The 26th General Assembly for the International Astronomical Union was an astounding success! More than 2500 astronomers participated in six Symposia, 17 Joint Discussions, seven Special Sessions and four Special Sessions. New science results were vigorously discussed, new international collaborations were initiated, plans for future facilities put forward and much more.

In addition to all the exciting astronomy discussed at the General Assembly, six IAU Resolutions were also passed at the Closing Ceremony of the General Assembly:

1. Resolution 1 for GA-XXVI : "Precession Theory and Definition of the Ecliptic"
2. Resolution 2 for GA-XXVI: "Supplement to the IAU 2000 Resolutions on reference systems"
3. Resolution 3 for GA-XXVI: "Re-definition of Barycentric Dynamical Time, TDB"
4. Resolution 4 for GA-XXVI: "Endorsement of the Washington Charter for Communicating Astronomy with the Public"
5. Resolution 5A: "Definition of 'planet' "
6. Resolution 6A: "Definition of Pluto-class objects"

The IAU members gathered at the 2006 General Assembly agreed that a "planet" is defined as a celestial body that (a) is in orbit around the Sun, (b) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape, and (c) has cleared the neighbourhood around its orbit.

This means that the Solar System consists of eight "planets" Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. A new distinct class of objects called "dwarf planets" was also decided. It was agreed that "planets" and "dwarf planets" are two distinct classes of objects. The first members of the "dwarf planet" category are Ceres, Pluto and 2003 UB_{313} (temporary name). More "dwarf planets" are expected to be announced by the IAU in the coming months and years. Currently a dozen candidate "dwarf planets" are listed on IAU's "dwarf planet" watchlist, which keeps changing as new objects are found and the physics of the existing candidates becomes better known.

The "dwarf planet" Pluto is recognised as an important proto-type of a new class of trans-Neptunian objects. The IAU will set up a process to name these objects.

Results:

Resolution 5A: "Definition of Planet" was not counted but was passed with a great majority.
Resolution 5B: "Definition of Classical Planet" had 91 votes in favour, but many more against so there was no count.
Resolution 6A: "Definition of Pluto-class objects" was passed with 237 votes in favour, 157 against and 17 abstentions.
Resolution 6B: "Definition of Plutonian Objects" had 183 votes in favour and 186 votes against.

Below are the planet definition Resolutions that were passed.

Notes for editors
A press conference about the Closing Ceremony of the General Assembly, including the results of the planet-definition vote, will be held at 18:00, in Meeting Room 3.3 of the Prague Congress Center. (It will NOT be possible for journalists to ring in to this conference: they must be there in person.)

The panel for the press conference will be:

- Ron Ekers (outgoing IAU President)
- Catherine Cesarsky (incoming IAU President, Member of the Planet Definition Committee)
- Jan Palous (Chair of the National Organising Committee)
- Richard Binzel (Member of the Planet Definition Committee)
- Karel van der Hucht (incoming Secretary General)

This press conference will conclude around 18:30 CEST.

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Links

- Programme for the Closing Ceremony: http://www.astronomy2006.com/second-session-and-closing-ceremony.php
- Live public webcast of the Closing Ceremony: http://astronomy2006.com/tv/
- Live press webcast of the Closing Ceremony (press only, please do not distribute): http://www.astronomy2006.com/tv-press
- The IAU Web page: http://www.iau.org
- IAU News during the 2006 General Assembly: http://www.iau2006.org
- IAU General Assembly: http://www.astronomy2006.com
- Free registration for the media: http://www.astronomy2006.com/media-accreditation.php

RESOLUTIONS

Resolution 5A is the principal definition for the IAU usage of "planet" and related terms.

Resolution 6A creates for IAU usage a new class of objects, for which Pluto is the prototype. The IAU will set up a process to name these objects.

IAU Resolution: Definition of a "Planet" in the Solar System

Contemporary observations are changing our understanding of planetary systems, and it is important that our nomenclature for objects reflect our current understanding. This applies, in particular, to the designation "planets". The word "planet" originally described "wanderers" that were known only as moving lights in the sky. Recent discoveries lead us to create a new definition, which we can make using currently available scientific information.

RESOLUTION 5A
The IAU therefore resolves that "planets" and other bodies in our Solar System be defined into three distinct categories in the following way:

(1) A "planet"[22] is a celestial body that (a) is in orbit around the Sun, (b) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape, and (c) has cleared the neighbourhood around its orbit.

(2) A "dwarf planet" is a celestial body that (a) is in orbit around the Sun, (b) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape[23], (c) has not cleared the neighbourhood around its orbit, and
(d) is not a satellite.

(3) All other objects[24] except satellites orbiting the Sun shall be referred to collectively as "Small Solar-System Bodies".

IAU Resolution: Pluto

RESOLUTION 6A

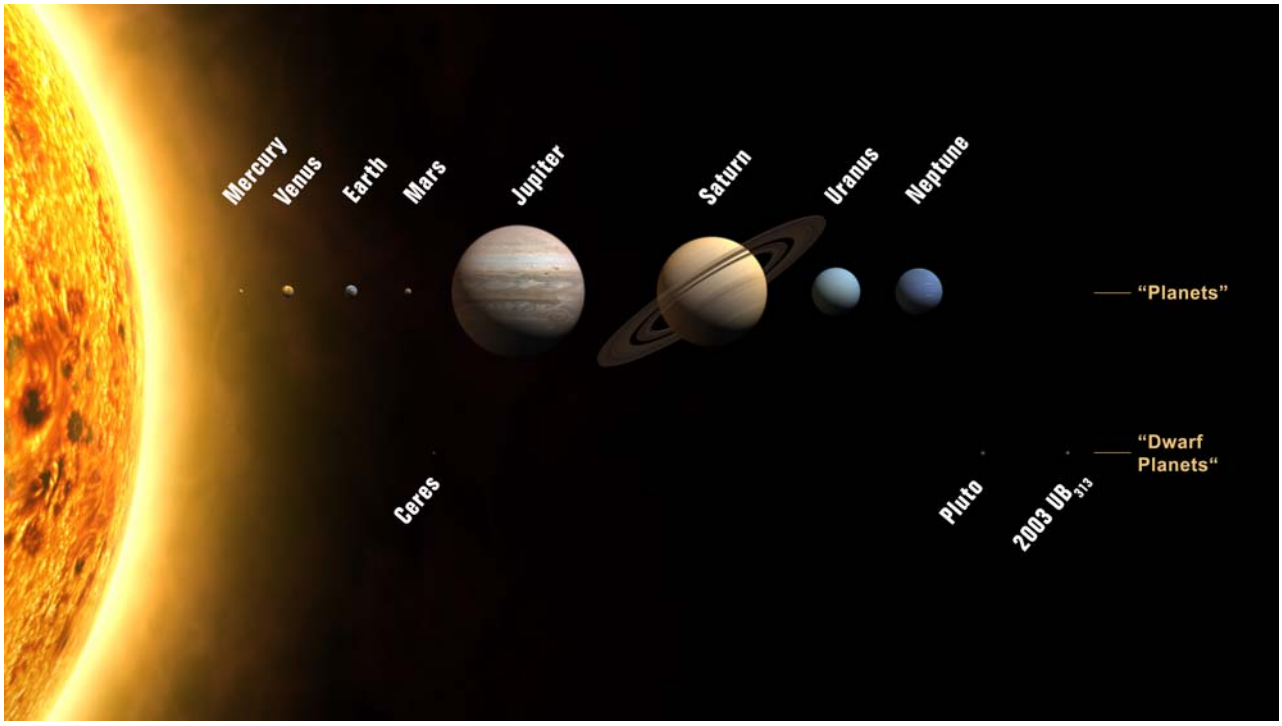
The IAU further resolves:

Pluto is a "dwarf planet" by the above definition and is recognized as the prototype of a new category of trans-Neptunian objects.

[22] The eight planets are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.
[23] An IAU process will be established to assign borderline objects into either dwarf planet and other categories.
[24] These currently include most of the Solar System asteroids, most Trans-Neptunian Objects (TNOs), comets, and other small bodies.

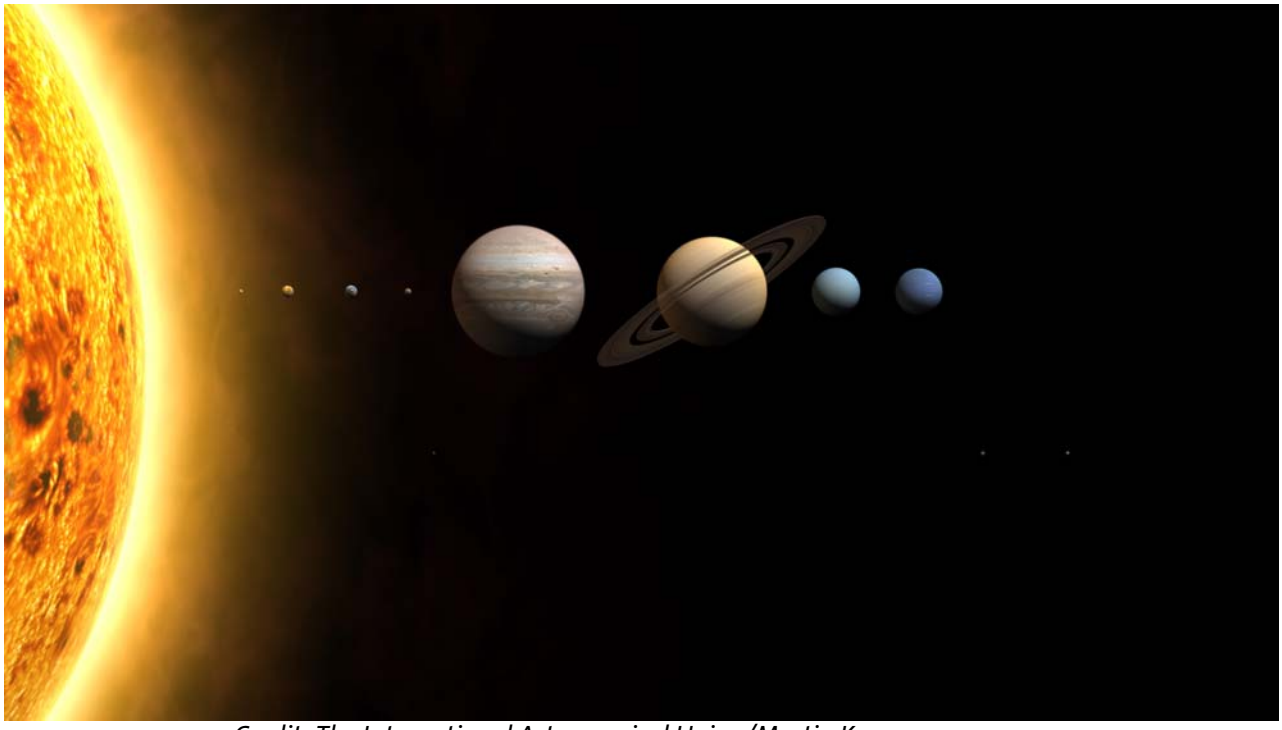
Images

iau0603a:



Credit: The International Astronomical Union/Martin Kornmesser

lau0603b:



Credit: The International Astronomical Union/Martin Kornmesser

lau0603c:

Credit: The International Astronomical Union/Lars Holm Nielsen

Iau0603d:

Credit: The International Astronomical Union/Lars Holm Nielsen

lau0603e:

Credit: The International Astronomical Union/Lars Holm Nielsen

lau0603f:

Credit: The International Astronomical Union/Lars Holm Nielsen

Questions and Answers 2

Q: What is the origin of the word "planet"?
A: The word "planet" comes from the Greek word for "wanderer", meaning that planets were originally defined as objects that moved in the night sky with respect to the background of fixed stars.

Q: Why is there a need for a new definition for the word "planet"?
A: Modern science provides much more knowledge than the simple fact that objects orbiting the Sun appear to move with respect to the background of fixed stars. For example, recent new discoveries have been made of objects in the outer regions of our Solar System that have sizes comparable to and larger than Pluto. (Noting that historically Pluto has been recognized as "the ninth planet.") Thus these discoveries have rightfully called into question whether or not they should be considered as new "planets."

Q: How did astronomers reach a consensus for a new definition of "planet"?
A: The world's astronomers, under the auspices of the International Astronomical Union, have had official deliberations on a new definition for the word "planet" for nearly two years. The results of these deliberations were channelled to a Planet Definition Committee and ultimately proposed to the IAU General Assembly. Continued evolution of the definition allowed a final consensus and vote.

Q: What new terms are used in the official IAU definition?
A: There are three new terms adopted as official definitions by the IAU. The terms are: "planet", "dwarf planet", and "small solar system body."

Q: In plain language, what is the new definition of "planet"?
A: A "planet" is an object in orbit around the Sun that is large enough (massive enough) to have its self-gravity pull itself into a round (or nearly round) shape. In addition a "planet" orbits in a clear path around the Sun – there are no other bodies in its path that it must sweep up as it goes around the Sun.

Q: What is the exact wording of the official IAU proposed definition of "planet"?
A: A "planet" is a celestial body that (a) is in orbit around the Sun, (b) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape, and (c) has cleared the neighbourhood around its orbit.

Q: Does a body have to be perfectly spherical to be called a "planet"?
A: No. For example, the rotation of a body can slightly distort the shape so that it is not perfectly spherical. Earth, for example, has a slightly greater diameter measured at the equator than measured at the poles.

Q: Based on this new definition, how many planets are there in our solar system?
A: There are eight planets in our Solar System; Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. "My very educated mother just served us nachos."

Q: Is that all, only eight planets?

A: No. In addition to the eight planets, there are also three known "dwarf planets". Many more "dwarf planets" are likely to be discovered soon.

Q: What is a dwarf planet?
A: A dwarf planet is an object in orbit around the Sun that is large enough (massive enough) to have its own gravity pull itself into a round (or nearly round) shape. Generally, a dwarf planet is smaller than Mercury. A dwarf planet may also orbit in a zone that has many other objects in it. For example, an orbit within the asteroid belt is in a zone with lots of other objects.

Q: How many dwarf planets are there?
A: Currently there are three known dwarf planets. Ceres, Pluto, and 2003 UB_{313}.

Q: What is Ceres?
A: Ceres is (or now we can say it was) the largest asteroid, about 1000 km across, orbiting in the asteroid belt between Mars and Jupiter. Ceres now qualifies as a dwarf planet because it is now known to be large enough (massive enough) to have self-gravity pulling itself into a nearly round shape. [Published reference for shape of Ceres: P. Thomas et al. (2005), *Nature* **437**, 224-227. Dr. Peter Thomas is at Cornell University.] Ceres orbits within the asteroid belt and is an example of a case of an object that does not orbit in a clear path. There are many other asteroids that can cross the orbital path of Ceres.

Q: Didn't Ceres used to be called an asteroid or minor planet?
A: Historically, Ceres was called a "planet" when it was first discovered (in 1801) orbiting in what is known as the asteroid belt between Mars and Jupiter. Because 19th century astronomers could not resolve the size and shape of Ceres, and because numerous other bodies were discovered in the same region, Ceres lost its planetary status. For more than a century, Ceres has been referred to as an asteroid or minor planet.

Q: Why is Pluto now called a dwarf planet?
A: Pluto now falls into the dwarf planet category on account of its size and the fact that it resides within a zone of other objects, known as the Kuiper Belt.

Q: Is Pluto's moon Charon a dwarf planet?
A: For now, Charon is considered just to be Pluto's moon. The idea that Charon might qualify to be called a dwarf planet on its own, may be considered later. (Charon may receive consideration because Pluto and Charon are comparable in size and orbit each other, rather than just being a moon orbiting a planet.)

Q: Jupiter and Saturn, for example, have large spherical satellites in orbit around them. Are these large spherical satellites now to be called dwarf planets?
A: No. All of the large satellites of Jupiter (for example, Europa) and Saturn (for example, Titan) orbit around a common centre of gravity (called the "barycentre") that is deep inside of their massive planet. Regardless of the large size and shapes of these orbiting bodies, the location of the barycentre inside the massive planet is what defines large orbiting bodies such as Europa, Titan, etc. to be "satellites" rather than planets.

Q: What is 2003 UB_{313}?

A: "2003 UB_{313}" is a provisional name given to a large object discovered in 2003 that resides in an orbit around the Sun beyond Neptune.

Q: Is 2003 UB_{313} a planet?
A: No. It is a dwarf planet.

Q: Why is 2003 UB_{313} a dwarf planet?
A: Recent Hubble Space Telescope images have resolved the size of 2003 UB_{313} showing it to be as large as, or larger than Pluto. Any object having this size, and any reasonable estimate of density, is understood to have sufficient mass that its own gravity will pull it into a nearly spherical shape. 2003 UB_{313} also orbits within the Kuiper Belt – a region that has not been cleared out. Therefore, 2003 UB_{313} is a dwarf planet. [Published reference: M. Brown et al. (2006). *Astrophysical Journal* **643**, L61-L63. Dr. Brown Michael Brown is at the California Institute of Technology.]

Q: Will the new dwarf planet 2003 UB_{313} receive a name? When?
A: Yes. The International Astronomical Union has the official authority to assign names to objects in space. This object has been popularly called "Xena", but this is not an official name. A decision and announcement of the new name are likely to be made within a few months.

Q: What is an object called that is too small to be a planet or dwarf planet?
A: All objects that orbit the Sun, which are too small (not massive enough) for their own gravity to pull them into a nearly spherical shape are now defined as being "small solar system bodies." This class currently includes most of the solar system asteroids, near-Earth objects (NEOs), Mars and Jupiter Trojan asteroids, most Centaurs, most Trans-Neptunian objects (TNOs), and comets.

Q: What is a "small solar system body"?
A: The term "small solar system body" is a new IAU definition to encompass all objects orbiting the Sun that are too small (not sufficiently massive) to satisfy the definition of planet or dwarf planet.

Q: Is the term "minor planet" still to be used?
A: The term "minor planet" may still be used. But generally the term "small solar system body" will be preferred.

Q: For any newly discovered object, how will a decision be reached on whether or not to officially call it a planet, dwarf planet, or other?
A: The decision on how to classify newly discovered objects will be made by a review committee within the IAU. The review process will be an evaluation, based on the best available data, of whether or not the physical properties of the object satisfy the definitions. It is likely that for many objects, a period of time of several years may be required in order for sufficient data to be gathered.

Q: Are there additional "planet" candidates currently being considered?
A: No. None appear likely in our Solar System. But there are planet discoveries galore around other stars.

Q: Are there additional "dwarf planet" candidates currently being considered?
A: Yes. Some of the largest asteroids may be candidates for "dwarf planet" status and some additional "dwarf planet" candidates beyond Neptune will soon be considered. The total number of dwarf planets to be found in the coming months and years could reach to over 100.

Q: When will additional new dwarf planets likely be announced?
A: Probably within a few months.

Q: How many more new dwarf planets are there likely to be?
A: There may be dozens or perhaps more than 100 waiting to be discovered.

********** IAU0604: FOR IMMEDIATE RELEASE **********
http://www.iau2006.org/mirror/www.iau.org/iau0604/index.html

The International Astronomical Union elects Catherine Cesarsky as new President

28-August-2006, Prague: The 2006 General Assembly of the International Astronomical Union (IAU), meeting in Prague (Czech Republic), has elected the ESO Director General, Dr. Catherine Cesarsky, as President for a three-year period (2006-2009). Dr. Cesarsky is the first woman to receive this high distinction. Dr. Cesarsky has three exciting years ahead of her, especially since 2009 will be the International Year of Astronomy.

The 2006 IAU General Assembly meeting in Prague contained two weeks of passionate discussions: From black holes, dark energy, Near Earth Asteroids, to the most distant galaxies, detection of extra solar planets, confusion limits in the infrared, the definition of a planet and much more. Every celestial object, every concept, every observation, every prediction got scrutinized, debated and refined by the 2500 participating astronomers. At the Closing Ceremony of the 26th General Assembly the IAU also chose the four new Officers of the Executive Committee for 2006-2009: Dr. Catherine Cesarsky, ESO Director General, as President , Dr. Robert Williams of the Space Telescope Science Institute as President-Elect, Dr. Karel A. van der Hucht of SRON, Netherlands, as General Secretary, and Dr. Ian Corbett, ESO's Deputy Director General, as Assistant General Secretary.

Prof. Ron Ekers, the outgoing IAU President said: "*The past few years have been highly productive for astronomy, with many discoveries giving new insights into our Universe which have excited scientists and general public alike. Catherine Cesarsky is internationally honoured as a scientist, and I am delighted that she has agreed to serve the IAU as President. She has already given invaluable service to the IAU and I am confident that she will provide outstanding leadership as President.*"

The new President said *"It is a great honour and a pleasure for me to be President of the International Astronomical Union for the next three years, especially in view of the proposed International Year of Astronomy in 2009, in which the IAU will play a leading role as a catalyst and a coordinator. I am very much looking forward to working with my colleagues in the IAU to ensure that this is a great success."*

The International Year of Astronomy in 2009 offers an ideal opportunity to highlight astronomy's role in enriching all human cultures, to promote astronomy in the developing nations, to inform the public about the latest discoveries, and to emphasize the essential role of astronomy in science education. Individual countries will be undertaking their own initiatives, considering their own national needs, while the IAU will act as coordinator of 2009 International Year of Astronomy on the global scale. The IAU plans to liaise with, and involve, as many as possible of the ongoing outreach and education efforts throughout the world, including those organized by amateur astronomers.

Notes for editors

Dr. Cesarsky, ESO Director General since 1999, is known for her successful research activities in several central areas of modern astrophysics. She first worked on the theory of cosmic ray propagation and acceleration, and galactic gamma-ray emission. Later, she led the design and construction of the ISOCAM camera onboard the Infrared Space Observatory (ISO) of the European Space Agency (ESA), and the ISOCAM Central Programme that studied the infrared emission from many different galactic and extragalactic sources. This has led to new and exciting results on star formation and galactic evolution, and in the identification of the sources providing the bulk of the energy in the Cosmic Infrared Background. Dr. Cesarsky is author of more than 250 scientific papers. Dr. Cesarsky received the COSPAR (Committee on Space Research) Space Science Award in 1998 and is member of several renowned national and international Science Academies. She is married and has two children.

Dr. Cesarsky was born in France. She received a degree in Physical Sciences at the University of Buenos Aires and graduated with a PhD in Astronomy in 1971 from Harvard University (Cambridge, Mass., USA). Afterwards she worked at the California Institute of Technology. In 1974, she moved to France, becoming a staff member of the Service d'Astrophysique (SAp), Direction des Sciences de la Matière (DSM), Commissariat à l'Eénergie Atomique. She then established her career in France. From 1985 to 1993, she was the Head of SAp. Later, as Director of DSM (1994 — 1999), she lead about 3000 scientists, engineers and technicians active within a broad spectrum of basic research programmes in physics, chemistry, astrophysics and earth sciences.

The IAU is the international astronomical organisation that brings together almost 10,000 distinguished astronomers from all nations of the world. Its mission is to promote and safeguard the science of astronomy in all its aspects through international cooperation. The IAU also serves as the internationally recognized authority for assigning designations to celestial bodies and any surface features on them. Founded in 1919, the IAU is the world's largest professional body for astronomers. The IAU General Assembly is held every three years and is one of the largest and most diverse meetings on the astronomical community's calendar.

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Images

The New IAU Executive Committee

From left to right: Dr. Karel A. van der Hucht (SRON, the Netherlands), new IAU General Secretary, Dr. Robert Williams (Space Telescope Science Institute), new President-Elect, Dr. Catherine Cesarsky (ESO), new President, and Dr. Ian Corbett (ESO), new Assistant General Secretary.

Credit: The International Astronomical Union/Ed Janssen (ESO)

Appendix D: List of other press releases distributed

1. ESO 32/06, 24.08.06: Catherine Cesarsky elected President of the International Astronomical Union and Ian Corbett elected Assistant General Secretary
2. CSIRO, 22.08.06: “Heartbeats” link magnetars, pulsars
3. Release: Demographics of globular clusters – a revolutionary new picture
4. IceCube: Fact Sheet 2006
5. CAHA, Calar Alto: AstraLux: Hubble’s Sharp Resolution from Calar Alto
6. CAHA, Calar Alto: The most luminous quasar state ever observed
7. UNAWE, 22.08.06: Launch of Universe awareness initiative
8. IceCube: IceCube Collaboration begins to analyze neutrino events
9. Release: “Universe 20% of the way through its fuel reserves”
10. ESO 31/06, 17.08.06: Far away galaxy under the microscope
11. ESA/Hubble, 17.08.06: Hubble sees faintest stars in a globular cluster
12. Peter Gruber Foundations, 15.08.06: COBE team honored
13. Gaia: Gaia Fringe Meeting
14. NASA, Spitzer, 15.08.06: NASA’s Spitzer digs up troves of possible solar systems in Orion
15. NASA, Spitzer, 14.08.06: Teens and teachers discover a cauldron of star formation
16. ESA, Hubble, 14.08.06: Large and small stars in harmonious coexistence
17. Jodcast: First podcast from an IAU General Assembly

Appendix E: Press briefings

Announcement of the Gruber prize

Tuesday 15 August 2006 12:00, Press Conference Meeting Room 3.3

The 2006 Gruber Cosmology Prize will be awarded at the opening ceremony of the International Astronomical Union's General Assembly in Prague on Tuesday 15 August 2006. The Prize carries a gold medal and a $US250,000 cash prize.

Two up and coming young cosmologists will also receive fellowships. Details are available on embargo for long-lead publications.

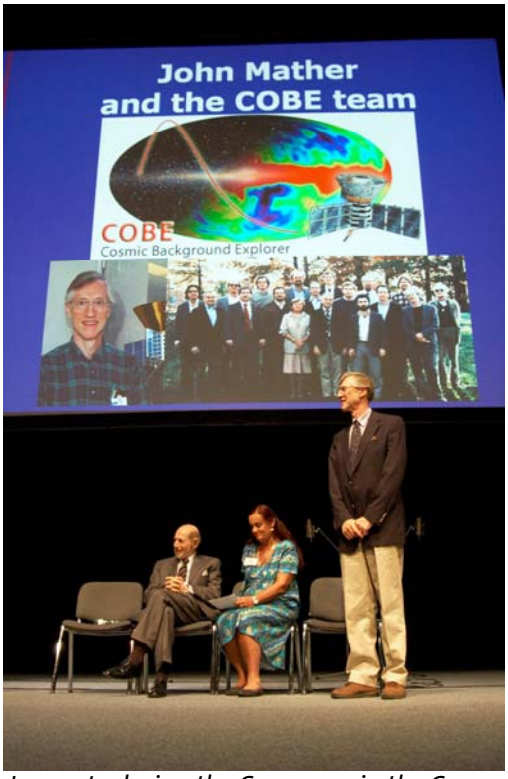
The Cosmology Prize opens the Gruber Prize season — with later ceremonies at Harvard Law School, American Society for Human Genetics, Annual Meeting in New Orleans, Society for Neuroscience Annual Meeting in Atlanta; and Columbia University Law School, New York City. Since 2000, the Cosmology Prize of the Peter Gruber Foundation has recognized individuals for their ground-breaking theoretical, analytical, or conceptual discoveries.

Present:

- Niall Byrne, Media Advisor
- Peter Gruber, Chairman of the Peter Gruber Foundation : Introduction
- Patricia Murphy Gruber, President of PGF
- Chair person of Cosmology Prize Advisory Board: Motivation & Announcement of the Gruber prize recipient
- 2006 Cosmology Prize Laureate: NN
- Other team members – grouped in the audience.

Gruber briefing

Gruber briefing: A large fraction of the COBE team



Gruber Laureate during the Ceremony in the Congress Hall

Evaluation

Worthwhile – Most of the COBE team was gathered. Number of journalist attending: ~20

Definition of a Planet process

Wednesday, August 16 2006 15:30, Press Conference Meeting Room 3.3

- IAU president Ron Ekers: Introduction and the IAU role for making a planet definition (5 mins)
- IAU EC "Planet Definition" Committee chair Owen Gingerich: The draft IAU Resolution and its implications (10 mins)
- Bob Williams: The IAU process during the GA (7 mins)
- Richard Binzel: Why this exact definition? — Physics of planetary bodies (5 mins)
- Q&A

Evaluation

Number of journalists attending: ~25
Excellent — Large interest including TV.

Professor Richard Binzel and the planet Play Doh models.

Near Earth Objects — risk or opportunity?

Thursday, August 17 2006 10:00, Press Conference Meeting Room 3.3

Asteroid science is the first link of a chain of actions that mankind must put up to prevent and/or mitigate the effects of a potential asteroid collision. The other links involve communities such as civil protection, politicians, disaster managers and even experts in international laws, that are these years becoming aware of the potential problem. Through the impressive new instruments and programmes planned to observe Near Earth Objects (NEOs), the next years will see an explosion in data about these objects. Data that will enable a much better coverage of the NEO population, and therefore also ultimately give us greatly improved risk assessments. The increasing amount of early, and thus inaccurate, data will initially have the Earth within the error box, and this will pose a major challenge to the IAU, the astronomical community and also the press. In order to respond timely, fact-based and with authority to the anticipated NEA detections the IAU Executive Committee has in July 2006 formed an "IAU EC Advisory Committee on Impact Threats to the Earth".

But NEOs is much more than just a risk. They also hold interesting scientific opportunities and are an essential tool to understand the overall populations of asteroids and comets and to constrain the formation of the planetary system.

During this briefing a brief status of some of the currently closest monitored, and publicly most discussed, objects will be presented. 2004 VD17 and 99942 Apophis are currently among those.

- Giovanni B. Valsecchi (6 mins): Near Earth Asteroids — risk or opportunity?
- Andrea Milani Comparetti (6 mins): Asteroid impact prediction
- David Morrison, Chair, the IAU EC Advisory Committee on “Impact Threats to the Earth” (6 mins): The expansion of NEO surveys to sub-km objects and its implications
- N. Kaiser, Principal Investigator of Pan-STARRS (6 mins): Pan-STARRS and other leaps in NEA instrumentation

Evaluation

Number of journalists attending: 15
Worthwhile + TV

Science discovery: Hubble sees faintest stars in a globular cluster

Thursday, August 17 2006 12:00, Press Conference Meeting Room 3.3

The NASA/ESA Hubble Space Telescope has uncovered what astronomers are reporting as the dimmest stars ever seen in any globular star cluster.

NASA's Hubble Space Telescope has uncovered what astronomers are reporting as the dimmest stars ever seen in any globular star cluster. Globular clusters are spherical concentrations of hundreds-of-thousands of stars.

These clusters formed early in the 13.7-billion-year-old universe. The cluster NGC 6397 is one of the closest globular star clusters to Earth. Seeing the whole range of stars in this area will yield insights into the age, origin, and evolution of the cluster.

Note: Story under embargo until 17.08 20:00 CEST

Note: Finger food and drinks available.

- Dr. Harvey Richer: Introduction and part
- Dr. Gregory Fahlman: part 2
- Lead scientist: part 3

Evaluation

Number of journalists attending: 18
Excellent – lots of interviews afterwards + TV

The most exciting astronomical facilities of the next decade

Thursday, August 17 2006 15:00, Press Conference Meeting Room 3.3

The next decade is going to see the completion or near-completion of a long range of exciting large and extremely large astronomical facilities. This briefing will provide a bite-size overview of the status of the most interesting of these.

- Gerry Gilmore (20 mins)
- Q&A (25 mins)

Evaluation

Number of journalists attending: 10

Worthwhile + TV

Supernova 1006 a millennium later

Friday, August 18 2006 13:00, Press Conference Meeting Room 3.3

Supernova 1006 is generally recognized as the brightest supernova ever witnessed in recorded human history. This star was so spectacular that contemporary observers around the world (all in the northern hemisphere) recorded the event during some three years, despite its southern location at Dec (1006) = – 38° and it was even compared with the Moon in brightness. Records indicate that the event itself reached a peak apparent magnitude of about –7.5, some three magnitudes brighter than any other historical supernova.

Agenda (6 mins per speaker)

- P.F. Winkler: Thousand years with SN 1006
- F.R. Stephenson: Historical records of SN 1006
- K.S. Long: Modern optical and UV observation of SN 1006
- K. Koyama: New results on SN 1006 from the just commissioned Japanese X-Ray telescope Suzaku
- S.P. Reynolds: SN 1006: the most direct evidence yet for 100+ TeV cosmic rays

Evaluation

Number of journalists attending: 6
Worthwhile + TV

Demography of globular clusters — a revolutionary new picture

Tuesday, August 22, 2006 10:00, Press Conference Meeting Room 3.3

Until few years ago it was commonly believed that globular clusters consisted of a "simple stellar population" — that all the stars were formed from a chemically uniform cloud of gas within a relatively short interval of time, long ago in the infancy of our Milky Way. Recent advances in observations and theory has provoked a revolution in our understanding and it is now well accepted that at least two different stellar components are common in an increasing number of globular clusters, and even three generations in some of them. In this briefing three independent experts outline how the latest observations and theories converge, and explain the implications for the emergence of this revolutionary new picture of the globular clusters.

Alison I. Sills (McMaster University, Hamilton, Ontario, Canada): Overview and Dynamical implications of multiple stellar populations

Giampaolo Piotto (Dipartimento di Astronomia, Universita' di Padova, Padova, Italy): Observational evidence of multiple stellar populations in globula clusters

Francesca D'Antona (INAF, Osservatorio di Roma, Monte Porzio): Formation of Globular Clusters: not as simple as we believed

Evaluation

Number of journalists attending: ~10
Worthwhile

Kick-off of the Universe Awareness project

Tuesday, August 22 11:30, Press Conference Meeting Room 3.3

The Universe Awareness initiative is being officially launched at the IAU General Assembly in Prague.

Universe Awareness (UNAWE) is an international project that will expose economically disadvantaged young children, aged between 4 and 10 years, to the inspirational aspects of astronomy. By conveying a feeling for the vastness and beauty of the Universe UNAWE aims to broaden the minds of the children, to enhance their understanding of the world and to demonstrate the power of rational thought.

Agenda (6 mins per speaker)

- Prof. George Miley, Joint Chair, UNAWE International Steering Committee
- Mr. Claus Madsen, Joint Chair, UNAWE International Steering Committee
- Dr. Cecilia Scorza de Appl, Chair, UNAWE Education Committee
- Dr. Carolina Ödman, Project Manager/Coordinator,

Evaluation

Number of journalists attending: 10
Worthwhile

Black Holes Anno 2006

Wednesday, August 23 2006 13:00, Press Conference Meeting Room 3.3

During this press briefing a selection of the most outstanding experts in black holes will summarize the current standing of our knowledge of these enigmatic objects.

- M.J. Rees: The use of black holes to test Einstein's theory, and the role they play in galaxy evolution, and in explosive phenomena such as gamma ray bursts, quasars, and radio galaxies
- P. Madau: The First Massive Black Holes
- G. Hasinger: How Black Holes Grow
- R. Genzel: News from the nearest supermassive Black Hole
- L. Ferrarese: Supermassive Black Holes and Stellar Nuclei: the Dark and Bright Side of Galaxy Cores

Evaluation

Number of journalists attending: 20
Excellent.

Results of the Resolution votes at the closing ceremony

Thursday, August 24 2006 18:00, Press Conference Meeting Room 3.3

- Richard Binzel
- Catherine Cesarsky
- Oddbjørn Engvold
- Jan Palous

Evaluation

Number of journalists attending: 30+
Excellent + TV

Status of the Definition of a Planet decision after the General Assembly

Friday, August 25 2006 10:30, Press Conference Meeting Room 3.3

- IAU President Catherine J. Cesarsky
- Past IAU President Ronald D. Ekers
- IAU President-Elect Robert Williams

Evaluation

Number of journalists attending: 20
Excellent — TV

Appendix F: List of participating journalists

In total 195 media were registered. Mostly from Czech and Japanese media. A few, but very influential, were from press agencies such as DPA, AFP and AP.

No	Name	Representing	Office	Section	Town/State
1.	Aikawa Haruyuki	Mainichi Shimbun Vienna			Vienna Austria
2.	Dr. Albanese Lara	La Repubblica-Firenze	Firenze	Science	Florence Italy
3.	Ando Kiyoshi	NIKKEI (Nihon Keizai Shimbun)	Paris Office	European News Division	Paris France
4.	Antoš Jakub	Aktualne.cz			Praha Czech Republic
5.	Dr. Baker Joanne	Science Magazine (AAAS)	Cambridge UK (AAAS Science International)	Editorial	Cambridge UK
6.	Battersby Stephen	New Scientist			Westow Hill United Kingdom
7.	Bigby Gemma	NNN — NTV London		Producer	London United Kingdom
8.	Blažek Vojtěch	Hospodářské noviny			Praha Czech Republic
9.	Boháč Jaromír	Občanský týdeník		Technical sect.	Praha Czech Republic
10.	Dr. Bohannon John	Science Magazine			Berlin Germany
11.	Bradley Simon	NNN — NTV London		Cameraman	London United Kingdom
12.	Bradna Josef	FaxMagazin			Praha Czech Republic
13.	Brooker Sarah	5th World Conference of Science Journalists			Melbourne Australia
14.	Dr. Bruneaux Nazaire	BBC — Press	BBC Radio	Press	London United Kingdom
15.	Ing. Bulíř Hynek	Český rozhlas			Praha Czech Republic
16.	Burger Martin	Intermedia SNG for TBS Vienna	Vienna Bureau	TV/Satellite News Gathering	Vienna Austria
17.	MA Butorin Pavel	Radio Free Europe / Radio Liberty		Central Newsroom	Praha Czech Republic
18.	Byrne Niall	Gruber Foundation			Melbourne Australia
19.	Caprara Giovanni	Corriere della Sera	Science	Science editor	Milano Italy
20.	Černý David	Reuters			Praha Czech Republic
21.	Černý Václav	Agentura — RADIA	Media Press — Radia		Praha Czech Republic
22.	Červ Jan	Metro			Praha Czech Republic
23.	Chang Alicia	Associated Press	Associated Press	Science Reporter	Los Angeles, CA USA
24.	Cheney Colin	Seed Magazine			Brooklyn, NY USA
25.	Chytilová Jana	ČT Praha	ČT 2		Praha Czech Republic
26.	Dr. Cirmanová Veronika	Vesmír			Praha Czech Republic
27.	Čížek Michal	AFP		Photographer	Praha Czech Republic
28.	Dr. Couper	BBC Radio	BBC Radio	Presenter/Writer	Loosley Row

	Heather				United Kingdom
29.	Crosby Alan	Reuters News Agency	Editorial		Praha Czech Republic
30.	Daibo Hajime	Asahi TV			Paris France
31.	Denzer Georg	NHK Japan Broadcasting Corporation	NHK Berlin Bureau		Germany
32.	Divíšek Martin	Deník Šíp			Praha Czech Republic
33.	Dudíková Andrea	Bloomberg News	Prague	Print	Praha Czech Republic
34.	Dr. Fienberg Rick	Sky & Telescope Magazine	Editor in Chief		Cambridge, MA USA
35.	Finley David	National Radio Astronomy Observatory (PIO)	National Radio Astronomy Observatory		Socorro, NM USA
36.	Fischer Daniel	Skyweek Magazine & Interstellarum			Koenigswinter Germany
37.	Furtula Aleksandar	AP Television News	AP Television News	Producer / cameraman	London United Kingdom
38.	Garlan Frederik	AFP	AFP	Science Department	Paris France
39.	Gisubelová Jaroslava	Radio Prague			Praha Czech Republic
40.	Ing. Glos Dalibor	Česká astronomická společnost			Praha Czech Republic
41.	Greš Josef	Hospodářské noviny			Praha Czech Republic
42.	Hampl Jaromír	Regiomix			Praha Czech Republic
43.	Harris George	Dalow Smithson Productions	Darlow Smithson Productions		London United Kingdom
44.	Hasenstab Susanne	ČR — Radio Praha			Praha Czech Republic
45.	Hašková Monika	ZDF — Zweites Deutsches Fernsehen			Praha Czech Republic
46.	Havlová Alžběta	Czech Radio 1 — Radiojournal			Praha Czech Republic
47.	Hayarii Hajime	Asahi TV			Paris France
48.	Henbest Nigel	Pioneer Productions (Television)	Pioneer Productions	Development	London United Kingdom
49.	Herman Jiří	Deník Šíp		Labe Press — Deník Šíp	Praha Czech Republic
50.	Hishiyama Shoji	Japan News Network — Tokyo Broadcasting System Vienna	Vienna Bureau	TV/correspondent	Vienna Austria
51.	Mgr. Hloušková Věra	Senior Revue & Veřejná správa	Senior Revue		Praha Czech Republic
52.	Hogan Jenny	Nature	Nature	The Macmillan Building	London United Kingdom
53.	Homma Keiichi	Yomiuri Shimbun	London Office	Edition	London United Kingdom
54.	Hornung Peter	ARD Deutscher Rundfunk Studio Prague	ARD Studio Prague		Praha Czech Republic
55.	Dr. Hurt Robert	Spitzer Space Telescope (public affairs office)	Spitzer Science Center		Pasadena, CA USA
56.	Hužvárová Marina	Press Department AV CR	Press Department AV CR	Academic Bulletin	Praha Czech Republic
57.	Hynková Alexandra	Burda			Praha Czech Republic
58.	Jakabová Charlotte	Airlines Newspaper		Free journalist	Praha Czech Republic
59.	Jakl René	Prague Post — weekly			Praha Czech Republic

60.	Jandová Kamila	TV Nova	TV Nova	News	Praha Czech Republic
61.	Janoušek Petr	ČTK			Praha Czech Republic
62.	Jarošová Jindra	Český rozhlas 2 — Praha			Praha Czech Republic
63.	Dr. Jašková Kamila	Magazin Ráva			Praha Czech Republic
64.	Jelínek Tomáš	Radio Bratislava	Repotáže pro ČR		Bratislava Slovak Republic
65.	Jin Jing	Xinhua News Agency			Peking China
66.	Jindrová Markéta	Deník Šíp	Deník Šíp		Praha Czech Republic
67.	Johnson Eric	Deutsche Presse-Agentur (dpa)			Prague Czech Republic
68.	Jorgensen Lars	Politiken	Politiken	Science	Praha Czech Republic
69.	Josek Petr	Associated Press	Associated Press	Photo	Praha Czech Republic
70.	Jungrová Alžběta	Lidové noviny	Lidové noviny	Photographer	Praha Czech Republic
71.	Kargl Helmut	Intermedia SNG for TBS Vienna	Vienna Bureau	TV/Satellite News Gathering	Vienna Austria
72.	Katsura Tomoko	NNN — NTV London		Reporter	London United Kingdom
73.	Khavina Natalia	NTV Russia	News	Brussels Bureau	Brussels Belgium
74.	Khavine Dimitrij	NTV Russia	News	Brussels Bureau	Brussels Belgium
75.	Klímová Julia	Zpravodajca SR			Praha Czech Republic
76.	Kobayashi Makoto	NHK Japan Broadcasting Corporation	NHK Berlin Bureau		Berlin Germany
77.	Kole William J.	Associated Press	The Associated Press		Vienna Austria
78.	Kolenov Genadij	TV NTV			Praha Czech Republic
79.	Dr. Kolmhofer Martin	FinanceNewEurope			Praha Czech Republic
80.	Ing. Koníčková Olga	Doba seniorů	Freelance		Praha Czech Republic
81.	Dr. Konrádová Libuše				Praha Czech Republic
82.	Mgr. Kořen Vladimír	CZECH TV Prague	News Desk	Science	Praha Czech Republic
83.	Korff Kal	Metropolitni Express	Metropoolitni Express Newspaper	Photo Editor, columnist,KAL's Korner	Praha Czech Republic
84.	Korselt Jan	Reuters	Reuters		Praha Czech Republic
85.	Kovaříková Lenka	Press Department AV CR	Press Department AV CR	Academic Bulletin	Praha Czech Republic
86.	Ing. Král Pavel	Podnikání a obchod			Praha Czech Republic
87.	Krčma Jaroslav	METRO	Redakce		Praha Czech Republic
88.	Křížek Pavel	CZECH TV Prague		News	Praha Czech Republic
89.	Křížová Helena	Česká televize		štáb	Praha Czech Republic
90.	Kroupová-Urbánková Daniela	Slovak TV			Praha Czech Republic

91.	Krumphanzl Michal	ČTK			Praha Czech Republic
92.	Kubíková Blanka	Česká televize		štáb	Praha Czech Republic
93.	Kuncová Eva	Czech Radio		Free journalist	Praha Czech Republic
94.	Lanté Agathe	France 5	Maximal Production		Paris France
95.	Larsen Rolf Ludvig	Aftenposten	Aftenposten	News and Science	Oslo Norway
96.	Ledinská Taťana	Rokycanský deník			Rokycany Czech Republic
97.	Lesiak Manfred	Japan News Network — Tokyo Broadcasting System Vienna	Vienna Bureau	Tv/Producer	Vienna Austria
98.	Link Petr	Deník Šíp	Deník Šíp		Praha Czech Republic
99.	Liška Kuba	Media Agency			Praha Czech Republic
100.	Liss Anna-Lotta	ČR — Radio Praha 7			Praha Czech Republic
101.	Lorenzen Dirk H.	Deutschlandfunk, German Public Radio	Deutschlandfunk	Forschung aktuell	Hamburg Germany
102.	Dr. Lukeš Bohumil		Freelance		Praha Czech Republic
103.	Macek Tomáš	MF dnes			Praha Czech Republic
104.	Machurková Dana	AHA!	editorial office		Praha Czech Republic
105.	Ing. Malík Jiří		Freelance		Praha Czech Republic
106.	Marchal Jan	AFP (Agence France Presse)			Praha Czech Republic
107.	Martin Emilie	Ciel et Espace			Paris France
108.	Maruniak Martin	TV Markíza	Slovak Office		Bratislava Slovak Republic
109.	Mgr. Mašková Martina	Czech Radio	Český rozhlas	Presenter/producer, ČRo-Rádio Česko, ČRo-Leonardo	Praha Czech Republic
110.	Materna Dan	MF dnes		fotograf	Praha Czech Republic
111.	Dr. Mocek Michal	MF dnes	Mfdnes		Praha Czech Republic
112.	Moudrý Karel	Český rozhlas		ČRo Leonardo	Praha Czech Republic
113.	Myšková Marta	ČTK foto			Praha Czech Republic
114.	Nakamura Shinichi	Japan News Network — Tokyo Broadcasting System Vienna	Vienna Bureau	Tv/Cameraman	Vienna Austria
115.	Nielsen Lars Holm	IAU Press Office	IAU Press Office		Garching Germany
116.	Nosková Anna	Metro			Praha Czech Republic
117.	Novotná Denisa	Euromedia			Praha Czech Republic
118.	Dr. Olivová Jana	Czech Radio	Czech Radio 3 — Vltava	Culture and Science News	Praha Czech Republic
119.	Ono Ryosuke	The Asahi Shimbun, Japanese newspaper	Geneva Bureau		Geneva Switzerland
120.	Ing. Pacner Karel	MF dnes			Praha Czech Republic
121.	Pedersen Soren	De Bergske Blade	De Bergske Blade	Holstebro	Holstebro Denmark
122.	Pekkola Marko	Tahdet ja avruus	Helsinki	Tahdet ja avaruus —	Helsinki

				magazine	Finland
123.	Peška Stanislav	Czech News Agency			Praha Czech Republic
124.	Ing. Petit Frederic	Asahi TV	Asahi TV	News Desk	Paris France
125.	Petrová Lucie	ČTK			Praha Czech Republic
126.	Pineda Swen	EFE (Spanish News Agency)			Madrid Spain
127.	Pokorný Jakub	MF dnes	Mladá fronta DNES	domácí redakce	Praha Czech Republic
128.	Pons Sophie	AFP		Prague	Praha Czech Republic
129.	Mgr. Pospěchová Petra	Týden	Mediacop	Tyden, Section Moderní život	Praha Czech Republic
130.	Pospíšil Richard	KK			Praha Czech Republic
131.	Pražan Vít	Česká televize	TV — ČT	News	Praha Czech Republic
132.	Ing. Prokis Roman	Znamení doby	SČN	press	Praha Czech Republic
133.	Ing. Dr Prošek Jaroslav	Economic Revue (Italy)	Redakce		Praha Czech Republic
134.	Ing. Prošková Marta	Economic Revue	Redakce		Praha Czech Republic
135.	Radová Lucie	TV PRIMA	News		Praha Czech Republic
136.	Ing. Rataj Stanislav	Česká astronomická společnost			Praha Czech Republic
137.	Raupachová Stáňa	TV Prima			Praha Czech Republic
138.	Řehák Jakub	ČTK			Praha Czech Republic
139.	Ing. Ribarovski Klíme	SKOK PLUS — kultura i novinky	Makedonie — zastoupení v Praze	Skok plus — kultura i novinky	Skopje Makedonia
140.	Mgr. Rusek Martin	CZECH TV Prague	News Desk	Foreign News and Science	Praha Czech Republic
141.	Šabovičová Irena	InfoPress			Praha Czech Republic
142.	Šáchová Světlana	Infonet TV		Reporter/Cameraman	Praha Czech Republic
143.	Šanda Karel	TÝDEN			Praha Czech Republic
144.	Šarochová Gabriela	Český rozhlas		ČRo Leonardo	Praha Czech Republic
145.	Sato Nobuyuki	JIJI Press Ltd	Foreign News Department	Tokyo Head Office	Tokyo Japan
146.	Schilling Govert		Freelance		Amsterdam Netherlands
147.	Schmirler Walbert		Freelance		Praha Czech Republic
148.	Schroeder Anke	NHK Japan Broadcasting Corporation	NHK Berlin Bureau		Berlin Germany
149.	Ing. Šedivý Vladislav	Český rozhlas	Programové oddělení		Praha Czech Republic
150.	Sekimoto Makoto	The Asahi Shimbun, Japanese newspaper	Vienna Bureau		Vienna Austria
151.	Serfam Lawrence	CAPA TV			Paris France
152.	Shida Raquel	Hubble European Space Agency Information Centre	ESA/Hubble	ST-ECF	Garching Germany
153.	Siegfried Tom	Science			Los Angeles, CA USA

154.	Singer Filip	ISIFA Image Service			Praha Czech Republic
155.	Dr. Skácel Jiří	Reuters TV		Cameraman/Reporter	Praha Czech Republic
156.	Ing. Slezák Karel	Express			Praha Czech Republic
157.	Sobotka Petr	Český rozhlas		ČRo Leonardo	Praha Czech Republic
158.	Sokolnikov Leonid	NTV Russia	News	Brussels Bureau	Brussels Belgium
159.	Dr. Špalek Jiří	Reuters TV	Cameraman — Reporter		Praha Czech Republic
160.	Dr. Squires Gordon	NASA/Spitzer Space Telescope public affairs	California Institute of Technology	Spitzer Science Center	Pasadena, CA USA
161.	Dr. Šťáhlavský David	Český rozhlas — radiožurnál	Český rozhlas	Radiožurnál	Praha Czech Republic
162.	Mgr. Stařecký Tomáš	The Realm of Stars (Říše hvězd)			Praha Czech Republic
163.	Štefániková Gabriela	Academic Bulletin	Press Department AV CR	Academic Bulletin	Praha Czech Republic
164.	Stegura Gregor	Česká televize	TV — ČT	News	Praha Czech Republic
165.	Ing. Stříteský Josef				Praha Czech Republic
166.	Mgr. Šumberová Vladimíra	MF dnes	Natiowide Edition	Entertainment	Praha Czech Republic
167.	Sun Xiyou	Tisková agentura Nová Čína			Praha Czech Republic
168.	Mgr. Toman Jan	Znojpres	Znojpres		Bechyně Czech Republic
169.	Tomanová Hana				Praha Czech Republic
170.	Tycova Martina	Metropolitní Express	MAFRA, a.s.	Producer / cameraman	Praha Czech Republic
171.	Uhlíř Martin	Respect Weekly		Civilization, Science	Praha Czech Republic
172.	Urbanová Michaela	TV Nova	TV Nova		Praha Czech Republic
173.	Vajs Miroslav	PRAVDA daily, Slovakia	Department of Economics	Science and Technology	Bratislava Slovak Republic
174.	Vajt Tilen	ŠÍP	Vlatava Labe Press — Šíp		Praha Czech Republic
175.	Valentová Vlasta	Czech Radio Praha			Praha Czech Republic
176.	Ing. Vališ Zdeněk	Český rozhlas 7, vysílání do zahraničí	ČR, redakce zahraničního vysílání		Praha Czech Republic
177.	Dr. Vališková Dana	ARD Deutscher Rundfunk Studio Prague	ARD Studio Prague		Praha Czech Republic
178.	Vávra Jiří	Eilyerove			Praha Czech Republic
179.	Vávra Josef	Media	Mfdnes		Praha Czech Republic
180.	Dr. Vejvoda Oldřich	Euro Zpravodaj	Prague	International	Praha Czech Republic
181.	Verbeke Bram	SVT			Liedekerke Belgium
182.	Vildungová Jana	Parlamentní Listy	Parlamentní Listy		Praha Czech Republic
183.	Vlčková Eva	Lidové noviny	AMC Lidové noviny	Science	Praha Czech Republic
184.	Volfík René	Czech Press Agency	ČTK	Photographer	Praha Czech Republic
185.	Dr. von	Wiley-VCH	Science, Technoloigy	Physics	Berlin

	Friedenburg Christoph		and Medicine (STM)		Germany
186.	von Heijne Thomas	Swedish Television SVT		S-105 10	Stockholm Sweden
187.	Mgr. Vršovský Jan	Revue Dialog			Praha Czech Republic
188.	Walker Graham	Rocketboom.com			Praha Czech Republic
189.	Wan Jacek	NNN — NTV London		Coordinator	London United Kingdom
190.	Weiss Vladimír	Prague Post — weekly			Praha Czech Republic
191.	White Jeffrey	The Prague Post	The Prague Post	News Editor	Praha Czech Republic
192.	Wildová Stanislava	Listy Prahy 1 — Volná			Praha Czech Republic
193.	Wolf Nadja	Hubble European Space Agency Information Centre	European Southern Observatory		Munchen — Garching Germany
194.	Dr. Wuchterl Günther	Sterne und Weltraum	MPI für Astronomie		Heidelberg Germany
195.	Yatagai Toshihiro	Kyodo News	Vienna Bureau		Vienna Austria

Appendix G: Lessons learned from the GA XXV 2003 Press Room

Helen Sim
Press Officer, IAU General Assembly XXV (Sydney, 2003)

- We asked for, but did not get, a room for running press conferences. This was a serious omission and affected the way we interacted with the press. We were not able to run press conferences about the meeting itself, scientific issues highlighted at the meeting, or conferences linked with media releases being sent out from the meeting.
- We had to buy an answering machine to receive calls that came in overnight, when the press room was unattended. (The conference centre switchboard was such that we were unable to set up voicemail for the pressroom.)
- The computers in the room were networked so that all had access to the printer. This was a big advantage. It would have been even better to have had a hub so that information could have been exchanged directly between the computers in the room – e.g. sent from any machine to the machine being used to layout the newspaper.
- We had, and used:
  - cabcharge vouchers (for sending people to interviews in radio and TV studios)
  - petty cash
  - details of local courier companies (used, for instance, to have B-roll tapes sent out to be copied)
- We had a large number of staff (mostly students) to:
  - answer phones
  - run errands and find people in the meeting
  - write copy for the newspaper.
- The staff worked to a roster, half a day at a time. We had at least six people working at any one time.
- Staff had to keep timesheets to record their hours worked, as they were being paid on an hourly rate.
- The arrangement for paying the staff was not put in writing before the meeting by the conference organizers: there was an oral agreement only. This was a serious disadvantage.
- The industrial conditions under which the staff were employed (insurance, and so on) were not clarified before the meeting.
- The most difficult task is finding people within the meeting. Key people must be supplied with mobile phones. We hired phones for the meeting. However, as most people now have a phone, it would be easier just to supply them with a SIM card for a local network.
- Many requests were received from overseas media (and locally, from the multicultural broadcaster, SBS television and radio) for scientists speaking specific languages. These requests could probably be best handled by the IAU country representatives. For this to happen, country representatives need to be equipped with (ideally) phones or pagers. As this was not the case, it was usually very difficult to find speakers of specific languages.
- As it was often impossible to contact people during the day, it is necessary to have the hotel names and phone numbers of all key people (including country representatives). This we did not have, except on an ad hoc basis.
- We used a paper-based system for recording incoming messages and queries and tracking whether they've been answered or otherwise followed up: a book with those tear-out sheets for taking messages, and a record book for EACH phone in the room where the details of callers and their questions were recorded, along with the action taken.
- For booking the interview room and scheduling interviews, we used a whiteboard.

- It was a huge advantage to have the interview rooms right next to the media room. The interview rooms were reasonably well sound-proofed, which was an advantage for TV and radio.
- We arranged to have food and drink sent to the media room. This was important, as the room was too busy for people to go out for lunch.
- The general non-specialist) media – especially radio and TV – wanted to speak with charismatic scientists who could summarise the whole meeting, explain what it was all about, and who felt comfortable in talking about a whole range of topics going on at the meeting. The local media all wanted to interview the people they already knew and had interviewed before (namely, Seth Shostak and Heather Couper — even though those two didn't have any active scientific roles at the meeting).
- I looked to identify newsworthy science stories ahead of time and present these as media releases. However, the organisers of the joint discussions and symposia weren't very good, in general, at knowing what exciting stories were going to emerge in their areas. I undertook to write the media releases or have them written locally. It would be preferable to accept only media releases that had been properly prepared by press officers of the relevant institutions, and which came with appropriate supporting materials (images, websites, animations, etc).
- We could not modify the meeting website to post news releases as they became current, or notify the press of events of events they might be interested in. This was a serious disadvantage.

Equipment for 2003 press room and media room

Furniture	at least	3	large (2m) tables for working at, sorting and distributing releases, etc
		8	chairs
			desks/tables for computers
			room dividers to separate media area from newspaper area
Equipment		4	PCs. Software: Microsoft Office and browser.
		1	fax machine with telephone handset
		1	photocopier
		1	A4 colour laser printer
		3	USB drives for data downloads
		5	mobile phones: one for the office, others for runners and the interviewees of the day.
		3	desk lamps
		2	powerboards
		2	extension cords
		2	large bins for waste paper (for recycling)
		1	general rubbish bin
		1	electric stapler
		1	pinboard for messages and announcements
		1	pinboard for press clippings
			stationery
		4	telephone handsets
Datalinks	Four		ISDN lines for phone calls to and from media. The phone numbers had to be known 6 weeks ahead of the meeting.
		4	broadband internet connections for the 4 permanent PCS (will be needed to download graphics and animations and update website)
		6	internet connections for journalists to plug their laptops into
Staff			
	four		student runners (mainly for locating people for interview)
	three		media wranglers

INTERVIEW ROOM for phone, TV and radio interviews

Furniture			room dividers sufficient to partition room into three reasonably soundproof areas
		3	small tables
		6	chairs
	1 or more		couches with backs, for TV interviews
Equipment		3	telephone handsets
			water jug and plastic cups
		3	backdrops featuring GA logo and suitable graphics
			sign/s for door
		3	tabletop vases for flowers
Datalinks		3	ISDN phone lines
Staff			room coordinator

Appendix H: Excerpt of media coverage

Here follow excerpts of the press coverage. They were somewhat randomly selected from the Internet. Getting access to all paper copies of the newspapers, journals and magazines was unfortunately not practically possible.

Selected headlines

Pluto for Demotion
Redorbit, 16.08.06

Candidate planets rock cosmic family
Business Day, 17.08.06

Don't let new planets overwhelm your world!
The Hindu, 18.08.06

Chaos im Sonnensystem
FAZnet, 16.08.06

Astronomers throw a bone to Pluto
The Roanoke Times, 20.08.06

Hubble glimpse faintest stars
BBC News, 18.08.06

Pluto identity crisis
Daily Telegraph, 18.08.06

Tiny Pluto deserves some respect
The Record, 17.08.06

Will Pluto go Bluto?
LA Times, 16.08.06

Pluto may survive war of the worlds
Irish examiner, 17.08.06

Make Pavarotti a planet already
The chaser, 18.08.06

Pluto stripped of planet status
AM, 25.08.06

Pluto: Down but maybe not out
space.com, 31.08.06

With Pluto gone, which of us will be next?
Toronto Star, 02.09.06

Not a dwarf planet to those who believe
Toronto Star, 02.09.06

Planet politics. How I tried – and failed – to save Pluto
Boston Globe, 03.09.06

Fight on to save Pluto
Herald Sun, 01.09.06

Pluto: The blacklash begins
Nature, 31.08.06

Adieu, poor Pluto, sent to the doghouse
The Age, 28.08.06

From planet to dwarf
Life, 29.08.06

Conspiracy Theories
Letter in Kuwait Times, 29.08.06

Pluto needs to find a new solar system
Telegram.com, 28.08.06

So I'm not a planet? Says who?
Baltimore Sun, 27.08.06

Going 'round and 'round on defining Pluto
Boston Globe, 28.08.06

Solar Shake up
Des Moines Register, 29.08.06

Scientists create big bang with planet definition
abc news, 31.08.06

And then there were 8 (goodbye, Pluto)
Herald Tribune, 25.08.06

Astronomers goofed on Pluto
Times Union, 30.08.06

Good Heavens! How many planets have we?
Cybernoon, 24.08.06

Astronomers clash in a war of worlds
The Associated Press, 24.08.06

Planets or pla-nots?
Austin American Statman, 24.08.06

Astronomie: ieider mit den Plutons!
Die Presse, 22.08.06

Planets Askew in the Heavens, and Here on Earth, a Mess
The NY Times, 22.08.06

I [heart] Pluto
The NY Times, 23.08.06

Astronomie: Die letzten Tage des Planeten Pluto
Die Presse, 24.08.06

And then there were eight...
Daily Telegraph, 25.08.06

...Uranus, Neptune...Hey, Where's Pluto?
Washington Post, 25.08.06

Kamera erspaeht geschrupften Riesen
Spiegel online, 21.08.06

Hubble fotografa estrelas mais fracas da galaxia
Tecnocientista, 18.08.06

Changes in our solar system: Is trouble coming? Hawking answers
abc news, 16.08.06

The most luminous quasar state ever observed
SpaceRef.com, 21.08.06

Get Pluto out of here!
Time Magazine, 20.09.06

"Asteroid busters" widen sky search,
LJWorld.com, 18.08.06

Does size matter?
Birmingham News, 20.08.06

Earth' moon could become a planet
CNN News, 18.08.06

A new world order
Courant, 16.08.06

Aging stars reveal secrets of the Universe
Innovations-report, 21.08.06

Spitzer descobre "planetas em potencial",
Ciencia, 21.08.06

Astronomers set up killer asteroid task force
FOXNews, 17.08.06

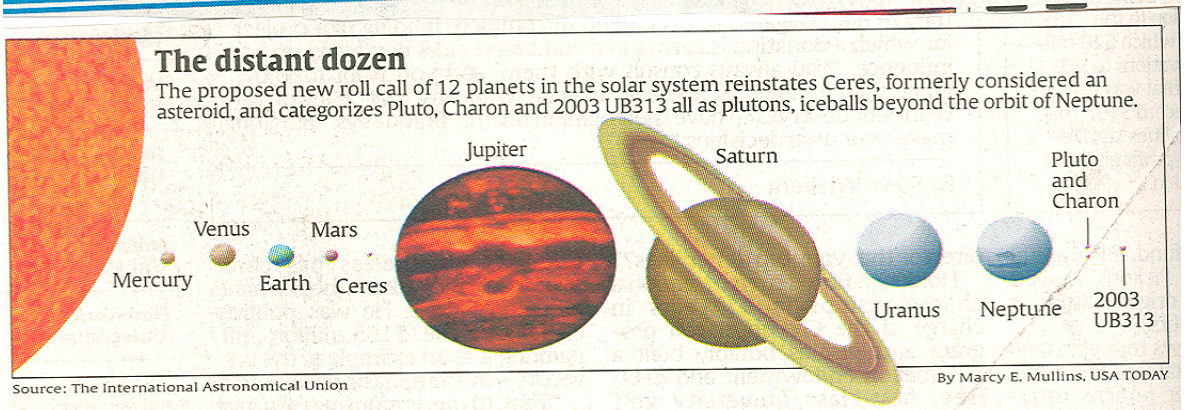
Asteroiden-Jaeger fuerchten Panik vor Resultaten ihrer Arbeit
Spiegel online, 18.08.06

Altersheim der Milchstrasse
Deutschlandfunk, 18.08.06

Selected press clippings

USA TODAY
AVAILABLE AROUND THE WORLD

Brad Garrett: *Everybody Loves Raymo*



Pluto's safe in remaining a planet

Little guy likely to get solar system company

By Dan Vergano
USA TODAY

Pluto stays, but textbooks may never be the same as astronomers call for a new definition of planets that would raise the solar system's total from nine to 12, with possibly more to come.

The proposal comes from the International Astronomical Union (IAU), the leading worldwide body for astronomers who have been trying to make sense of new discoveries as they ask old questions about whether Pluto is big enough to rate as a planet. The new definition adds three planets to the existing nine, keeping Pluto.

"Yes, Virginia, Pluto is a planet," says planet definition panel member Richard Binzel of the Massachusetts Institute of Technology.

Some science museums and astronomers have removed Pluto from the list of planets, sparking squabbles about a definition.

The IAU panel would define a planet as any object orbiting a star that has been pulled by its own gravity into a ball shape and is not a satellite of another planet. In effect, it means:

► Ceres, initially called a planet after its 1801 discovery and the largest object in the asteroid belt, is reinstated as a planet after a century's demotion to asteroid.

► Pluto and Charon, Pluto's large moon, are the solar system's first "double planet" because they revolve around one another. Even though Earth's moon is bigger than Pluto or Charon, it is considered a satellite because it revolves around a center of gravity within Earth.

► At least two dozen "plutons," or Pluto-like planets, are likely to be discovered.

The proposal will be voted on next week.

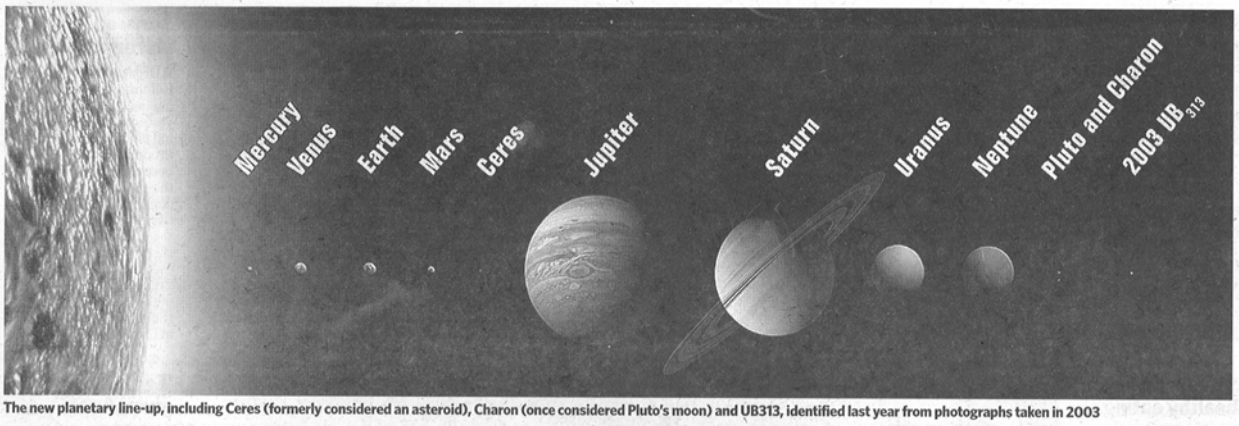
"Overall, I think the proposal is a step in the right direction," says Bob Millis, director of the Lowell Observatory in Flagstaff, Ariz., where Pluto was discovered.

But Mike Brown of the California Institute of Technology, whose team announced the discovery of the planet UB313 last year, said he was "shocked" by the proposed definition. He views the caveat about moons, which would make the 568-mile-wide Ceres a planet, while leaving off Jupiter's moon Ganymede, 3,200 miles wide, as unscientific. "Ceres isn't a planet," he says. "Give me a break."

USA Today, 15.08.06

Bild cover (Germany), 16.08.06

THE INDEPENDENT WEDNESDAY 16 AUGUST 2006 NEWS 3



The new planetary line-up, including Ceres (formerly considered an asteroid), Charon (once considered Pluto's moon) and UB313, identified last year from photographs taken in 2003

Solar system welcomes three new planets

By Steve Connor
Science Editor

The nine planets of the solar system are about to be transformed into 12, with three new members being added to the exclusive club of large celestial objects orbiting the Sun.

Astronomers are about to vote on an official proposal to extend the definition of a planet to include at least three more objects that are known to be big enough to warrant planetary status.

It will mean that astronomy textbooks will have to be rewritten with the names Ceres, Charon and UB313 being added to the more familiar names of the classical planets.

At one point it was thought that Pluto – the smallest and most distant of the planets – would be kicked out of the club, but now it appears that it is welcomed as the prototype of a new class of smaller planets known as "plutons".

The International Astronomical Union (IAU), which has been the arbiter of planetary nomenclature since 1919, has received a new definition of a planet from a special committee of seven experts set up two years ago to adjudicate on the issue. Ron Ekers, the president of the IAU, said the ancient description of a planet as an object that wanders against a backdrop of fixed stars is no longer valid in an age of advanced telescopes.

"Modern science provides much more knowledge than the simple fact that objects orbiting the Sun appear to move with respect to the background of fixed stars," Dr Ekers said.

"Recent new discoveries have been made of objects in the outer regions of our solar system that have sizes comparable to and larger than Pluto. These discoveries have rightfully called into question whether or not they should be considered as new planets." The three new planets are Charon, once considered a moon of Pluto but now described as its double planet; Ceres, formerly known as an asteroid or minor planet; and UB313, an object that has yet to be given a formal name (although it has been nicknamed Xena), and which was only identified last year.

There are now eight "classical" planets, three "plutons", those planets that are similar in size to Pluto with extremely wide solar orbits, and the asteroid-like Ceres.

Experts sitting on IAU's planet definition committee – composed of astronomers, historians and writers – concluded that in future a planet should be defined as a celestial body that is big enough for its gravity field to form a near-spherical shape. The object must also be in orbit around the Sun – or another star – but not as a satellite of another planet, which rules out the Moon and the larger moons of other planets.

"Our goal was to find a scientific basis for a new definition of 'planet', and we chose gravity as the determining factor," said Professor Richard Binzel, a planetary scientist and member of the definition committee. "Nature decides whether or not an object is a planet.".

The new definition of a planet means that there are another dozen or two dozen other known objects in the solar system that may one day be included in the planetary club.

The seven-member definition committee convened in Paris in late June and early July, and its recommendations will now go to the IAU's general assembly which will vote on the resolution as its meeting in Prague this week.

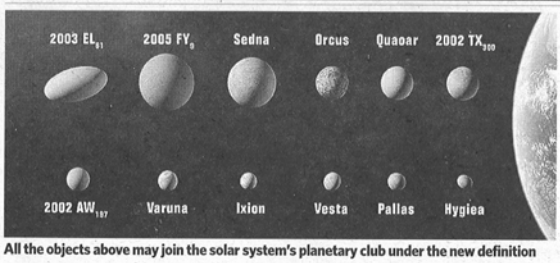
Professor Owen Gingrich, the committee chairman, said the deliberations were long and hard, but in the end a consensus was reached.

"In July we had vigorous discussions of both the scientific and the cultural-historical issues and on the second morning several members admitted that they had not slept well, worrying that we would not be able to reach a consensus," Professor Gingrich said.

"But by the end of a long day, the miracle had happened – we had reached a unanimous agreement."

The issue came to a head after it was discovered that UB313 was bigger than Pluto, which was discovered in 1930 and was only called a planet because it was originally thought to be as big as Earth.

The recommended definition

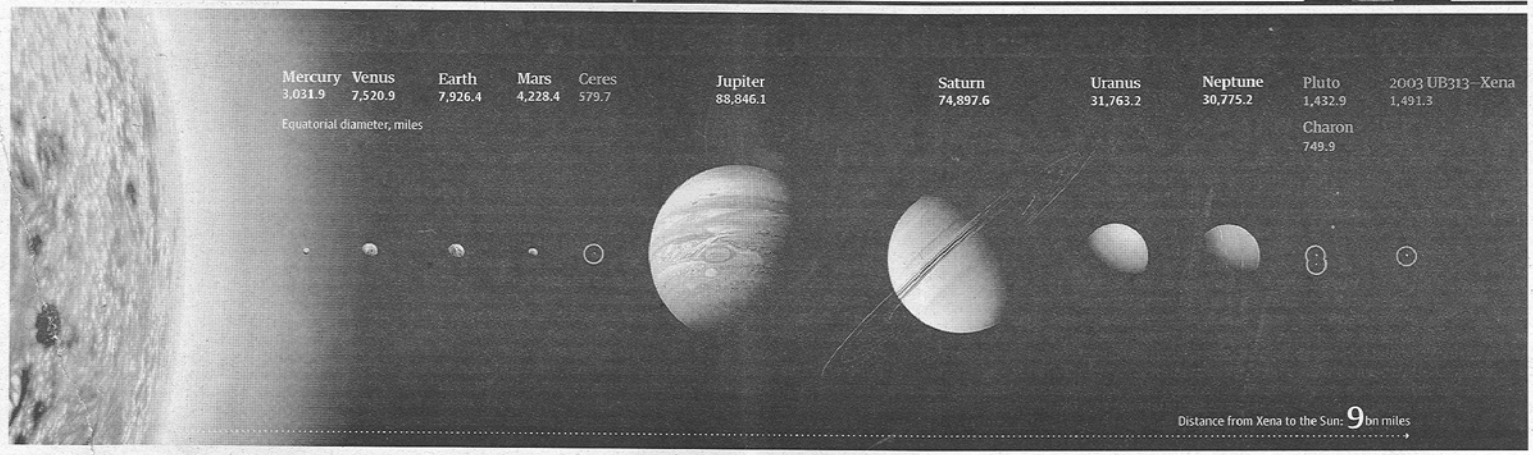


All the objects above may join the solar system's planetary club under the new definition

The International Astronomical Union is to consider the following new definition of a planet: "A planet is a celestial body that (a) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape, and (b) is in orbit around a star, and is neither a star nor a satellite of a planet."

The Independent, 16.08.06

guardian.co.uk/dispatch
Xan Rice visits Eritrea – Africa's most paranoid state



Pluto survives as solar system acquires three more planets

Scientists reach 'natural' definition of a planet

Smaller bodies that meet criteria to be called plutons

Alok Jha
Science correspondent

Science textbooks will have to be ripped up; the solar system is about to get a bunch of new planets. Astronomers want to redefine our home in the Milky Way as a place with 12 – rather than nine – planets orbiting the sun.

The proposal comes from a two-year project by the International Astronomy Union (IAU) to create the first ever scientific definition for the term planet. It will also mean that Pluto keeps its status as a planet, despite calls from many astronomers, revealed in the Guardian on Monday, that it should be demoted because of its diminutive size.

If the ideas are approved at the general meeting of the IAU in Prague next week, schoolchildren will, in future, have to learn that the solar system has 12 planets: eight classical ones that dominate the system – Mercury, Venus, Earth, Mars, Jupiter, Saturn, Neptune and Uranus – and four in a new category called plutons. These are Pluto, its moon Charon, a spherical asteroid that sits between Mars and Jupiter called Ceres, and an object called 2003 UB313 but nicknamed Xena by American astronomers who found it.

The word planet comes from the ancient Greek for "wanderer" because early astronomers would see them moving in the sky against a stationary backdrop of stars. Today, a planet is thought of loosely as a non-luminous object orbiting a star but with the advent of high-powered telescopes astronomers have found that this definition is too woolly – it could easily include thousands of comets and asteroids.

"Modern science provides much more knowledge than the simple fact that objects orbiting the sun appear to move with respect to the background of fixed stars," said Ron Ekers, president of the IAU. "For example, recent discoveries have been made of objects in the outer regions of our solar system that have sizes comparable to and larger than Pluto. These discoveries have rightfully called into question whether or not they should be considered as new 'planets'."

The situation came to a head three years ago with the discovery of 2003 UB313, a 1,860-mile-wide rock further from the sun than Pluto and the biggest object to be found in the solar system since Neptune in 1846. The IAU, which has decided on the names of celestial objects since its inception in 1919, subsequently agreed to come up with a scientific definition for planets.

Artist's impression of Pluto which maintains its status as a planet despite calls for its demotion because of its small size

The proposal says two conditions must be met: it must orbit a star without being a star itself, and it has to be big enough for its gravity to pull it into a spherical shape.

Richard Binzel, a scientist at the Massachusetts Institute of Technology and a member of the IAU committee that came up with the definition, said: "Our goal was to find a scientific basis for a new definition of planet and we chose gravity as the determining factor. Nature decides whether or not an object is a planet."

The definition keeps Pluto in the planets club, despite calls from some astronomers to demote it. "Had astronomers realized in 1930 that Pluto was smaller than our moon and with a mass well under 1% that of the Earth, perhaps some special designation would have been devised for it," said Owen Gingerich, chairman of the planet definition committee. "Although Pluto remains a planet by the proposed definition, it will generally be preferable to call it a pluton to emphasise its role as the prototype for a physically distinct category of planetary bodies."

Plutons are defined as having orbits around the sun that take more than 200 years to complete and are tilted with respect to those of the classical planets. These differing characteristics suggest that plutons have a different origin to the classical planets.

The IAU is already monitoring 12 more candidate planets, any of which could be upgraded in future. These include Varuna, Quaor and Sedna, all Pluto-like objects that reside in a region on the fringe of the solar system known as the Kuiper Belt.

Mapa de las fluctuaciones en el universo primitivo hecho por el satélite *COBE.* /NASA

Los astrónomos que confirmaron el Big Bang obtienen el premio Gruber

M. R. E., **Madrid**

El diseñador de la misión espacial que permitió detectar en 1992 fluctuaciones en el eco del Big Bang y 18 miembros de su equipo científico compartieron ayer el premio Gruber de cosmología, dotado con 250.000 dólares (196.000 euros). La Fundación Gruber premió sus hallazgos con el satélite *COBE* de la NASA, que midió irregularidades en la radiación de fondo que, en el rango de las microondas, permea actualmente el universo y es una reliquia de la explosión primordial con la que se inició. Los experimentos no sólo confirmaron que se produjo el Big Bang sino que permitieron identificar estas *arrugas térmicas* con el nacimiento de las actuales estructuras, como las galaxias. Los hallazgos fueron considerados uno de los hitos científicos del siglo XX. Desde entonces, numerosas observaciones desde Tierra y desde el espacio han aumentado la información sobre la historia del Universo, la evolución de sus estructuras e incluso la existencia de componentes misteriosos como la energía y la materia oscuras.

El premio fue anunciado en la ceremonia de apertura de la reunión de la Unión Astronómica Internacional en Praga. John Mather, director científico de la misión *COBE,* obtuvo la mitad del premio. La otra mitad la compartieron los miembros del equipo científico, entre ellos George Smoot, que lideró en 1992 el análisis. Ayer, Smoot señaló: "Fue un placer participar en los descubrimientos de *COBE* y mucho más que sean reconocidos con este premio".

Hacia atrás en el tiempo

Los instrumentos a bordo del satélite miraron hacia atrás en el tiempo 13.000 millones de años, hasta el universo primitivo. Fue la primera misión de cosmología de la NASA y la culminación de un sueño de 15 años de Mather, que hizo la propuesta en 1974 y que dirigió el proyecto, que llegó a ocupar a 1.500 personas.

El desarrollo del proyecto sufrió retrasos por razones como la tragedia del *Challenger* en 1986 que hizo suspender los vuelos de los transbordadores estadounidenses. El satélite tuvo que ser rediseñado para poder lanzarlo en un cohete Delta en 1989. Mather es ahora el director científico del telescopio espacial *James Webb,* que sustituirá al *Hubble* y sigue intentando mirar hacia atrás en el tiempo. "Somos exploradores", dijo ayer. "Necesitamos comprender de dónde venimos nosotros y nuestro universo".

El Pais, 16.08.06

PAGE TWO

So what is a planet? The debate continues

By Dennis Overbye

Pluto, it seems, has dodged a bullet.

In the hope of ending years of wrangling, a committee of astronomers and historians has proposed a new definition of the word "planet" that would expand at a stroke the family of planets from nine to 12 and leave textbooks and charts in thousands of classrooms out of date.

But astronomers immediately began to wrangle about it.

"It's a mess," Michael Brown of the California Institute of Technology said.

Among the chosen few within the solar system would be not only Pluto, whose status has been challenged in recent years, but also Ceres, the largest asteroid; 2003 UB313, nicknamed Xena, an object discovered by Brown in 2005 orbiting far beyond Pluto in the outer solar system; and even Pluto's largest moon, Charon.

In addition, at least a dozen more solar system objects are waiting in the wings for more data to see if they fit the new definition of planethood, which is that an object be massive enough that gravity has formed it into a sphere and that it circles a star and not some other planet.

The definition, they said, would apply both inside and outside the solar system.

The new definition was to be announced Wednesday in Prague, where about 2,500 astronomers are meeting in the triannual assembly of the International Astronomical Union. It is the work of the group's Planet Definition Committee, whose chairman is Owen Gingerich, a Harvard astronomer. The astronomers will vote on the definition on Aug. 25.

In a statement, Gingerich said this might not be the last word on what a planet is. "Science is an active enterprise, constantly bringing new surprises," he said.

So it was no surprise that as word of the decision leaked out Tuesday, reaction from astronomers suggested that the argument was far from over.

"This will be the talk of the town in Prague," said Alan Boss, a planetary theorist at the Carnegie Institution of Washington, who said the new definition, with four paragraphs and four footnotes, read as if it had been written by lawyers, not scientists. "I don't think this is the one we're looking for," Boss said.

Neil deGrasse Tyson, director of the Hayden Planetarium, which was raked over the coals five years ago for demoting Pluto in an exhibit in its new Rose Center at the American Museum of Natural History in New York, was clearly disappointed in the committee's work. "I'm happy there's finally a definition that's unambiguous," Tyson said. "There hasn't been one in 2,500 years."

But roundness, he said, was not a very interesting attribute to use in classifying astronomical bodies. "A Plutophile is well served by this definition," he said.

But Alan Stern, of the Southwest Research Institute, in Boulder, Colorado, called the definition "a nice solution that works both inside and outside the solar system."

Everybody agrees that a little clarity is needed when it comes to categorizing the members of the solar system. The proposed definition would come as a relief to schoolchildren and others who have rallied to the cause of Pluto.

The planet (if that is what it is) has been an oddball ever since Clyde Tombaugh spied it wandering in the outer reaches of the solar system beyond Neptune in 1930. Not only is it much smaller than the other eight planets, only a fiftieth the mass of Earth, but its orbit is unusually elliptical and inclined to the plane that marks the orbits of the other planets. In recent decades, however, other objects with orbits like Pluto's have been discovered in the Kuiper Belt, a junkyard of icy debris beyond Neptune.

Many astronomers began to argue that it made more sense to think of Pluto as a Kuiper Belt object, a minor planet instead of a planet. When it was reported that the Hayden Planetarium had done just that in its new Rose Center, which opened in 2000, a firestorm erupted. Schoolchildren rushed to the defense of lonely little Pluto.

Two years ago, the International Astronomical Union appointed a group to come up with a definition that would resolve this tension. The group, led by Ivan Williams, of Queen Mary, University of London, deadlocked. This year, a new group with broader roots took up the problem. After a sleepless night in Paris this spring, what Gingerich calls a miracle took place: "We had reached unanimous agreement."

In a nod to the idea of classifying Pluto with the Kuiper Belt, the group proposed calling planets with elongated orbits beyond Neptune "Plutons," while emphasizing that they would still be planets.

But Brown pointed out that at least 43 other publicly known objects in the Kuiper Belt are big enough to fit the planet definition, and that his group was sitting on a list of dozens more.

Boss said, "We're going to have more planets inside the solar system than we have outside."

Boss and Brown were especially critical of a feature of the new definition that would bestow planetary status on Charon, a moon of Pluto. With a diameter of about 700 miles, or 1,100 kilometers, Charon is big enough for gravity to crush all other forces and make it round, but so are some of Jupiter's and Saturn's moons, as well as our own.

The difference, according to the definition, is that the center of gravity for Pluto and Charon is between them, not inside either. So technically, Charon is not orbiting Pluto but is orbiting the center of gravity of the two bodies. The center of gravity for the Earth and its moon, on the other hand, is inside the Earth. Boss calls this "a legalistic definition."

Brown said, "That one doesn't pass the smell test."

"I really hoped something good would come of this," he said. "They proved me wrong."

"It is sad," he added. "Clarity would have been nice."

Stern, however, who is the principal scientist on the New Horizons space mission to Pluto, said the new definition was logical and not arbitrary.

It makes sense, he said, that there could be dozens of planets in the solar system. The discoveries in the Kuiper Belt have put Pluto in context, he said. "Pluto is no longer the misfit," Stern said. "It is closer to average than the Earth."

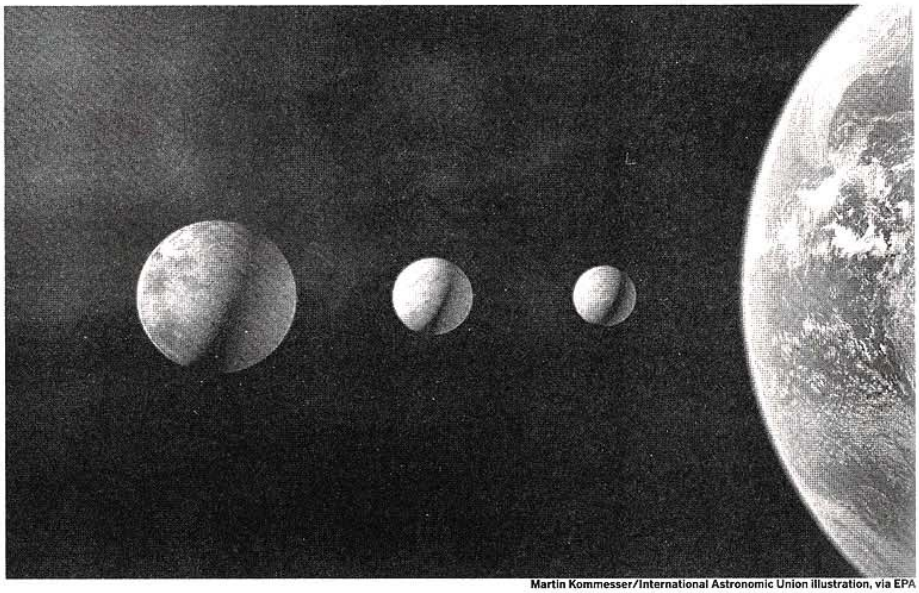
He added: "Nature is much richer than our imagination. Life is tough, life is complicated. Get over it."

Not everybody cares about the great planet debate.

Geoffrey Marcy, of the University of California at Berkeley, a widely known hunter of planets around other stars, said in an e-mail message, "I am not attending the IAU meeting, nor do I care about the outcome of any vote about whether Pluto and Xena are 'planets.'"

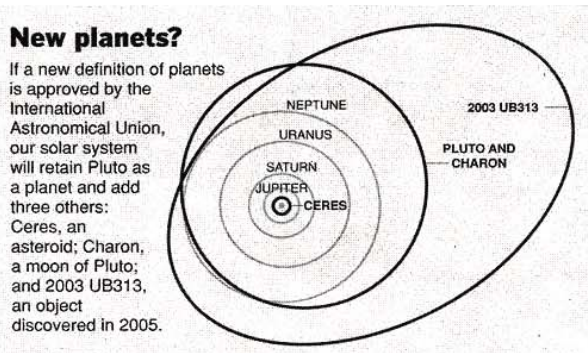
"The universe," he added, "contains so much beauty and so many mysteries that we astronomers already have our hands full figuring out how it all came about."

The New York Times



Martin Kommesser/International Astronomic Union illustration, via EPA

In contention to be planets: 2003 UB313 (also Xena), left; Charon, second from left; and Ceres, second from right, next to Earth.



NY Times, 16.08.06

Allen on Damage Control After Remarks to Webb Aide

BY RICH LIPSKI — THE WASHINGTON POST

Sen. Allen made controversial comments to S.R. Sidarth, shown at Webb offices in Arlington.

By Michael D. Shear and Tim Craig
Washington Post Staff Writers

RICHMOND, Aug. 15 — Sen. George Allen on Tuesday sought to contain the political damage from remarks he made to a Fairfax County man that dredged up charges of racial insensitivity — allegations that have dogged him for years as governor, senator and now presidential hopeful.

Despite a quick apology Monday, criticism poured in about Allen's use of the word "Macaca" to address a volunteer for the campaign of his Democratic opponent, James Webb, and also about another Allen comment, "Welcome to America." Democrats, left-wing bloggers and civil rights groups called him "insensitive" and "racist," while some conservatives called him "foolish" and "mean."

The question was fiercely debated all day: Was "Macaca," which literally means a genus of monkey, a deliberate racist epithet or a weird ad-libbed word with no meaning? And what was Allen trying to say by singling out the young man of Indian descent?

Allen's defenders rushed to his side, saying the comments, though careless, do not reflect what is inside the senator's heart. Sudhakar

See ALLEN, *A6, Col. 3*

Pluto's New Place in Space Could Be as a 'Pluton'

By Rob Stein
Washington Post Staff Writer

Hoping to end the agonizing over whether Pluto is really a planet, an international committee of astronomers has come up with a new definition that would save the tiny body's place in the sun's family.

Under the long-awaited proposal, Pluto would remain in the pantheon of planets by becoming the prototype of a new subcategory of small, outer solar system objects dubbed "plutons" — planets, but distinct from the eight larger "classical" planets closer to the sun.

The changes would require astronomy textbooks to be rewritten and every schoolchild to be taught a new vision of the solar system, because three other orbs would get promoted to planet status, as well — expanding the total from the traditional nine to 12.

"Everybody's been wanting to know: 'Is Pluto a planet?' " said Richard P. Binzel of the Massachusetts Institute of Technology, who served on the seven-member committee assembled by the International Astronomical Union (IAU) to settle the explosive issue. "The answer is: 'Yes, Virginia, Pluto is a planet.' "

The proposal to resolve the dispute is being officially unveiled today at the IAU's general assembly in Prague. It will be hotly debated until Aug. 24, when about 1,000 astronomers will vote on it. Some astronomers expressed misgivings about the new definition, but it generally drew initial praise, and several predicted it

See PLUTO, *A7, Col. 1*

Israel. They were to take up positions under the aegis of a reinforced contingent of the United Nations Interim Force in Lebanon, or UNIFIL, to form a peacekeeping corps with a total

See LEBANON, *A10, Col. 1*

try; in Khiam, at times, they outnumbered the residents. Acting on the orders of Hasan Nasrallah, the group's secretary general, they began clearing rubble, pulling bodies from collapsed homes,

See HEZBOLLAH, *A10, Col. 5*

BY GEORGES FARAH — BLOOMBERG NEWS

Homeward-bound residents cross a bridge in southern Lebanon. Hezbollah activists provided money for the trip to many refugees around the country.

U.N. Is Calling All Peacekeepers

Governments that have promised to put together a peacekeeping force for southern Lebanon are not moving quickly enough, officials warn. *A9*

Web Searches Go Low-Tech: You Ask, a Person Answers

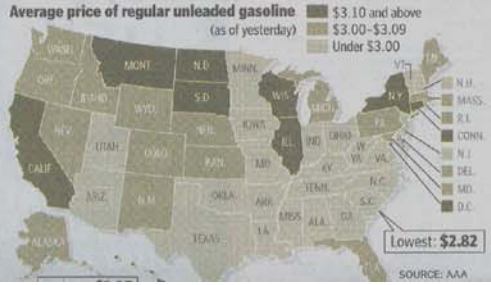
By Yuki Noguchi
Washington Post Staff Writer

Yahoo Inc. wants people such as Felicia Vallera, a San Francisco food aficionado, and Richard Marchal, a grandfather from Marion, Ill., to turn an ordinary online search into a place to find answers to life's pressing questions: What's the best way to vanquish a spaghetti stain? How do I know if it's true

digital files.

For Yahoo and a handful of other companies trying to harness knowledge from a vast corps of users, such projects raise their own big questions: Will users trust the advice of volunteers, and is this new form of sharing information online useful and accurate?

Typical search engines — such as Google and the main engine at Yahoo — rely primarily on mathe-



INSIDE

Pluto May Become A 'Pluton'

PLUTO, *From A1*

will be ratified.

"I think it's a good compromise," said Larry W. Esposito of the University of Colorado, who had opposed maintaining Pluto and similar bodies as planets. "They're really too small and don't amount to much. But it would be too difficult to demote Pluto. This way, we don't have to scratch it off the list."

The status of Pluto, the smallest of the nine planets, has been called into question by the discovery in recent years of other objects of similar size and distance from the sun. But suggestions that Pluto be demoted prompted heated debate and angry denunciations.

In an attempt to settle the issue, the IAU assembled a 19-member committee, which deadlocked after two years of intensive debate. That led to creation of the smaller committee, which met in Paris June 10 and July 1 to find a way out of the thicket.

Under the new definition, a planet would be defined as any body massive enough to be round that is not a star but is orbiting one.

"These are the most fundamental physical parameters that apply not only in our solar system, but everywhere in the universe," Binzel said. "That's what's so appealing about the definition — it can be applied universally."

The eight "classical" planets would be Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. Ceres, an object located between Mars and Jupiter that has long been considered an asteroid, would be considered a planet.

"One might call it a 'dwarf planet,' but that's not an official term," Binzel said.

Pluto, another object discovered orbiting it in 1978 called Charon, and a body discovered in 2003 that is slightly farther from the sun — temporarily named UB_{313} — would be plutons. A pluton would be any planet beyond Neptune.

"Currently, we know of three, but there are other objects that are close in size to Pluto that will have to go through an evaluation process to determine whether they will be considered plutons," Binzel said. "We fully expect there are even more discoveries to come that are likely to be in this class of plutons."

Binzel and other committee members stressed that categorizing Pluto as a pluton was in no way meant to downgrade its longtime status as the ninth planet.

"We might be demoting it from the list of eight classical planets, but we're promoting it by making it the head of its own special class," said Owen Gingerich of Harvard University, who chaired the panel.

Other astronomers praised the committee for developing a relatively simple but scientifically valid definition to categorize the new objects being discovered, thanks to advances in technology and more powerful telescopes.

"I think the group brilliantly came up with a simple scientific sieve that can be used to decide whether something should be considered a planet," said S. Alan Stern of the Southwest Research Institute in Boulder, Colo., who served on the committee that deadlocked. "I'm very pleased."

But Mike Brown of the California Institute of Technology in Pasadena said he is disappointed, even though the proposal would characterize the object he discovered, UB_{313}, as a planet.

"My first reaction was, 'Wow, this would mean this thing I found is a planet,' which is pretty exciting," Brown said. "Then I started looking at the details, and I don't think they got it quite right."

Brown questioned the caveats in the details of the proposal, which, for example, would make Pluto a planet but not Earth's moon.

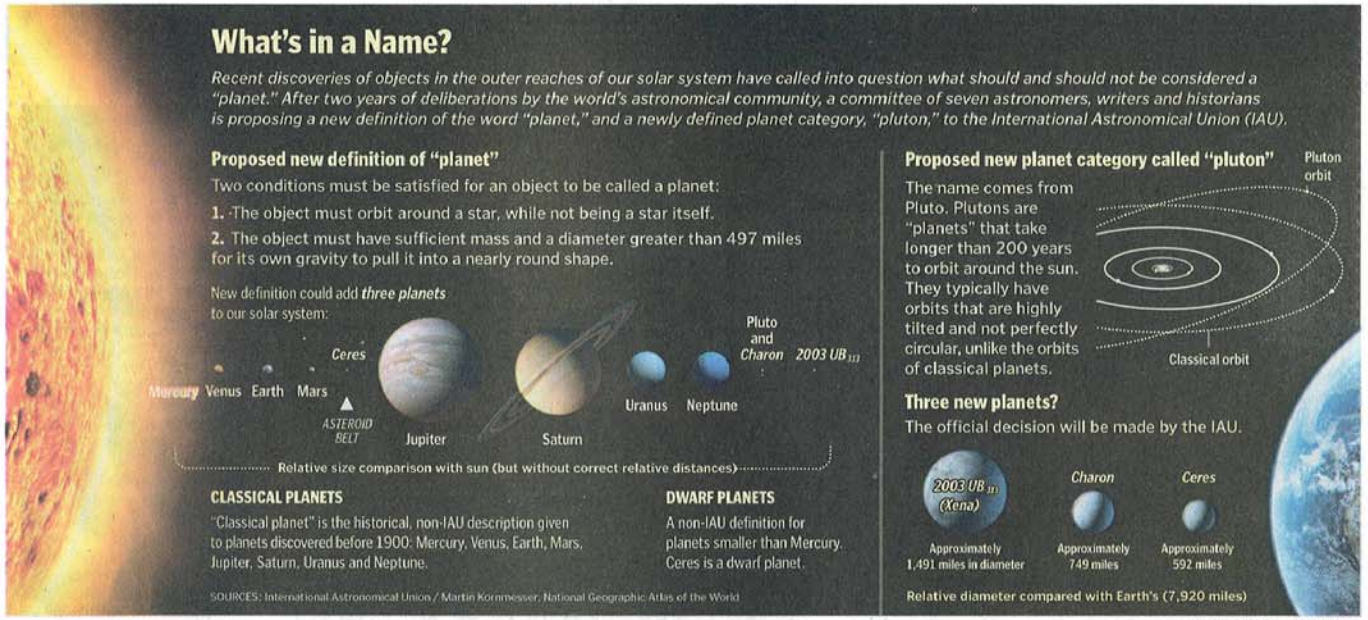
"I find the definition oddly inconsistent. It makes no sense to me," Brown said. "They are sort of trying to have things both ways: They want to have a scientific definition, but they also don't want to offend cultural sensibilities."

Brown questioned why a committee would need to vote on what gets planet status.

"That's weird," Brown said. "That's not science."

But the proposal came as welcome news to Neil deGrasse Tyson, director of the Hayden Planetarium in New York. Tyson was inundated with angry and anguished e-mail and letters from schoolchildren when he opened an exhibit that displayed Pluto apart from other planets.

"This is about the only way you could define planethood in a way that would include Pluto. So I find it a little suspicious," Tyson said. "But I'm happy to finally have an unambiguous definition, so I don't have to worry about it after this."



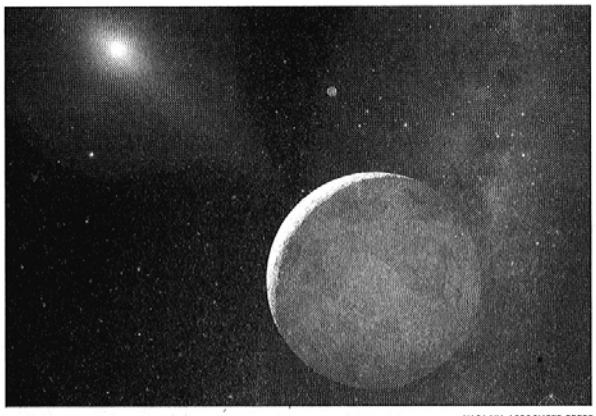
Dava Sobel

Pluto's Brave New Worlds

Discoveries in Our Solar System Force Astronomers to Ask: What's a Planet?

Pluto has become the butt of jokes lately, replacing Uranus as the solar system's laughingstock — and all because scientists find themselves forced, at last, to come to terms with the meaning of the word "planet."

Tacit definitions have existed since ancient times, when planetai, meaning wanderers, applied to seven moving lights in the sky: the sun, the moon, Mercury, Venus, Mars, Jupiter and Saturn. But telescopes have revealed more objects in the solar system than were dreamt of in ancient philosophy, and new discoveries demand strict, useful terminology that will help astronomers categorize a host of newfound worlds.



NASA VIA ASSOCIATED PRESS

An artist's rendering from NASA's Hubble Space Telescope team shows a distant sun shining on the Kuiper Belt object known as "Xena."

Pluto, discovered in 1930, was hailed as a planet before its true nature came to light. In time, Pluto proved to be far smaller than any of the other planets, and very unlike them in the way it orbits the Sun at an exaggerated tilt. Even so, there seemed no need to coin a new designation for Pluto, and it held on to its planet classification. But in 1992 astronomers made the first of what now amount to several hundred sightings of other solar system bodies at the distance of Pluto and beyond. Suddenly there was reason to reclassify Pluto as a member of this new society, which quickly became known as "trans-Neptunian objects" or "Kuiper Belt objects," in honor of Gerard Kuiper (1905-1973), who had predicted a vast zone of small bodies in the environs of Pluto.

As astronomers began to debate the issue, it spilled over into popular awareness and ignited considerable heat, for the planets are held in common, in awe, by all humankind. What might have constituted a purely scientific discussion, akin to deciding whether a particular tree was coniferous or deciduous, instead became public discourse.

On one side were major-planet purists who felt that bodies smaller than 1,500 miles in diameter (a size calculated to eliminate Pluto) should be dropped from the planet list. On the other side were Plutophiles who objected to arbitrary size discrimination. One Pluto specialist asked pointedly, "Is a dachshund not a dog?"

The lack of consensus on the "planet" definition struck people both within and outside the planetary science community as ludicrous, though several everyday terms we all think we understand are similarly vague. "Life," for example, poses semantic problems for biologists — as well as for exobiologists, who hope to identify it if and when they find it on Mars or Europa.

In 2005, after a Kuiper Belt object tentatively named "Xena" turned out to be larger than Pluto, the question changed from "Should Pluto continue to be called the ninth planet?" to "Are there 10 planets in all?" Also in 2005, Ceres, a small body discovered more than 200 years ago between Mars and Jupiter and long dismissed as a "minor planet" or "asteroid," was observed by the Hubble telescope to be more or less round. Scientifically, a roundish object carries more weight than a potato-shaped one, because roundness signifies the greater mass required to pull itself into a ball, or "hydrostatic equilibrium." Round Ceres raised the question, "Are there perhaps 11 planets?"

Not for the first time, but with new urgency in 2006, the International Astronomical Union (IAU) impaneled a committee to define both the word "planet" and the status of Pluto.

Our committee — seven in number, like the planets of old — met at the Paris Observatory in late June and reached a unanimous agreement. In short: A planet is a body in orbit around a star (as opposed to orbiting another planet) and big enough for gravity to make it round. The full text of our proposed definition is being released today, to be discussed by astronomers from around the world, now in Prague at the IAU General Assembly, and voted upon next week. If approved, our resolution will not only leave Pluto in place but will also add "Xena" (2003 UB313) and Ceres to the current census of planets — with room for additions as future discoveries warrant.

What's more, Pluto will lend its name to a newly defined category of planets — the "plutons" — which differ from the other planets by virtue of their highly inclined, elongated orbits, which take more than two centuries to complete and which suggest a different origin. As the prototype of this class, Pluto may still attract funny remarks, but it will have gained new significance.

Dava Sobel, author of "Longitude," "Galileo's Daughter," and "The Planets," served as the sole non-scientist on the Planet Definition Committee.

Dava Sobel's Op-Ed piece in the Washington Post, 16.08.06

Mass cut-off between stars and brown dwarfs revealed

19:00 17 August 2006
NewScientist.com news service
David Shiga

The faintest stars ever seen in an ancient star cluster have been imaged by the Hubble Space Telescope.

The observations provide the most accurate measurement ever made of the mass boundary between lightweight stars and "failed" stars called brown dwarfs – the dividing line is at about 80 times the mass of Jupiter, in line with theoretical predictions.

Stars and brown dwarfs are both made of the same materials – mostly hydrogen and helium – but their long-term behaviour is different. Stars – even those with very low mass, called red dwarfs – can burn hydrogen for many billions of years. Brown dwarfs, on the other hand, are not massive enough to sustain hydrogen fusion for long, fizzling out after just 1 billion years or so.

Previously, scientists calculated that the minimum mass needed to sustain long-term hydrogen burning is about 75 Jupiters. But observational confirmation has been hard to come by because young brown dwarfs and young low mass stars look very similar.

The core of the ancient star cluster NGC 6397, seen in this Hubble image, is an ideal hunting ground for stars only slightly more massive than brown dwarfs (Image: NASA/ESA/H Richer/UBC)

Ancient clusters

One way to distinguish the two is to look for the faintest stars in very old star clusters. Stars in clusters are thought to share approximately the same age, so old clusters should contain no observable brown dwarfs – the failed stars would have already cooled and faded from view.

Any faint objects seen in such clusters would be red dwarfs or white dwarfs, dense cores of mostly carbon and oxygen that are the cooling embers of stars like the Sun.

"Globular" star clusters – so named because of their round shape – are ideal for studying these faint stars because they are more than 10 billion years old, and contain hundreds of thousands or millions of stars.

Now, astronomers led by Harvey Richer of the University of British Columbia in Vancouver, Canada, have used Hubble to find the faintest red dwarfs ever seen in a globular cluster. They looked at a relatively nearby cluster called NGC 6397, which is 8500 light years from Earth.

Stark contrast

The cluster is 13.5 billion years old, nearly as old as the universe. "The brown dwarfs have by now faded off into obscurity so there is a very stark contrast between the stars that could burn hydrogen and the ones that couldn't," says team member Jay Anderson of Rice University in Houston, Texas, US.

Theory predicts that the mass cut-off for what constitutes a star is different for objects of different metallicity, which refers to the proportion of elements heavier than hydrogen the object contains.

For objects with a metallicity similar to that of the Sun, theory suggests that anything with less than 7.5% the mass of the Sun – or about 75 Jupiters – will be a brown dwarf.

New Scientist, 17.08.06

In the case of NGC 6397, which has a metallicity 100 times lower than that of the Sun, the dividing line is expected to be at 8.3% the mass of the Sun, or about 83 Jupiters.

The members of the dim red dwarf population seen in the Hubble images appear to be heavier than this limit, in agreement with theoretical calculations.

Tightest constraint

The new observations are sensitive to stars 10 to 20 times fainter than in previous work on the same cluster, Anderson told **New Scientist**.

"This kind of observation is probably the best kind of constraint one can get," says Gibor Basri of the University of California, Berkeley, US. The theoretically predicted hydrogen burning limits "have stood up to what observational tests we have," he told **New Scientist**. "I don't think anyone thinks they're off by a lot."

The observations also revealed the telltale signs of very old white dwarfs. Although white dwarfs start out with temperatures of about 100,000° Kelvin, some of those seen in the Hubble images are old enough to have cooled below 4000° K.

That is low enough for hydrogen atoms in their atmospheres to join together to form molecules. This makes the white dwarfs bluer than they would otherwise appear, an effect rarely observed before.

Journal reference: *Science* (vol 313, p 936)

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Round objects

Planets are spherical, and the International Astronomical Union's attempt to make this part of their definition has merit.

There was once a prissy British civil servant who, when he came across a passage in a memo that displeased him, wrote "round objects" in the margin as a synonym for something ruder. This arch circumlocution was lost on the bluff minister he served, who fired back a query as to who this Round fellow was, and why he objected so much.

We can expect there to be plenty of members of the International Astronomical Union (IAU) who, reading the proposed new definition of a planet offered to them by their executive committee, will want to scrawl something equally rude and rather blunter in the margin — and will want to make their objections heard, possibly quite vociferously, at their general assembly in Prague this week (see page 724).

We understand and, to some extent, sympathize. But we would suggest that, instead, they acquiesce in the new definition, which will have the effect of increasing the number of planets in the Solar System to 12, and open the doors to more. They should do this for two reasons: it is not a bad definition; and it will at least stop the rumbling debate over the status of Pluto.

In the 1990s, it became clear that Pluto, the most newly discovered planet, was the most conspicuous of a crowd of icy 'trans-neptunian objects' (TNOs), some of which might well be larger. There was an obvious historical parallel to this situation with asteroids in the nineteenth century. When it was found that there were dozens of asteroids, Ceres, the largest and first discovered, was demoted from its position as a proper planet; it is now a 'minor planet' along with all the other asteroids. Pluto, it was argued by analogy, should be a minor planet with the rest of the TNOs on similar grounds.

This proposal sparked a degree of public debate that irritated many astronomers, who felt that the question of whether a particular body gets called a planet or not is of no scientific interest whatsoever. Still, the IAU decided that it should try and resolve the matter: planets loom large in the public imagination, and it seemed only reasonable for astronomers to be able to say whether a new discovery (or for that matter an old friend) was a planet or not.

The IAU's proposal is that the term 'planet' should apply to an object that has a sufficiently strong gravitational field to have pulled itself into a spherical shape, that is in orbit around a star, but that is not a star itself. This lets in Pluto and 2003 UB_{313}, a TNO that is a touch bigger and not yet equipped with an IAU-approved name. It also readmits Ceres. And in the most peculiar aspect of the whole business, Charon, previously considered to be a moon of Pluto, will become a planet in its own right. Moons, however spherical, will remain satellites, not planets, in the IAU's eyes. But because the centre of mass of the Pluto–Charon system lies outside the body of Pluto, Charon, although tiny compared with, say, Neptune's moon Triton, qualifies as a planet.

Nine more TNOs, and three more asteroids, will become candidate planets, pending further investigation of how spherical they are. More planetary TNOs may follow, when discovered. To tidy things up, the minor planets will get renamed: those that don't have enough of a gravitational grip on themselves to be proper planets will now be 'small Solar System bodies'.

"All this will doubtless lead to ructions, but it is at least a coherent approach, and it has a fairly clear basis in physical properties."

All this will doubtless lead to ructions. But it is at least a coherent approach, and it has a fairly clear basis in physical properties. It has been convenient to have a small and easily memorized number of planets in the Solar System, but convenience is not the only thing that counts. The effects of mass define (unofficially) the upper limits of the planetary realm; anything big enough for fusion is a star. It is fitting, then, that mass should define the lower limit too. This, we think, adds up to a case for IAU members to accept the proposal. ■

Revival in Iran

Whatever its motivation, Iran's support for education and science is to be welcomed.

In eleventh-century Persia, it is said that three school friends pledged to serve their country and share their fortunes. Very different fortunes, it turned out.

Nizam al-Mulk became prime minister to two consecutive Persian kings. He built a network of roads across the country, and established the chain of 'Nizamiyya' schools, which taught theology, science and mathematics, adhering to a national curriculum.

Hassan-i Sabbah became the head of a fanatical religious group, the Hashshashin, which operated an almost independent government, protected by a string of castles. The many attempts by Persian kings to overthrow the Hashshashin failed, and Nizam al-Mulk was eventually assassinated by Sabbah's followers.

Omar Khayyam became the greatest astronomer and mathematician of his age. He invented, for example, the Khayyam triangle — better known as the Pascal triangle, after Blaise Pascal who described it hundreds of years later. Khayyam also provided his country with a solar calendar, more accurate than the gregorian calendar we use today. And he became one of Persia's most popular poets.

In the millennium since the three school friends parted company, the country we now know as Iran has witnessed a sometimes glorious, often sad, political history. Along with the rest of the Middle East, Iran's scientific power declined as Europe's ascended with the

Nature, 17.08.06

Planets are round. Will that do?

Next week, by a simple show of hands at an astronomy meeting, Earth could go from being one of nine planets to one of twelve — with unknown numbers yet to be discovered.

A seven-member panel appointed by the International Astronomical Union (IAU) has recommended a new definition of a planet: any body in orbit around a star that is not a star itself nor in orbit around a much larger planet, and that is massive enough for gravity to have squished it into an approximately spherical shape.

The IAU planned to introduce the notion in a draft resolution on 16 August, after *Nature* went to press, and will discuss it on 22 August during an open session at its general assembly in Prague, Czech Republic. Two days later, if a simple majority of IAU members vote for it or a slightly revised version, that will become the official scientific word on the topic.

"If there is nothing accepted, we have to sit in the silly place where we are now."

Under the definition, most objects with a mass greater than 5×10^{20} kilograms, and typically with a diameter greater than 800 kilometres, would qualify as planets. That would instantly elevate the asteroid Ceres and Pluto's moon Charon to planet status, as Ceres is roughly spherical and Pluto and Charon can be described as a binary planet system. The Solar System's twelfth planet would be object 2003 UB_{313}, nicknamed Xena, one of many 'trans-neptunian objects' lurking on the Solar System's fringes.

Not all are happy with the 'roundness' criterion, however. "It's not what I think of when I think of a planet," says Michael Brown, an astronomer at the California Institute of Technology in Pasadena and co-discoverer of UB_{313}. "I don't think of things that are a thousand times smaller than Earth."

The discovery of UB_{313} beyond Pluto's orbit last year brought matters to a head. Astronomers have estimated that it is at least 2,400 kilometres in diameter — larger than Pluto, but smaller than any of the other eight planets.

All this demands a new definition of 'planet', some say. "If there is nothing accepted, we have to sit in the silly place where we are now: Pluto is a planet and UB_{313} is not," says Iwan Williams, an astronomer at Queen Mary, University of London.

Williams chaired an earlier IAU committee that was meant to define a planet, but it deadlocked last November. "People came in with well-defined ideas of what a planet should be, expressed them strongly, and hardly anybody changed their mind," says committee member Alan Boss, an astronomer at the Carnegie Institute of Washington. Opinions were divided between three options to define a planet orbiting a star: any object with a diameter greater than 2,000 kilometres; any object massive enough for gravity to make it round; or any object that dominates its region of space.

Faced with that stalemate, the IAU appointed another planet definition committee, chaired by astronomer and historian Owen Gingerich of Harvard University. The group met on 30 June for two days at the Paris Observatory. "We converged relatively quickly after the first day," says panel member Richard Binzel of the Massachusetts Institute of Technology.

A definition based on gravity, the group concluded, made the most scientific sense. "It involves the most physics," Binzel says.

To acknowledge that trans-neptunian objects are different to the other planets, the committee proposed a subcategory of planets known as 'plutons'. These are planets that take more than 200 years to orbit the Sun and would include Pluto, Charon and UB_{313}.

The number of planets is likely to rise as more large trans-neptunian objects are found. After Ceres, other asteroids may also be eligible. Such changes may upset generations who grew up with nine planets. "If I have any concern, it's that the public will accept this," says astronomer Ron Ekers, president of the IAU.

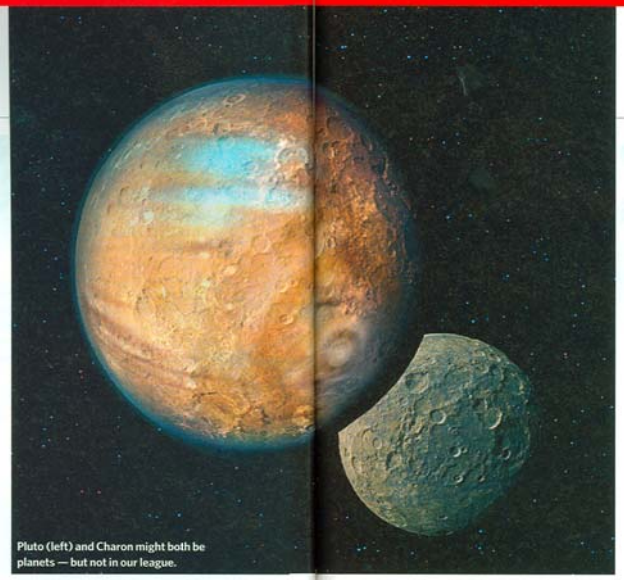
Binzel thinks there are ways around that. "My expectation is that children will memorize the eight classical planets, they will know that Ceres is a planet in the asteroid belt, and that there's a whole collection of planets out beyond Neptune, of which Pluto is the first."

Convincing fellow astronomers may not be easy either. "There will be a long line of people waiting for the microphone to denounce it," Boss predicted before he had heard details of the proposal. "I think there's a good chance nothing will be decided formally."

That prospect dismays those who have been working on the new definition. "This is a very good compromise," says Binzel, "and it's time to move forward." ■

Jenny Hogan
With additional reporting by Geoff Brumfiel

Discuss the IAU proposal on what makes a planet — and propose your own mnemonic for what could be the new 12 planets — on *Nature*'s newsblog, blogs.nature.com/news/blog.
See also the Editorial on page 719.



Pluto (left) and Charon might both be planets — but not in our league.

D. VAN RAVENSWAAY/SPL

AIDS meeting urged to rethink prevention strategy

TORONTO

Scientists, governments and funding agencies need to revise their strategy for deploying and testing HIV-prevention methods, delegates to the XVI International AIDS Conference in Toronto, Canada, heard this week.

Although conventional prevention methods, such as the use of condoms, have had some success, advocates say that women need to have more control over prevention. Various new approaches, including the externally applied gels known as microbicides or drugs taken orally, show promise, said leaders in the fight.

Challenges remain, however, in bringing such methods to the clinic. "There are serious obstacles that could significantly delay, or even derail, critical prevention trials — including inadequate resources and capacity to launch and complete trials, and emerging ethical concerns," warned a group of scientists, doctors and activists called the Global HIV Prevention Working Group.

A 15 August report from the coalition called on governments and scientists to focus on the most promising interventions, set up trial sites, and coordinate their plans to avoid wasting time and money duplicating efforts. It also advised the creation of a panel of experts that could provide ethical guidance for the trials. And it urged societies to prepare for the roll-out of new prevention methods if they prove successful.

The warnings aim to reduce the problems already hampering efforts to find alternative prevention methods. For example, activists' concerns, such as over whether people who contracted HIV during the trial would receive treatment afterwards, shut down two trials on preventive drugs in Cambodia and Cameroon in 2004 and 2005.

Scientists hope that interest from big funding groups, such as the Bill and Melinda Gates Foundation, based in Seattle, Washington, could focus attention on these preventive efforts.

Trials are currently testing the effects on HIV infection of microbicides, orally-ingested drugs, male circumcision, barriers such as diaphragms and the treatment of herpes infections. But the studies are costly and difficult to run.

"We need to make strategic choices, and I hope Gates is going to give leadership in the way that is finally happening in the vaccine field," says Joep Lange, chairman of the International AIDS Society's Industry Liaison Forum.

Trial results can also be complicated when counselling, provided with the trial, cuts the rate of new infections. For instance, the first completed trial of oral prevention drugs, reported at the meeting, tested whether the oral drug tenofovir prevented new infections in 936 women mainly in Ghana. But too few people became infected, so it was difficult to tell whether the drug actually worked, said Leigh Peterson of Family Health International, which conducted the trial with money from the Gates Foundation.

The foundation has already led efforts to coordinate research on a microbicide, and helped write a strategy for microbicide development, due to be released on 17 August. Renee Ridzon, a senior programme officer at the foundation, said it is keenly aware of the need to coordinate prevention trials.

"The field needs to think hard about this," she said. "It's definitely on our radar screen." ■

Erika Check

This year's AIDS conference focused on new preventive methods.

J. LUTON/AFP/GETTY

G. ROBINS/AFP/GETTY

INTERNATIONAL AIDS MEETING
Read our conference report on the newsblog.
http://blogs.nature.com/news

Homing in on the genes for humanity

Researchers have identified a gene that has changed rapidly during human evolution — a discovery that could be a step towards understanding what sets us apart from other animals.

The work, reported online this week in *Nature*, is some of the first to come from comparing the human genome with that of the chimpanzee, which was published last September. The gene, called *HAR1F*, does not directly code for a protein. Instead, it lies in a non-coding segment of the genome and produces RNA. Many geneticists believe that rapidly evolving non-coding regions harbour the secret of what makes humans different from our nearest primate relatives.

HAR1F is produced by cells in the brain called Cajal–Retzius cells, which regulate how the six layers of the cortex are laid down during development. The gene may interact with a protein called reelin, which plays a vital role in this layering. "But it's wild speculation," says geneticist David Haussler of the University of California, Santa Cruz, who led the study.

The group identified the gene by comparing the human genome with those of the chimpanzee, mouse and rat. Forty-nine segments, dubbed 'human accelerated regions' or HARs, showed sequence changes in the human version but not in the other animals. The greatest change was found in HAR1, which in humans had undergone 18 substitutions in comparison with the other animals when one or none was expected (D. Haussler *et al. Nature* doi:10.1038/nature05113; 2006).

What the gene does is a mystery, but there are some guesses. "Given that it's changed so dramatically only for humans, it might be involved in human-specific brain wiring," says Gerton Lunter at the University of Oxford, UK.

One thing is becoming clear: protein-coding genes may not be the movers and shakers of human evolution scientists once thought. "We should stop looking at proteins and start looking at non-coding DNA," says Lunter. "Everything points in that direction." ■

Kerri Smith

Les plus pâles étoiles du ciel

NGC 6397 est situé à 8.500 années lumière, il s'agit d'un des amas globulaires les plus proches de la Terre.

(NASA/ ESA/ H. Richer, University of British Columbia)

Des astrophysiciens affirment avoir observé les étoiles les plus pâles qui puissent exister, dans l'amas NGC 6397, grâce au télescope spatial Hubble. Deux catégories extrêmes d'étoiles ont ainsi pu être ''calibrées'', expliquent Harvey Richer et ses collègues aujourd'hui dans la revue *Science* : d'un côté les étoiles dont la masse est trop faible pour qu'elles puissent s'allumer, de l'autre les vestiges des étoiles géantes qui dont les cendres sont presque froides.

Les naines brunes sont des étoiles ''ratées'' dont la masse est insuffisante pour que la réaction de fusion s'enclenche en leur cœur. Elles restent donc de faibles astres toute leur vie. Grâce à une observation en continu de plusieurs jours d'une région de l'amas globulaire NGC 6397, les chercheurs ont obtenu une image révélant les étoiles les plus faibles, autrement dit les plus petites étoiles capables de consommer de l'hydrogène. Ils en déduisent la masse critique à partir de laquelle la fusion de l'hydrogène peut se déclencher. Les calculs de l'équipe de Richer rejoignent la théorie : la limite est de 0,083 fois la masse du Soleil.

Une autre théorie a été vérifiée par l'observation au cour de cette étude : l'évolution des naines blanches, les vestiges des étoiles supermassives qui meurent en explosant. Les naines blanches sont des objets très denses dont la température diminue progressivement, pendant des millions d'années, jusqu'à ce qu'elles deviennent totalement obscures. L'équipe de Richer affirme avoir identifié les plus pâles naines blanches, qui émettent une lumière bleue, comme l'avait prédit Hansen à la fin des années 90. En effet, lorsque l'étoile refroidit, son atmosphère s'enrichit en hydrogène qui absorbe la lumière rouge.

Ces travaux permettront de mieux calculer l'âge de l'amas sphérique, qui s'est formé dans notre galaxie il y a plus de 13 milliards d'années.

Cécile Dumas
(18/08/06)

Le Nouvel Observateur, 18.08.06

TIME

FROM THE MAGAZINE

Sunday, Aug. 20, 2006

Get Pluto out of Here!

Why it's not a planet, Europe is no continent and W. isn't "43"

By JEFFREY KLUGER

History has no record of Grover Cleveland and Grover Cleveland ever sitting down together. That's odd, since the two Presidents occupied the Oval Office just four years apart--Cleveland from 1885 to 1889, and Cleveland following him there in 1893. Had it not been for the four years Benjamin Harrison served as President between them, the country could have transitioned from one Cleveland to the other without even changing the monogrammed bathrobe in the White House residence.

Had Cleveland and Cleveland ever spoken, it would have been a decidedly one-way conversation, since they were the same man. But you wouldn't know it from American history books. Right there in the great march of Presidents, from Washington at No. 1 to Bush at 43, is Cleveland clocking in at 22 and then again--like a presidential whack-a-mole--at 24. We're a country with 43 Presidents, but only 42 men have held the job. The two President Bushes affectionately refer to each other by the nicknames 41 and 43, but the fact is, they're really 40 and 42.

It was last week's coverage of the controversy concerning the planet Pluto that brought Cleveland to mind (and, no, not because of his physique; that was Taft). Much the way 19th century pundits no doubt fought over which numeral to assign the inconveniently nonconsecutive Cleveland, astronomers have spent the past few years debating whether or not Pluto is in fact a planet or whether new findings place it in a family of smaller, humbler objects. The problem is more complex than just firing a planet and downsizing the solar system from nine to eight. If you keep your definitions loose enough to retain Pluto, then you have to award the planet label to at least three similar objects in our solar system. Think Congress gets into a slapfest over the problem of immigrant workers? That's civil compared with astronomers' catfights over immigrant worlds.

So let's be clear: Pluto has to go. Clean out your locker, turn in your playbook and go see the coach. Oh, and on your way out, tell the other walk-ons and wannabes that the roster is frozen. We're sticking with the original eight.

Time, 20.08.06

There's sound scientific reason to return the solar system to what it was before Pluto the poseur was discovered in 1930. True planets form in roughly the equatorial plane of the sun, occupying specific, permanent orbits. That's not Pluto. It is a tiny joyrider from the rubble stream surrounding the solar system that broke free and orbits the sun in a tilted, elongated orbit.

But astronomers don't see things so simply. Instead, they've appointed a committee that met in Paris in June and July and drafted a proposed solution that defines a planet by shape, center of orbital gravity and more. Committees and clarity don't go together, and the proposal is just what critics feared: science as tax code, with the cosmos codified in such elaborate ways that, never mind nine planets, we could end up with dozens.

It's this kind of overthinking that leads not just to the cosmic sloppiness of a crowded solar system but also to the existential absurdity of counting Cleveland twice. You don't have to be a stickler to want to heed the dictum of William of Ockham, the 14th century monk who famously declared, "Things should not be multiplied unnecessarily," which is how they said "Less is more" back then. So in honor of Ockham, let's dispense with a few other stubborn, definitional problems once and for all.

Europe: you're not a continent; you've never been a continent. I know, it would be galling if a raw cowboy island like Australia retained its glittery Continent label while you were downgraded to Midsize Peninsula of Western Asia. But hello? Look at a map. Besides, these days you've got the euro, which is currently trading at about a buck thirty against the dollar. Don't be greedy.

Y: a vowel? Please. Y gets plenty of work as a consonant without having to moonlight in a job it wasn't designed for. Someone needs to show some guts and either change the spelling of problem words (what's wrong with fli, cri, cript?) or relax the rule about every word having to have at least one vowel in it. Either way is fine, but the whole "sometimes y" thing has always smelled like a dodge.

Panda: raccoon or bear? Seems the lesser known red panda has a scrap of raccoon in him, which has thrown the whole panda clan into question. I say split the difference: go with bears for the white ones, raccoons for the red ones, and do it quick. (These are biologists we're dealing with, not astronomers. Give them too much time, and they'll start dissecting things.) And if we ever find yet another type of panda out there, just call it Grover Cleveland. There are plenty of those to go around.

Time, 20.08.06

latimes.com Los Angeles Times

http://www.latimes.com/news/nationworld/world/la-082406pluto,0,2964274.story?track=mostviewed-homepage

Pluto Demoted, Loses Planetary Status

From Associated Press

9:06 AM PDT, August 24, 2006

PRAGUE, Czech Republic — For decades, it's been confused with a cartoon dog and ridiculed as a puny poser. Now Pluto, the solar system's consummate cling-on, has suffered its worst humiliation: It's not even a planet anymore.

After a tumultuous week of clashing over the essence of the cosmos, leading astronomers today stripped Pluto of the planetary status it has held since its discovery in 1930. The new definition of what is -- and isn't -- a planet fills a centuries-old black hole for scientists who have labored since Copernicus without one.

The historic vote by the International Astronomical Union officially shrinks Earth's neighborhood from the traditional nine planets to eight.

But the scientists made clear they're as sentimental as anyone else about the ninth rock from the sun.

Jocelyn Bell Burnell -- a specialist in neutron stars from Northern Ireland who oversaw the proceedings in Prague -- urged those who might be "quite disappointed" to look on the bright side.

"It could be argued that we are creating an umbrella called 'planet' under which the dwarf planets exist," she said, drawing laughter by waving a stuffed Pluto of Walt Disney fame beneath a real umbrella. Later, she hugged the doll as she stood at the dais.

"Many more Plutos wait to be discovered," added Richard Binzel, a professor of planetary science at the Massachusetts Institute of Technology.

The decision by the prestigious international group spells out the basic tests that celestial objects will have to meet before they can be considered for admission to the elite cosmic club.

For now, membership will be restricted to the eight "classical" planets in the solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

Much-maligned Pluto -- named for the God of the underworld -- doesn't make the grade under the new rules for a planet: "a celestial body that is in orbit around the sun, has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a ... nearly round shape, and has cleared the neighborhood around its orbit."

LA Times, 24.08.06

Pluto is automatically disqualified because its oblong orbit overlaps with Neptune's.

Instead, it will be reclassified in a new category of "dwarf planets," similar to what long have been termed "minor planets." The definition also lays out a third class of lesser objects that orbit the sun -- "small solar system bodies," a term that will apply to numerous asteroids, comets and other natural satellites.

Experts said there could be dozens of dwarf planets catalogued across the solar system in the next few years -- handing the world's school teachers a challenge.

Neil Crumpton, a science teacher at Mountfitchet High School in Stansted Mountfitchet, north of London, called the announcement "very exciting."

"To be honest, this has been brewing for a while. Pluto has always been a bone of contention among astronomers because of the odd way it orbits the sun," Crumpton said. "For a start, we'll have to change all the mnemonics we use to teach children the lineup of the planets. But Pluto has not disappeared and it doesn't hurt children to know about it."

NASA said today that Pluto's demotion would not affect its $700 million New Horizons spacecraft mission, which earlier this year began a 91/2-year journey to the oddball object to unearth more of its secrets.

"We will continue pursuing exploration of the most scientifically interesting objects in the solar system, regardless of how they are categorized," Paul Hertz, chief scientist for the science mission directorate, said in a statement.

The decision at a conference of 2,500 astronomers from 75 countries was a dramatic shift from just a week ago, when the group's leaders floated a proposal that would have reaffirmed Pluto's planetary status and made planets of its largest moon and two other objects.

That plan proved highly unpopular, splitting astronomers into factions and triggering days of sometimes combative debate that led to Pluto's undoing. In the end, only about 300 astronomers cast ballots.

Now, two of the objects that at one point were cruising toward possible full-fledged planethood will join Pluto as dwarfs: the asteroid Ceres, which was a planet in the 1800s before it got demoted, and 2003 UB313, an icy object slightly larger than Pluto whose discoverer, Michael Brown of the California Institute of Technology, has nicknamed "Xena."

Charon, the largest of Pluto's three moons, is no longer under consideration for any special designation.

Brown was pleased by the decision. He had argued that Pluto and similar bodies didn't deserve planet status, saying that would "take the magic out of the solar system."

"UB313 is the largest dwarf planet. That's kind of cool," he said.

But as it all sank in, he added: "Deep down inside, I know this is the right thing to do. It's sad. As of today, I have no longer discovered a planet."

LA Times, 24.08.06

Comment and analysis

Down but not out

The decision to relegate Pluto from planet to "dwarf planet" was a wrench for astronomers, but there's no need for a tearful farewell, says **Stephen Battersby**

LAST week's relegation of the planet formerly known as Pluto – now classed merely as a dwarf planet – has upset some people. They had become rather attached to it. For 76 years, Pluto was one of only eight other worlds deemed worthy of being grouped in the same category as our own home. It was also the smallest planet by far – always an endearing characteristic, but also its problem, of course.

In recent years many other icy objects have been discovered out there beyond the orbit of Neptune, some of comparable size to Pluto, one of them bigger. If the word "planet" was going to have a scientifically sensible definition, then either they all had to join the club, or Pluto had to leave.

The decision was in the hands of the International Astronomical Union, which names everything in the heavens. At last week's general assembly in Prague, Czech Republic, its planetary definition committee suggested ranking as a planet anything with sufficient gravity to squeeze it into a sphere. It was a daringly simple definition that would include a hundred or more objects in the solar system, Pluto among them.

Inevitably, it got a hostile reaction from many astronomers. One reason is scientific. The study of solar-system dynamics suggests that the planets (except for Pluto) formed around the young sun by sweeping up or flinging away the material around their orbit, clearing out their own space in the protoplanetary disc. In that context, Pluto is more like the asteroids that orbit between Mars and Jupiter, a leftover planetary building-block rather than a planet.

There's also an emotional reason for the astronomers' antipathy: a sentimental attachment to the special status of planet. The word would be debased by letting in the riff-raff. A hundred planets? Two hundred? It's an uncomfortable prospect.

You may baulk at the idea that sentimentality plays a role in a decision like this, but scientific considerations could only take the argument so far. Scientists identified three distinct categories of object orbiting the sun: eight big planets, lots of small irregular junk, and quite a few round planetoids in between. The only remaining issue was whether to class all those round things as planets.

"Talk of Pluto being airbrushed out of textbooks is nonsense. It's just as intriguing as it was before"

The IAU members decided not to, so we are left with eight, though there is no compelling scientific argument for or against; the choices differed only in emotional appeal, and among the astronomers present in Prague the definition excluding Pluto turned out to be more appealing. Fearing that this would anger the public, the committee tabled a resolution that all the new dwarf planets beyond Neptune should be put in a new class named "Plutons".

But should the IAU even have tried to give the word "planet" a scientific definition? Why not just let it remain in general use and define more precise scientific terms for themselves? In part it is because of an attachment to the word itself; it crops up a lot in scientific papers, and would be hard to abandon. It would also be unfair. The public deserve a scientific definition, one that reflects the world as accurately as possible. Not perfectly, of course – there are a lot of diverse objects in the solar system, and putting them into strict categories is artificial. Yet it's also necessary, if we want to use words to describe the world.

In the classroom, the original definition suggested by the IAU would probably have worked just as well as the final one. If the original draft had passed, with nine planets becoming hundreds, then teaching their names and order to every schoolchild would rapidly have become absurd, so the focus would have shifted to what kinds of planet there are, which is far more interesting than simply learning a list.

How will the ruling affect science beyond the classroom? One area where we could see a concrete difference is in space exploration. It will probably be easier to sell a mission to a fully fledged planet, so Ceres – which was briefly considered the fifth planet from the sun when it was discovered in 1801 – might now miss out. Luckily, the New Horizons mission to Pluto, Charon and the Kuiper belt has already been launched.

There's no need to lament little Pluto. Talk of it being airbrushed out of textbooks is nonsense. Pluto is just as intriguing a place now as it was before. Indeed, it will gain much more positive publicity when NASA's New Horizons mission visits in 2015. "The first mission to the last planet" now has to become the first mission to the late planet, but that hardly matters; it will turn Pluto from a vaguely mottled blob into a well-mapped world.

After all, plenty of other heavenly bodies have not suffered too much in public estimation despite relatively lowly status. Being called a moon has not affected the way people look at Jupiter's icy Europa, with its interior ocean thought to be a possible home for life. People are as fascinated with Saturn's methane-clouded moon Titan as they are with the planet itself, and there are plenty of other satellites out there more interesting than certain planets one could mention. Planets are interesting because of their kinship to Earth, but for Pluto there is life beyond. ●

New Scientist, 2 September 2006

Asteroid fly-by eludes study

On 3 July, an asteroid zipped past Earth at a distance of some 400,000 kilometres — slightly farther away than the Moon. In theory, something that close ought to be easy to study. But astronomers have struggled to map the size and shape of the space rock — and now say they know why they found it so difficult.

The rock, dubbed 2004 XP14, is one of more than 800 'near-Earth asteroids' that have been identified in orbits that come perilously close to our planet. This particular rock is unlikely to hit us, but astronomers hoped their observations would help establish how diverse such asteroids are and so better quantify the threat they pose.

But the data obtained by the team proved surprisingly hard to analyse. "The asteroid rotates slowly, so its appearance in the images, due to rotation, hardly changed at all," says Lance Benner, an astronomer at NASA's Jet Propulsion Laboratory in Pasadena, California, who led the effort to image the asteroid.

That's unusual. "Most near-Earth asteroids are very fast rotators," says Vishnu Reddy, a graduate student at the University of North Dakota who also observed the object.

Benner and his colleagues imaged 2004 XP14 using a 70-metre radio antenna at the Goldstone Complex in California. At 260 metres across, the asteroid was a lot smaller than earlier predictions of up to 880 metres. This, together with its rotation rate of roughly one turn every 500 hours, meant that the images the team received barely changed during recording sessions of up to 2 hours. As a result, the researchers could not build the detailed picture of the rock that they wanted.

Earth may be safe from 2004 XP14, but there are plenty more asteroids out there that might collide with us. Having identified three-quarters of the candidates 1 kilometre or more in diameter, NASA plans to widen its search to include objects as small as 150 metres across. And in July, the International Astronomical Union formed a committee to keep it up to date about asteroids that may pose a serious threat to our planet.

Heidi Ledford

L. BENNER, JET PROPULSION LAB.

Blip on the horizon: radar imaging of the asteroid 2004 XP14 proved to be more difficult than expected.

Nature, 24.08.06 (IAU NEA WG mentioned)

The New York Times

Thursday, August 24, 2006 Last Update: 12:44 PM ET

'Morning After' Pill Is Cleared for Wider Sales

By GARDINER HARRIS 9:33 AM ET

The Food and Drug Administration today approved over-the-counter sales of the "morning-after" contraceptive pill to women 18 and older.

The Announcement (fda.gov)

Some in G.O.P. Say Iran Threat Is Played Down

By MARK MAZZETTI

Some Republicans are voicing anger that American spy agencies have not issued more ominous warnings about Iran.

U.S. Says Iranian Nuclear Proposal Is Inadequate

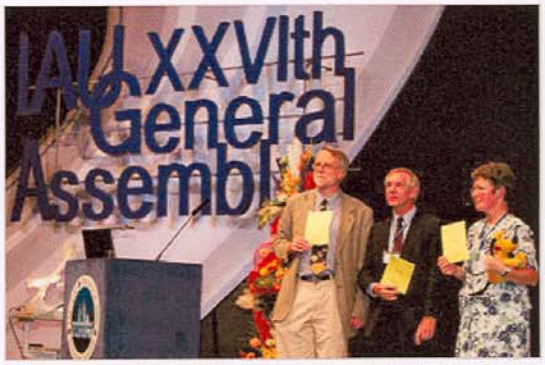
THE KATRINA YEAR

Storm's Escape Routes: One Forced, One Chosen

By SHAILA DEWAN

The experience for many New Orleanians who went west instead of east has been very different.

Audio Feature: Evacuees in Houston and Atlanta
Graphic: Katrina's Diaspora
Complete Coverage >>



David W Cerny/Reuters

Astronomers Decide Pluto Is Not a Planet

The International Astronomical Union set new guidelines that downsized the solar system from nine planets to eight.

Housing Reports Reveal a Slowing Market

By JEREMY W. PETERS 55 minutes ago

The Commerce Department reported today that 4.3 percent fewer new homes were sold in July than in June.

New Home Sales Report (pdf)

Africa Adds to Miserable Ranks of Child Workers

By MICHAEL WINES

In sub-Saharan Africa, more than one in four children below age 14 works, and some are not even paid.

Audio and Photos: Child Labor in Zambia

U.S. and New Zealand Reject Kidnappers' Demand

By GREG MYRE 9:35 AM ET

A militant group in Gaza demanded the release of Muslims in U.S. prisons for 2 two Fox News journalists.

Incident Aboard Plane Not Linked to Terrorism

By JEREMY W. PETERS 10:02 AM ET

Northwest Flight 42 turned back after several passengers were observed passing cell phones back and forth.

MORE NEWS

3 U.S. Soldiers Among Fatalities in Iraq 33 minutes ago

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NY Times, 24.08.06

The New York Times
nytimes.com

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August 24, 2006

Astronomers Decide Pluto Is Not a Planet

By THE ASSOCIATED PRESS

Filed at 12:20 p.m. ET

PRAGUE, Czech Republic (AP) -- Leading astronomers declared Thursday that Pluto is no longer a planet under historic new guidelines that downsize the solar system from nine planets to eight.

After a tumultuous week of clashing over the essence of the cosmos, the International Astronomical Union stripped Pluto of the planetary status it has held since its discovery in 1930. The new definition of what is -- and isn't -- a planet fills a centuries-old black hole for scientists who have labored since Copernicus without one.

Although astronomers applauded after the vote, Jocelyn Bell Burnell -- a specialist in neutron stars from Northern Ireland who oversaw the proceedings -- urged those who might be "quite disappointed" to look on the bright side.

"It could be argued that we are creating an umbrella called 'planet' under which the dwarf planets exist," she said, drawing laughter by waving a stuffed Pluto of Walt Disney fame beneath a real umbrella.

"Many more Plutos wait to be discovered," added Richard Binzel, a professor of planetary science at the Massachusetts Institute of Technology.

The decision by the prestigious international group spells out the basic tests that celestial objects will have to meet before they can be considered for admission to the elite cosmic club.

For now, membership will be restricted to the eight "classical" planets in the solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

Much-maligned Pluto doesn't make the grade under the new rules for a planet: "a celestial body that is in orbit around the sun, has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a ... nearly round shape, and has cleared the neighborhood around its orbit."

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NY Times, 24.08.06

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"We will continue pursuing exploration of the most scientifically interesting objects in the solar system, regardless of how they are categorized," Paul Hertz, chief scientist for the science mission directorate, said in a statement.

The decision on Pluto at a conference of 2,500 astronomers from 75 countries was a dramatic shift from just a week ago, when the group's leaders floated a proposal that would have reaffirmed Pluto's planetary status and made planets of its largest moon and two other objects.

That plan proved highly unpopular, splitting astronomers into factions and triggering days of sometimes combative debate that led to Pluto's undoing. In the end, only about 300 astronomers cast ballots.

Now, two of the objects that at one point were cruising toward possible full-fledged planethood will join Pluto as dwarfs: the asteroid Ceres, which was a planet in the 1800s before it got demoted, and 2003 UB313, an icy object slightly larger than Pluto whose discoverer, Michael Brown of the California Institute of Technology, has nicknamed Xena.

Charon, the largest of Pluto's three moons, is no longer under consideration for any special designation.

Brown, who watched the proceedings from Cal Tech, took Thursday's vote in stride -- even though his discovery won't be christened a planet.

"UB313 is the largest dwarf planet. That's kind of cool," he said.

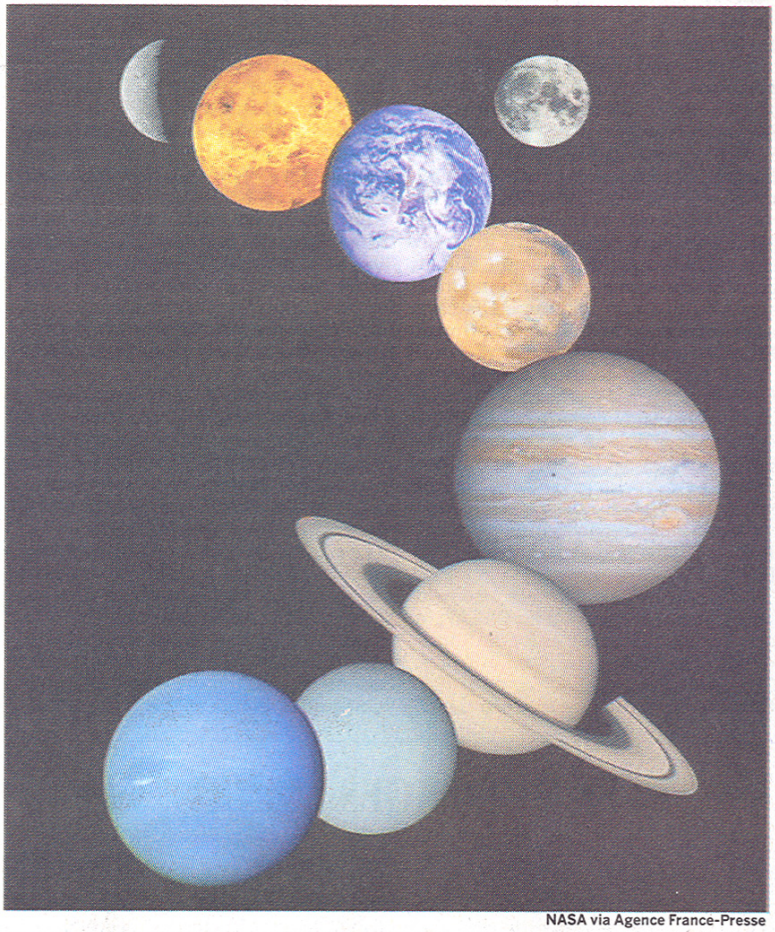
AP Science Writer Alicia Chang in Los Angeles contributed to this story.

On the Net:

International Astronomical Union, www.iau.org

NY Times, 24.08.06

And then there were 8 (goodbye, Pluto)



NASA via Agence France-Presse

A montage of images taken by NASA spacecraft. In the new solar system there are only eight planets. Scientists have demoted Pluto to the status of a "dwarf planet."

Astronomers vote to trim solar system

By Dennis Overbye

Pluto got its walking papers on Thursday. Throw away the place mats. Grab a magic marker for the classroom charts. Take a pair of scissors to the solar system mobile.

After years of wrangling and a week of bitter debate, astronomers meeting in Prague voted on a sweeping reclassification of the solar system. In what many of them described as a triumph of science over sentiment, Pluto was demoted to the status of a "dwarf planet."

In the new solar system there are 8 planets, at least 3 dwarf planets, and tens of thousands of so-called "smaller solar system bodies," like comets and asteroids.

For now, the dwarf planets include, besides Pluto, Ceres, the largest asteroid, and an object known as UB 313, nicknamed Xena, that is larger than Pluto and, like it, orbits out beyond Neptune in a zone of icy debris known as the Kuiper Belt. But there are dozens more potential dwarf-planets known in that zone, planetary scientists say, and the number in that category could quickly swell.

In a nod to Pluto's fans, the astronomers declared Pluto to be the prototype for a new category of such "trans-Neptunian" objects but failed in a close vote to approve the name Plutonians for them.

"The new definition makes perfect sense in terms of the science we know," said Alan Boss, a planetary theorist at the Carnegie Institution of Washington, adding that it does not go too far in cultural terms. "We have a duty to satisfy the whole world."

The vote completed a stunning turnaround from only a week ago, when the assembled astronomers had been presented with a proposal that would have included 12 planets, including Pluto, Ceres, Xena and even Pluto's moon Charon, a fact that Boss said spoke to the integrity of the planet-defining process. "The officers were willing to change their resolution and find

PLUTO, Continued on Page 4

Tom Cruise in middle of real-life drama

The war of words between the actor Tom Cruise and the Viacom chairman, Sumner Redstone, is escalating. In a rare attack against a powerful studio executive, Cruise's representatives at Creative Artists Agency, the leading talent shop in Hollywood, signaled that it would be loath to do more business with Paramount if Redstone continued to call the shots. That warning came after Redstone declared that his movie unit was severing ties with Cruise's production company after 14 years because of the actor's erratic behavior. *Page 12*

Meanwhile, losing likability is the cardinal sin for any movie star, and Cruise's began to plummet even before his couch-jumping days. *Page 8*

Herald Tribune International, 25.08.06

Pluto toch gedegradeerd tot dwerg

Door GEORGE BEEKMAN

ROTTERDAM, 25 AUG. Pluto heeft het niet gered. De kleinste en buitenste planeet van het zonnestelsel wordt voortaan een 'dwergplaneet' genoemd, waardoor er in het zonnestelsel nog maar acht 'echte' planeten overblijven.

Dat is de uitkomst van een stemming gistermiddag onder astronomen tijdens de algemene vergadering van de Internationale Astronomische Unie (IAU) in Praag. Het zonnestelsel verliest een planeet, maar krijgt er een serie dwergplaneten bij. De zogenaamde 'ijswerelden' van het formaat van Pluto die voorbij de baan van Neptunus voorkomen, mogen – wanneer ze aan de juiste criteria voldoen – voortaan ook dwergplaneten worden genoemd.

Het heelal is daarmee opnieuw geordend volgens een nieuwe definitie van planeet. De vergadering stemde in met een voorstel planeten voortaan te definiëren als hemellichamen die om de zon draaien, voldoende massa bezitten om onder invloed van hun eigen gewicht vrijwel bolvormig te zijn, en andere objecten in de buurt van hun omloopbaan hebben 'weggeveegd'. In die definitie passen Mercurius, Venus, de aarde, Mars, Jupiter, Saturnus, Uranus en Neptunus, niet Pluto.

Hemellichamen die aan het eerste en het tweede criterium voldoen maar niet aan het derde, worden 'dwergplaneten' genoemd. Dat geldt nu voor Ceres (de grootste planetoïde in de gordel tussen Mars en Jupiter), Pluto (een van de grootste ijswerelden buiten de baan van Neptunus) en Xena (een in 2003 ontdekte ijswereld die groter is dan Pluto).

Een alternatief voorstel stuitte op veel kritiek. Hierin zou Pluto wel een planeet blijven en zouden ook de planetoïde Ceres, Pluto's grote maan Charon en andere grote ijswerelden de status van planeet krijgen. Na hevige discussies werd uiteindelijk de aanvullende astronomische eis gesteld dat een hemellichaam alleen een planeet mag worden genoemd als het – via zijn zwaartekrachtsveld – andere objecten in de buurt van zijn baan om de zon heeft 'weggeveegd'. Het belang van de acht 'klassieke' planeten ging voor.

NRC Handelsblad, the Netherlands, 25.08.06

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Sobota–niedziela 26-27 sierpnia 2006 • Gazeta Wyborcza • www.gazeta.pl

Układ Słoneczny wściekle się broni

Awantura wśród astronomów po relegowaniu Plutona z Układu Słonecznego. Nic mu to jednak nie pomoże

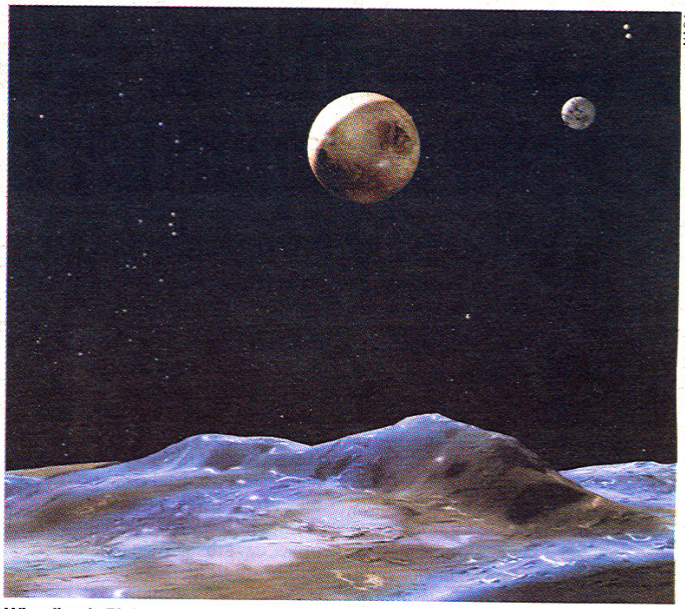
TOMASZ ROŻEK

To fatalna decyzja i przykład naukowego niechlujstwa - komentował wzburzony Alan Stern z instytutu w San Antonio.

O tym, że Pluton nie jest już planetą, zdecydowała w czwartek Międzynarodowa Unia Astronomiczna (IAU). Ma ona na całym świecie prawie 10 tysięcy członków, z których na zjeździe w Pradze pojawiło się niespełna 3 tysiące. Zainteresowanie definicją planety było znikome - do głosowania dotrwały tylko 424 osoby, 5 proc. uprawnionych!

Pierwsza definicja planety pojawiła się kilka dni przed głosowaniem. Wynikało z niej, że Układ Słoneczny powiększy się o planetoidę Ceres, największy plutonowy księżyc Charon i daleką planetoidę Xenę. Komisja opracowująca definicję planety nie spytała jednak o zdanie wszystkich specjalistów. - Z tej propozycji zadowoleni byli geolodzy planetarni, ale inni uczeni poczuli się pominięci i postanowili ją odrzucić - powiedział szef komisji Owen Gingerich. Według niego najliczniejszą opozycję powiększenia Układu stanowili specjaliści od dynamiki procesów planetarnych. To oni mieli się skrzyknąć i stworzyć konstruktywną większość. - W ostatnim dniu pojawili się w komplecie na ostatecznym głosowaniu - powiedział Gingerich. No i Pluton przepadł.

Od czwartku planetą jest tylko takie ciało niebieskie, które spełnia trzy warunki. Dwa pierwsze - musi krążyć wokół gwiazdy (samo nie będąc ani gwiazdą, ani księżycem) i mieć kształt kulisty - nie budzą kontrowersji. Trzeci jest dyskusyjny. Sąsiedztwo orbity, po której porusza się planeta, ma być wolne od innych obiektów.


NASA

Wizualizacja Plutona z powierzchni jednego z jego księżyców. Mniejszy glob to Charon

Planetą nie może być Ceres, bo krąży w towarzystwie milionów małych ciał niebieskich. Z tych samych powodów na miano planety nie zasługują Xena i Pluton, bo poruszają się w towarzystwie planetoid z tzw. pasa Kuipera. Kłopot w tym, że większość planet ma towarzystwo. W bliskim sąsiedztwie Ziemi krąży 10 tysięcy małych planetoid. Jowisz ma ich dziesięć razy więcej.

Dodatkowo nieporozumienia może budzić nazwanie Plutona, Ceres i Xeny planetami karłowatymi. Można to interpretować jako podgrupę ośmiu właściwych planet. A tak nie jest. Planety karłowate to niezależna grupa ciał niebieskich.

- Jest mi przykro, ale mój mąż na pewno zrozumiałby tę decyzję - powiedziała wdowa po Clydzie Tombaughu, odkrywcy Plutona. Za oceanem decyzja IAU budzi szczególne emocje, ponieważ Pluton był jedyną planetą odkrytą przez Amerykanina. Już teraz za oceanem można kupić naklejkę na zderzak samochodowy z napisem „zatrąb, jeżeli Pluton jest planetą".

- Przygotowujemy petycję wzywającą IAU, by przywróciła Plutona do rodziny planet - powiedział Alan Stern. Jego determinacja, by wziąć w obronę Plutona, pojawiła się dopiero po ujawnieniu wyników głosowania. Jest to o tyle zaskakujące, że on sam w Pradze nie był. I tylko złośliwi przypominają, że dr Stern jest szefem rozpoczętej w styczniu misji New Horizons. Jej celem jest m.in. zbadanie Plutona jako planety. Teraz nie można jej już nazywać misją planetarną.

Gazeta Wyborcza, Poland, 26.08.06

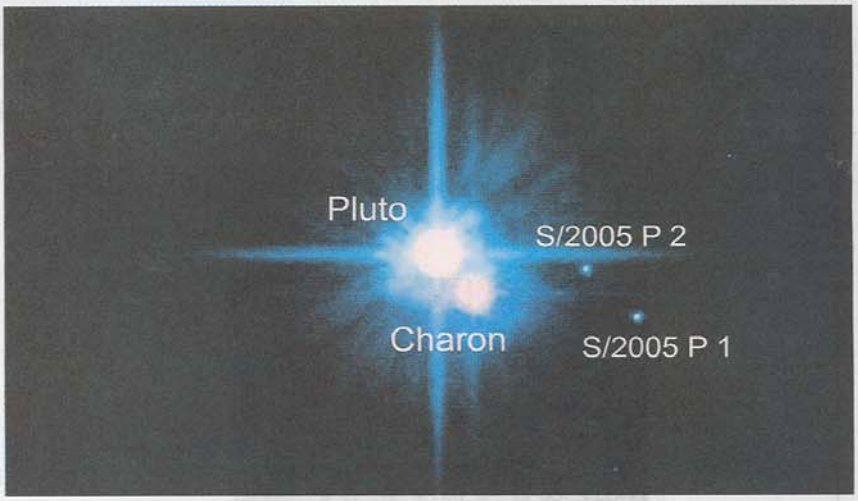


Photo prise par le télescope spatial Hubble le 22 février 2006, sur laquelle apparaissent, outre Pluton et Charon, deux nouvelles petites « lunes ». NASA/ESA/AFP

Les planétologues rétrogradent Pluton

Notre système solaire ne compte finalement que huit planètes, a tranché l'Union astronomique internationale après de houleux débats

En moins d'une semaine, le système solaire aura été l'objet d'incroyables secousses. Il y a un mois encore, il comptait neuf planètes. Il y a quelques jours, il était sur le point d'en gagner trois. Aujourd'hui, il n'en a plus que huit. Les astronomes qui, jeudi 24 août, participaient à Prague à l'assemblée générale de l'Union astronomique internationale (UAI) ont en effet décidé de retirer à Pluton son statut de planète.

Depuis sa découverte il y a presque quatre-vingts ans aux confins du système solaire, Pluton fait débat. Ses différences ne lui permettent pas de s'intégrer facilement dans la grande famille des planètes historiques. Elle n'est en effet ni une planète rocheuse – on dit aussi tellurique – comme Mercure, Vénus, la Terre et Mars, les quatre planètes les plus proches du Soleil, ni une géante gazeuse comme Jupiter, Saturne, Uranus et Neptune.

Tout juste un astre désert et glacé dont le diamètre – 2 300 km – est inférieur de plus de 1 000 km à celui de la Lune, satellite naturel de la Terre. De plus, Pluton suit une trajectoire très elliptique – quand celles des planètes historiques sont plutôt circulaires –, dont le plan est incliné par rapport à celui de ses anciennes sœurs.

Votant à main levée, les astronomes ont donc balayé avec un bel ensemble à Prague la motion que l'UAI leur avait présentée il y a une semaine (*Le Monde* du 18 août). Motion qui était pourtant le fruit de réflexions menées pendant des mois par un petit groupe de sept experts, il est vrai pas toujours d'accord sur le sens à donner aux mots. Mais c'est le lot de toutes les assemblées générales, une motion en appelle une autre, puis une autre...

De « complets idiots »

Au point qu'il y a quelques jours les planétologues ne retrouvaient plus leurs petits. Fatigué de ces discussions, mais encore amusé, l'un d'entre eux proposait même en aparté de s'en remettre à ces peuples très sages qui ne comptent pas au-delà de trois. Une planète donc, deux planètes, trois planètes et... au-delà, beaucoup de planètes !

Fini donc la belle et éphémère classification entre planètes classiques – telluriques et gazeuses – et planètes naines parmi lesquelles figuraient en première analyse Pluton, son satellite Charon, avec lequel elle forme un système binaire très différent du couple Terre-Lune, mais aussi Xena. Celle connue officiellement sous le nom 2003 UB313 et par qui le scandale est arrivé, puisque son embonpoint dépasse Pluton de 100 km.

Avait été également intégrée à l'équipe Cérès une boule rocheuse dépassant les 900 km et croisant, non pas aux confins du système solaire comme Pluton, Charon et Xena, mais entre Mars et Jupiter, où tournent des milliers d'astéroïdes dont peu sont de forme sphérique. Un critère essentiel pour entrer dans l'histoire.

Ne peuvent prétendre désormais au titre envié de planète que les astres qui ont *« une masse suffisante pour que leur gravité l'emporte sur les forces de cohésion du corps solide et le maintienne, en équilibre hydrostatique, sous une forme presque sphérique »*. Mais il faut aussi, et c'est sans doute le critère le plus sévère, qu'ils *« aient éliminé tout corps susceptible de se déplacer sur une orbite proche »*.

De facto, les objets de la ceinture d'astéroïdes en sont exclus tout comme ceux plus lointains – et chaque année plus nombreux – de la ceinture de Kuiper, à laquelle appartient Pluton. La crainte était en effet grande de devoir réviser régulièrement la liste des planètes avec de nouvelles découvertes.

Peu importe qu'on ait pu passer pour de *« complets idiots »* avec nos hésitations, plaide le professeur Rowan-Robinson, l'important, *« c'est que le verre* [de la connaissance] *se remplisse.* (...) *Dans quelques années, nous pourrions avoir quarante de ces nouvelles planètes naines. Le fait que Pluton ait été rétrogradée n'est donc pas si important. »* ■

JEAN-FRANÇOIS AUGEREAU

Le Monde, 26.08.06

Sueddeutsche Zeitung, 26.08.06

Ελλάδα

ΤΑ ΝΕΑ / Σο

ιετά τις αλλαγές συσχετισμών στο πλανητικό μας σύστημα, μένουν ανενημέρωτα τα σχολικά βιβλία, αλλά αναστατώνεται και η αστρολογική κοινότητα...

Παρθένοι - Ζυγοί σε αμηχανία

λλάζει ο ουρανός, αλλάζουν και οι... αστρολογικοί χάρτες

ανήτες του ηλιακού μας συστήματος δεν είναι ν εννέα, όπως πιστεύαμε έως τώρα. Παραλίγο να νταν δώδεκα ή έντεκα, αλλά τελικά κατέληξαν ο- Και υπάρχει σοβαρή πιθανότητα να αποδειχθούν ιά... 53 (!).

Η Δήμητρα, ο Χάρων, η Ζήνα, αλλά και ο Πλούτωνας, «ήρθαν» να αναστατώσουν την παγκόσμια κοινότητα των αστροφυσικών. Νέοι πλανήτες ανακαλύπτονται, άλλοι χάνουν την... ιδιότητα του πλανήτη, οι ερασιτέχνες αστρολόγοι έχουν επιδοθεί σε κυνήγι συντεταγμένων προκειμένου να μπορέσουν να δουν γνωστά και άγνωστα ουράνια σώματα, τα σχολικά βιβλία πρέπει να ξαναγραφτούν. Μέσα σ' όλα αυτά, όσοι «ανήκουν» σε δύο ζώδια – Παρθένοι και Ζυγοί – είναι πολύ πιθανό να μάθουν πολύ περισσότερα πράγματα για τον εαυτό τους. Με τις τελευταίες εξελίξεις το βράδυ της Πέμπτης στην Πράγα, στο συνέδριο της Διεθνούς Αστρονομικής Ένωσης, υποβιβάσθηκε ο Πλούτωνας από πλανήτης σε νάνο, λόγω του μεγέθους του.

Σχολικά βιβλία. Μπορεί το μάθημα της Αστρονομίας να μη διδάσκεται πλέον στη Β' Λυκείου (όπως γινόταν για πολλά χρόνια) και το σχετικό βιβλίο να έχει αποσυρθεί, ωστόσο εγκυκλοπαιδικές γνώσεις για το Διάστημα – και τον Γαλαξία μας – δίνονται στους μαθητές και μάλιστα σε πολύ μικρότερη ηλικία. Στο βιβλίο Γεωγραφίας της Α' Γυμνασίου αφιερώνονται αρκετές σελίδες στο ηλιακό μας σύστημα, όπου αναφέρονται οι έως πρόσφατα γνωστοί πλανήτες. Στις περιπτώσεις επιστημονικών ανακαλύψεων καινούργιων δεδομένων, καλείται από το Παιδαγωγικό Ινστιτούτο του υπουργείου Παιδείας μια ειδική επιστημονική επιτροπή, στην οποία εκάστοτε συμμετέχουν και οι συγγραφείς του βιβλίου. Αυτή προτείνει τις αναγκαίες αλλαγές στην ύλη του βιβλίου. Ωστόσο, όπως επισημαίνουν εκπαιδευτικοί, «τέτοιου είδους αλλαγές φυσικά δεν προλαβαίνουν να γίνουν φέτος. Εκείνο που προβλέπεται είναι να εκδοθεί διευκρινιστική εγκύκλιος του υπουργείου Παιδείας προς τους διδάσκοντες του μαθήματος στα σχολεία, με την οποία θα τους ζητείται να αγνοήσουν συγκεκριμένες σελίδες του βιβλίου και να παραδώσουν στους μαθητές άλλη ύλη».

Δύο ζώδια χωρίς «κυβερνήτη». Αναστάτωση φέρνουν οι νέοι πλανήτες στην αστρολογία και σε όσους ανήκουν στους αστερισμούς των Παρθένων και των Ζυγών, που μάλλον ήταν... αινιγματικές προσωπικότητες. «Στα δύο αυτά ζώδια δεν γνωρίζουμε τον... "κυβερνήτη". Δεν γνωρίζουμε δηλαδή τον πλανήτη που καθορίζει κυρίως τις εξελίξεις που αφορούν όσους ανήκουν στα ζώδια αυτά. Αν είναι ένας από τους νέους πλανήτες, τότε θα μπορέσουμε να αντλήσουμε περισσότερες πληροφορίες γι' αυτά τα δυο ζώδια, να αποσαφηνίσουμε τα χαρακτηριστικά όσων ανήκουν σε αυτά και να δίνουμε καλύτερες προβλέψεις», αναφέρει ο αστρολόγος Πέτρος Κατσαμάκης.

Ο ίδιος διευκρινίζει ότι τα ζώδια μένουν ως έχουν, τίποτα δεν αλλάζει με τις νέες ανακαλύψεις. Αναφέρει μάλιστα ότι κάτι ανάλογο είχε συμβεί και αρχές του περασμένου αιώνα. Η ανακάλυψη του – νάνου πλέον – Πλούτωνα συνοδεύτηκε από τον προσδιορισμό του ως «κυβερνήτη» του Σκορπιού. «Συμπληρώθηκε τότε το παζλ των χαρακτηριστικών που έχουν οι περισσότεροι Σκορπιοί», λέει ο αστρολόγος.

Οι ερασιτέχνες. Οι ερασιτέχνες... αστρονόμοι έχουν ενθουσιαστεί με τις νέες εξελίξεις. «Πολλοί τηλεφωνούν στο Αστεροσκοπείο ζητώντας να μάθουν πώς θα μπορέσουν να δουν τους νέους πλανήτες. Δυστυχώς, τους απογοητεύω» λέει ο αστροφυσικός - ερευνητής στο Εθνικό Αστεροσκοπείο Αθηνών Ιωάννης Μπέλλας - Βελλίδης. «Από την Αθήνα είναι ορατή μόνο η Δήμητρα και μόνο μέσω πολύ δυνατών τηλεσκοπίων. Τα πιο καινούργια από αυτά έχουν ενσωματωμένους μίνι υπολογιστές που στρέφουν αυτόματα τον φακό προς μια κατεύθυνση, αφού τους εισαγάγεις συγκεκριμένες συντεταγμένες. Στο Διαδίκτυο υπάρχουν σελίδες που δίνουν τις συντεταγμένες από κάθε σημείο της Γης (για παράδειγμα *http: //solarsystem. nasa. gov/planets*)».

ΤΑ ΝΕΑ, Greece, 26.08.06

Crescono le polemiche dopo la ridefinizione della «mappa» del sistema solare. Bocciato il progetto americano di promuovere i piccoli corpi celesti

Nasa contro gli astronomi: Plutone è un pianeta

L'amarezza dell'ente Usa dopo il declassamento: l'Europa ha sbagliato

DAL NOSTRO INVIATO

PRAGA — La cancellazione di Plutone dall'elenco dei pianeti classici e la nuova geografia del sistema solare sono diventate una sorta di deflagrazione che sta sollevando un'ondata di critiche. C'è l'amarezza degli americani che si sentono sconfitti: la prima ad essersi dichiarata insoddisfatta è stata, non a caso, la Nasa, direttamente impegnata nell'esplorazione planetaria. Una sconfitta politica: l'Europa è riuscita a imporre una visione capace di ridimensionare il sogno americano.

Infatti nella proposta di risoluzione presentata inizialmente all'assemblea riunita a Praga, nella definizione di pianeta rientravano tutti quei corpi che avevano una forma quasi sferica e con un diametro di oltre 800 chilometri. Il fatto di distinguerli, poi, nella denominazione era secondario. In questo modo non solo Plutone era salvo ma se ne aggiungevano addirittura altri come UB313/Xena (più grande di Plutone) come chiedeva Michael Brown, l'astronomo del California Institute of Technology, che lo scopriva nel 2003. Per tale motivo Brown si sentiva, di fatto, lo scopritore del fantomatico decimo pianeta inseguito da decenni.

Ma a Praga le cose sono andate in altro modo: è prevalsa l'idea europea, che ha finito per distinguere nella sostanza del voto (espresso a grandissima maggioranza) gli otto pianeti classici (da Mercurio a Nettuno) dai nuovi nanopianeti nei quali è caduto Plutone, anch'esso scoperto negli Stati Uniti da Clyde Tombaugh, nel 1930. Gli americani sono riusciti soltanto a salvare per tre voti (186 contro 183) il riferimento a Plutone come capostipite della nuova classe di nanopianeti perdendo invece, di nuovo, nel voto che voleva battezzarli con il termine «plutoniani».

Il progetto di riorganizzare il sistema solare in nuove classi era partito nel 1999 nell'ambito dell'Unione astronomica internazionale proprio come conseguenza del ritrovamento di oggetti sempre più grandi oltre l'orbita di Nettuno. Gli scienziati statunitensi avevano sostenuto la proposta, ma con l'intento di arrivare al loro obiettivo che sembrava raggiunto alla vigilia dell'assemblea di Praga, dopo due anni di duro confronto nell'ambito di una commissione internazionale di sette saggi.

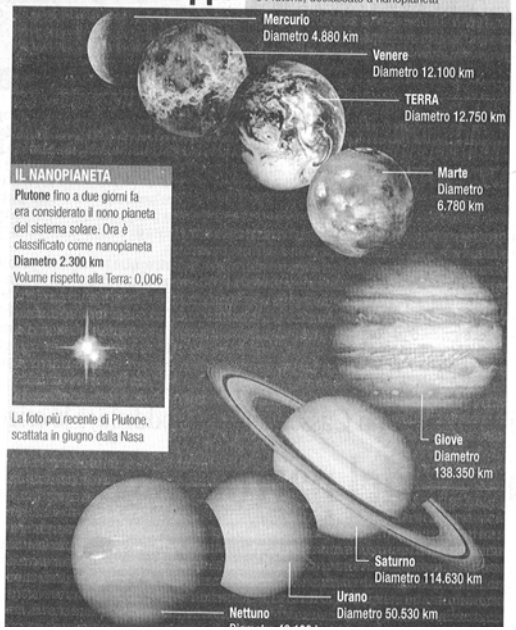
Dietro questa ambizione c'era la posizione dei planetologi Usa, oggi i più forti sulla scena mondiale grazie alle numerose sonde della Nasa che riescono a esplorare e raccogliere dati in grande quantità. I russi, una volta concorrenti, sono paralizzati dalla caduta dell'Unione Sovietica e l'Europa e il Giappone da poco hanno incominciato a muovere i primi passi. Attribuire dunque più importanza al mondo da esplorare (tutti pianeti di serie A) facilitava la caccia alle risorse, che nel mondo della ricerca Oltreoceano è una pratica indispensabile.

La seconda ragione, tuttavia, che ha acceso le proteste è legata al fatto di aver intaccato una conoscenza comune del cielo. Qui il gelido Plutone insieme al suo satellite Caronte erano associati all'immagine classica del corteo planetario. Declassarlo in una serie B è parso un affronto a una cultura forse meno scientifica in senso stretto, ma più popolare.

Giovanni Caprara

La nuova mappa

Gli otto pianeti del sistema solare e Plutone, declassato a nanopianeta



A FAVORE

La Hack: sono proteste senza senso Aggiornarsi è un dovere degli scienziati

DAL NOSTRO INVIATO

PRAGA — «Non capisco tutto questo clamore e vedo esagerata la protesta della Nasa. Scoprendo nuovi corpi, era giusto rivedere la loro classificazione». Margherita Hack è convinta che il declassamento di Plutone andava fatto.

Non c'era alternativa?

«Mi sembra normale che l'astronomia metta ordine, per poter andare avanti con maggior chiarezza».

E le polemiche?

«E' sbagliato veder le cose inamovibili. Bisognava forse tacere per non disturbare la conoscenza comune?».

Margherita Hack

Questa decisione però è sembrata a molti affrettata.

«Intervenire era necesario: Plutone aveva caratteristiche ben diverse dai pianeti classici. L'aver scoperto in seguito corpi celesti più grandi ha

Anche il metodo adottato ha generato qualche perplessità .

«Mi fa ridere tanto appassionarsi su una questione tutto sommato marginale. In fondo ogni giorno la scienza procede con questo metodo e scoprendo il nuovo costringe a continui aggiornamenti. Questo è un dovere oltre che un diritto dello scienziato. Oggi, tra l'altro, penso che la nostra mente sia più preparata ai cambiamenti rispetto al passato».

La nuova classificazione crea confusione ?

«Al contrario, porta utili distinzioni rispecchiando la nuova realtà del sistema solare, la quale, grazie alle ultime scoperte, è molto diversa rispetto a ciò che si conosceva. Non si può ignorare il peso che avranno sempre più gli oggetti trasnettuniani: alcuni sono più grandi di Plutone»

CONTRO

Benvenuti: così si distrugge il passato La cultura non si cambia a colpi di voto

DAL NOSTRO INVIATO

PRAGA — «È una pessima decisione, culturalmente sbagliata. Condivido la protesta della Nasa e degli americani». Non ha mezzi termini Piero Benvenuti, presidente dell'Istituto nazionale di astrofisica, per dimostrare la sua contrarietà alla scelta praghese.

Perché?

«Soprattutto per coloro che non sono scienziati, la cultura astronomica ha offerto elementi di base, appresi sui banchi di scuola, dai quali è derivata una storia culturale importante. Su di essa poggia la capacità di aggiungere altri pensieri, la voglia di gettare lo sguardo oltre la siepe del noto e il coraggio di guardare verso l'infinito. Scardinare delle cognizioni comuni per una banale esigenza di classificazione è un segno di insipienza».

Piero Benvenuti

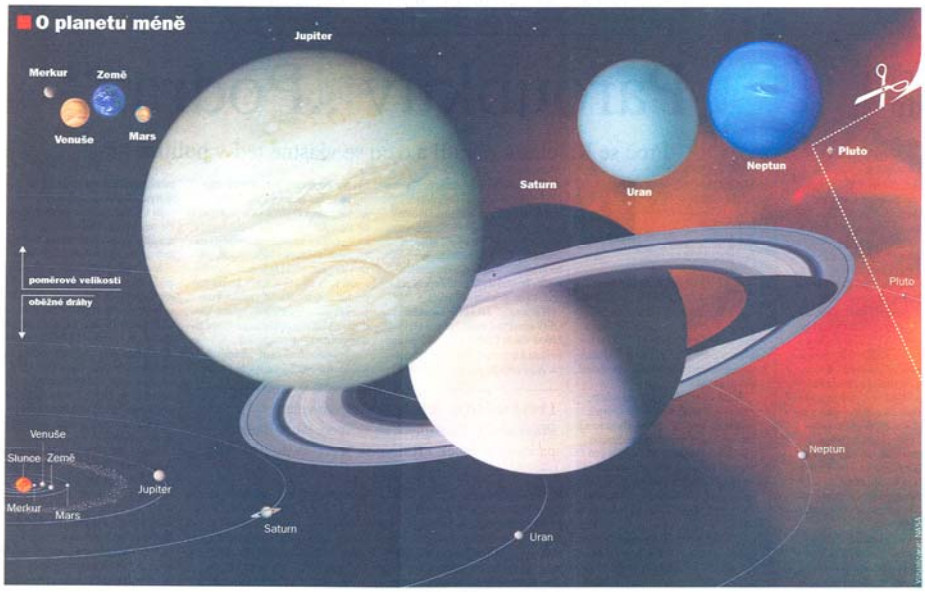
«Poteva avvenire all'interno del mondo scientifico, adattando le vecchie classificazioni alle nuove esigenze di riordino. Era accaduta la stessa cosa con la nomenclatura delle stelle. Anche se la questione era meno popolare, allora si è agito con maggiore coscienza e quando, a partire dagli Anni '20, con le scoperte sugli spettri degli astri si è vista la necessità di un aggiornamento lo si è affrontato senza alterare l'ordine precedente».

Toccare i pianeti sembra rischioso?

«Perché il termine pianeta accompagna la visione del cielo a partire dagli antichi. E Plutone, anche se lontano, era ormai parte di questa immagine. Perciò andava rispettata. La cultura ha valori sottili e per accrescerli bisogna procedere per gradi. Senza di-

DNES 25. srpna 2006 Z DOMOVA www.idnes.cz A5

KONEC PLUTA Astronomové včera na kongresu v Praze rozhodli, že Pluto již není planetou sluneční soustavy, a postavili ho na roveň asteroidů. Končí sedmdesát šest let dlouhá éra, kdy sluneční soustava měla devět planet.



Po dlouhých diskusích zmizela z vesmíru

Planeta Pluto

Nejmenší planetu sluneční soustavy objevil 18. února 1930 Clyde Tombaugh. V roce 1978 byl objeven měsíc Pluta nazvaný Charon. Mezi lety 1985 až 1990 byly postupně určeny rozměry Pluta i Charona.

Plutovo působení mezi planetami bylo **ukončeno 24. srpna 2006** na kongresu astronomů **v Praze**.

Hmotnost	1,3×1022 kg (0,0022 hmotnosti Země)
Průměr	2324 km
Povrchová teplota	– 230 °C
Doba otáčení kolem své osy	6,4 dne
Doba oběhu kolem Slunce	248,5 let
Vzdálenost od Slunce	5 906 380 000 km

Pluto končí. Už to není planeta

Pokračování ze str. 1

„Malé změny mají velké důsledky. Lze tvrdit, že to, co děláme, je vytváření deštníkové kategorie, do níž se vejdou trpaslíci i klasické planety," varovala Bell Burnellová před návrhem, který nakonec neprošel. Kdyby se vedle planetárních trpaslíků, mezi něž Pluto nyní patří, objevila i kategorie „klasických planet", mohlo by to vyvolat zmatek. „Mělo by to tři rozdílné kategorie ve dvě třídy: planety a zbytek," varoval jeden z astronomů. Třetí kategorií, o které mluvil, jsou „malá tělesa sluneční soustavy": planetky, asteroidy, komety i meteority.

Astronomové se chtěli vyhnout jakémukoli zmatku, protože planetární definici vypracovávali i s ohledem na veřejnost. Nakonec se v ní uvádí, že planety jsou taková tělesa, která „vyčistila sousedství své oběžné dráhy" od jiných těles. Vymezení platí pro Zemi stejně jako pro Merkur či Jupiter, nikoli pro Pluto.

Nová definice je však úzká: popisuje jen tělesa, která se nacházejí v sluneční soustavě. „Zabýváme se jen slunečním systémem. Původně jsme doufali, že dokážeme definovat planetu šířeji, ale pak jsme zjistili, že je to příliš složité," vysvětlila Burnellová. Pro více než 150 planet, které vědci objevili u jiných hvězd, tak stále chybí obecně přijímaná definice.

MICHAL MOCEK

Školy se Pluta nevzdají

Praha - Ten seznam devíti planet se žáci základních škol učili sedm desítek let. Znělo: Merkur, Venuše, Země, Mars, Jupiter, Saturn, Uran, Neptun a planetou nejvíc vzdálenou od Slunce byl Pluto. Po včerejšku si však budou muset žáci zapamatovat, že Pluto mezi planety nepatří.

„Vědci pořád s něčím přicházejí"

O sluneční soustavě se děti učí hned na prvním stupni základní školy v přírodovědě. O planetách jim učitelé říkají i v dalších ročnících, a to hned v několika různých předmětech, například ve fyzice nebo přírodovědě. Včerejší rozhodnutí valného shromáždění Mezinárodní astronomické unie, které se konalo v Praze, však neznamená, že by se učební osnovy okamžitě a nějak výrazně přepisovaly.

„Není důvod, abychom osnovy nějak měnili. Vědci prakticky neustále přicházejí s nějakými novými poznatky a také se hned kvůli tomu nedělají aktualizované knížky," řekl včera Pavel Petroušek, ředitel jedné ze základních škol v třináctém pražském obvodu.

„Učitelé se nové věci prostě vždy naučí a děti upozorní, že některé věci z učebnic už neplatí. Stejně to bude s Plutem. Maximálně budeme dětem říkat, že až do roku 2006 byl Pluto považován za planetu," doplnil.

Stejně mluví i učitelé z jiných míst Česka. Změnu, kterou astronomové včera odsouhlasili, navíc berou spíš s úsměvem. „Děti se to učí v páté třídě, což je na to asi nejlepší věk. Baví je to poznávání různých planet," řekla ředitelka základní školy v Proseči u Skutče Jarmila Broulíková.

„Možná to pro ně bude nyní ještě zajímavější, když jim učitel bude vyprávět, že Pluto planetou byl a nyní není," dodala.

Právě v Proseči ovšem rozhodnutí astronomů jednu změnu vyvolá. V červenci zde místní škola společně s radnicí otevřela planetární stezku. V celé republice jsou dvě, tu v Proseči však připravovali hlavně žáci zdejší základní školy. Nejprve ve třídě postavili model sluneční soustavy a radnice pak jednotlivé planety nechala ve zmenšeném měřítku vyrobit.

Ty teď jsou rozmístěné přímo v obci a jejím okolí, a pokud se zájemce rozhodne stezku projít, ujde od Slunce k Plutu šest kilometrů. I vzdálenosti mezi jednotlivými planetami jsou totiž přesně propočítané, aby v určitém měřítku odpovídaly těm skutečným ve vesmíru.

PŘEDČASNÁ RADOST. Na počátku prázdnin vznikla v Proseči naučná stezka, kde je Pluto ještě planetou. FOTO: MAFA – RADEK KALHOUS

„Pluto rozhodně ze stezky odebírat nebudeme. Počkáme, až se o té změně objeví podrobnější informace a podle nich údaje na tabuli k této planetě doplníme," řekla Jarmila Broulíková.

Astrologům změna nevadí

Změna nezamotá hlavu ani astrologům, kteří podle hvězd sestavují horoskopy. Někdejší ministr obrany a nyní astrolog Antonín Baudyš včera řekl, že jemu i jeho kolegům bylo vždy úplně jedno, zda byl Pluto označován za planetu, planetku, nebo jiný vesmírný útvar.

„Pro nás je hlavní, že Pluto astrologicky funguje a my s ním při výpočtech můžeme počítat. Je nám prostě jedno, jestli je, nebo není některé vesmírné těleso označované za planetu," uvedl včera Baudyš.

„Navíc debaty o tom, zda Pluto je, nebo není regulérní planetou, probíhaly už delší dobu. Osobně se mně stejně nejvíc líbí návrh jednoho z profesorů z univerzity v Berkeley. Ten navrhoval, ať jsou za planety označené všechny velké kulovité objekty v naší sluneční soustavě," podotkl Baudyš.

A co v astrologii Pluto vlastně znamená a představuje? Znázorňuje především moc. Zároveň ovšem značí krizi a válku a také hloubku poznání.

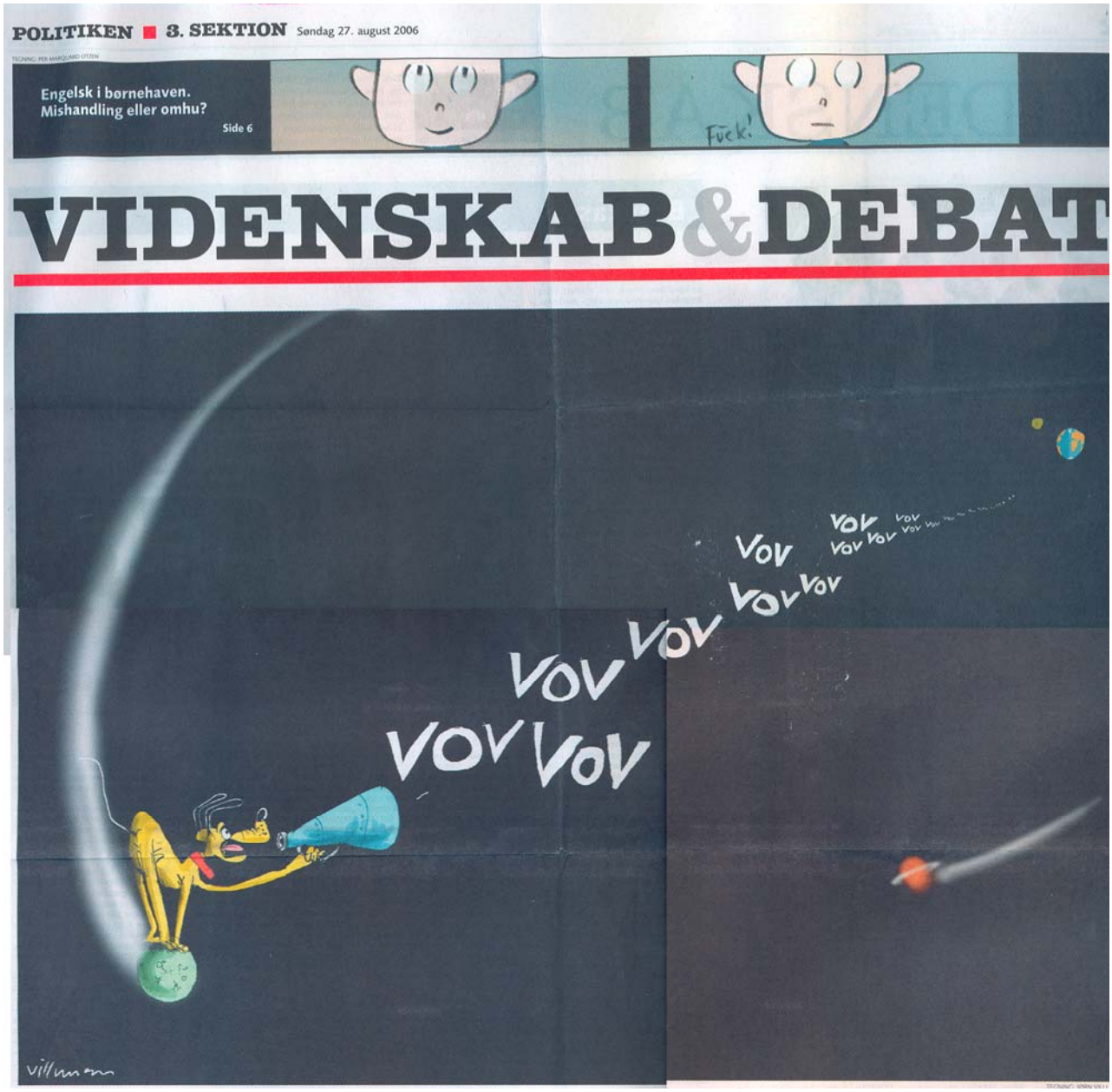
JAN VACA

Pes se jmenuje po planetě, říká autorka

Praha (om) - Jméno Venetia Phairová nic neřekne ani většině znalců astronomie. Přitom je to právě tato dnes sedmaosmdesátiletá žena, která vymyslela jméno pro devátou planetu sluneční soustavy.

Ten příběh začal ráno 15. března 1930, tehdy jedenáctiletá Venetia z Oxfordu seděla u stolu se svým dědečkem Falconem Madanem. Ten si v The Times přečetl, že americký astronom Clyde Tombaugh objevil novou planetu. „Ještě nemá jméno, co bys navrhovala," zeptal se vnučky. „Pluto," nevářila Venetia, která si tehdy ráda četla v řeckých mýtech. Madanovi se návrh líbil, a tak si promluvil se svým přítelem, profesorem astronomie. Profesor poslal návrh dívenky do Lowellovy observatoře, kde novou planetu objevili. 1. května 1930 vědci oficiálně vyhlásili jméno nové planety. Znělo Pluto. Madan dal své vnučce za odměnu 5 pencí. Ta pak často slýchala, že vesmírné těleso pojmenovala po animované postavičce psa Pluta z dílny Walta Disneyho, která přišla na svět ve stejném roce. „Teď je doufám dostatečně prokázané, že ten pes se jmenuje po planetě, ne naopak," zdůraznila letos v lednu Phairová pro BBC.

DNES, Czech Republic, 26.08.06. Note the crying children and Pluto being cut away from the Solar System.



Politiken, 27.08.06

Politiken, 27.08.06

Da Pluto røg ud af vores univers

Diplomatiske baggårdshandler, fraktioner, tætte flertalsafgørelser og tvister om formuleringer, der var et FN-topmøde værdigt. Degraderingen af Pluto på denne uges astronomtopmøde i Prag mindede mere om politik end videnskab.

Af Lars Dahlager, Prag

De har fjernet bindestregen!«.

En ophidset gruppe af astronomer var braset ind i kongrescenterets presserum med dokumenter med understregninger og hjemmegjorte plancher og stod omringet af journalister, indtil vi alle blev forvist til et andet, mere roligt rum.

»De har fjernet bindestregen, fordi de ønsker at beholde Pluto som en planet. De forsøger at kuppe os!«, fortsatte astronomen Gonzalo Tancredi, en lavstammet, sortskægget forsker fra Universidad de la República i Uruguay.

Han og et par andre kolleger, en landsmand fra Uruguay og en kollega fra Brasilien – eller bare 'sydamerikanerne' - var den lille, men højrøstede gruppe, der havde startet oprøret mod den internationale astronomiske unions ledelse og dets forsøg på at bevare Pluto som planet. Mange andre havde fulgt trop. Oprøret rettede sig mod et forslag, hvor Pluto ville beholde sin status som planet og verden ville få tre planeter yderligere.

Nu var de rasende. Bindestregen, der ophidsede gruppen, havde siddet mellem 'dværg' og 'planet' i det kompromisforslag, som sydamerikanerne havde presset den internationale astronomiske ledelse til at indgå to dage tidligere. Pluto var ifølge kompromiset ikke længere en planet, men en dværg-planet - på engelsk Dwarf-planet. Men i det nytrykte afstemningspapir stod der Dwarf Planet.

»Så bliver dværg pludselig et beskrivende adjektiv foran ordet planet, ligesom 'stor planet' eller 'lille planet'. Men Pluto er ikke nogen planet. Det er vi imod. Det er en planetino!«, sagde Cambridge-astrofysikeren Brian Marsden og hev med tryllekunstnerens sans for drama et A3-ark frem bag ryggen, hvor han med store tusch-bogstaver havde skrevet sit hjemmelavede ord, planetino.

Så hastede gruppen videre for at fremlægge sine krav og sin nye betegnelse for planetinoen Pluto for unionens ledelse.

Rund=Planet

Bindestregen var bare et sidste slag i den mest ophidsede kamp i Den Internationale Astronomiske Unions historie, en kamp, der i denne uge på unionens topmøde i Prag fik en del astronomer på barrikaderne og endnu flere til at grine nervøst og åbent frygte for fagets anseelse.

»Pluto er ikke nogen planet. Det er vi imod. Det er en planetino!«

Hvad ville omverdenen ikke tænke, hvis astronomer den ene dag udråbte, at vi havde tolv planeter, den næste, at vi havde otte og måske til sidst, at vi stadig havde ni, fordi ingen kunne blive enige? Hvad ville hr. og fru Verden så tænke om astronomi som videnskab?

Der har aldrig været en egentlig definition af, hvad en planet er, og heller ikke været den store brug for en. Men i 2003 blev det en mangel, man ikke længere kunne lukke øjnene for. Det var fundet af et nyt himmellegeme, UB313, der udløste krisen. UB313 var både rund og større end Pluto og kunne vel med lige så stor ret pryde sig med titlen af planet. Men skulle den have ret til det?

Planetdefinitionskomiteen blev nedsat for at finde svaret på det spørgsmål og dermed det bredere: Hvad er den videnskabelige definition på en planet? Men den havde også i opdrag at tage hensyn til kulturelle værdier og historiske traditioner og havde ligefrem en lægmand, forfatteren Dava Sobel, i panelet.

Komiteen havde faktisk leget med ideen om at definere en planet som alt der vejer og fylder det samme eller mere end Pluto og på den måde sikre, at Pluto beholdt sin status og at UB313 blev den tiende planet. Men definitionen var arbitrær og uvidenskabelig og blev opgivet til fordel for én, der var videnskabelig enkel og elegant:

En planet er noget, der: 1) er i kredsløb omkring en stjerne men ikke selv er en stjerne og 2) er stort set rund - eller i astronomi-*speak* 'i hydrostatisk ekvilibrium'.

Eftersom kun himmellegemer med tilstrækkelig stor tyngde bliver runde, så havde man dermed noget, der lugtede af stram videnskab, og som passede fint i almindelige menneskers mentale billede af en planet: Noget stort og rundt, der kører rundt om solen.

Men konsekvensen var ikke bare, at Pluto forblev en planet. Vi ville også umiddelbart få tre nye planeter i solsystemet og der stoppede det ikke. Ifølge astronomen og 'planetjageren' Michael Brown, der har opdaget UB313, ville IAU's definition snart give os mindst 53 planeter.

Ikke nemt at lære udenad i folkeskolen.

»Det vil fjerne magien ved solsystemet«, skrev Brown i sin blog på internettet.

En katastrofe

Ikke desto mindre var det den planetdefinition, der blev fremlagt onsdag for en uge siden på Den Internationale Astronomiske Unions kongres i Prag, og tirsdagen efter brød helvedet løs.

Foran omkring 1.000 deltagere i kongrescenterets største sal fremlagde unionens præsident Ron Ekers forslaget om de mange, nye planeter, og da der blev åbnet for mikrofonerne, kravlede deltagerne over hinanden for at komme til orde og formede sig i vrede køer bag to mikrofoner.

Der var anklager om, at processen var lukket, at det hele var et kupforsøg, at definitionen var fjollet, at den ikke hjalp, når man skulle definere planeter omkring andre stjerner end solen, at planeters bane overhovedet ikke var indeholdt i definitionen og at komiteen ikke havde basalt begreb om planetfysik.

Forsøg på at lukke talerrækken blev mødt med tumult og råben.

»Lad folket komme til orde!«, råbte en af sydamerikanerne.

Til sidst havde præsidenten for unionen fået nok.

»Det ville være *vidunderligt*, hvis vi kunne løse alle solsystemets problemer på en gang. Men det kan vi ikke!«, snerrede han.

Fortsættes side 2

DEFINITION

Den er rund, den er tung

■ Planet er græsk og betyder en 'vandrer'. Mere præcist har det faktisk aldrig været defineret før nu.

■ Torsdag bestemte fagorganisationen Den Internationale Astronomiske Union, IAU, ved en afstemning, at en planet nu er defineret som et legeme, der:

1) Er i kredsløb omkring en stjerne, men ikke selv er en stjerne.

2) Har så meget masse, at dens egen tyngdekraft tvinger den til at antage en (næsten) rund form (modsat mange asteroider, der f.eks. kan være formet som en ingefærknold eller en banan).

3) Har *clearet* området omkring sit kredsløb. Altså at den har haft tyngde nok til at tiltrække og optage alle andre objekter i sin bane eller skubbe dem væk, og nu er alene i kredsløbet (når man ser bort fra dens egne måner, naturligvis). Modsat f.eks. Pluto, der svæver rundt i et asteroidebælte sammen med alle mulige andre objekter.

■ En dværgplanet er også i kredsløb omkring solen og har antaget en næsten rund form på grund af dens egen tyngdekraft. Men den har ikke clearet sin bane.

■ Pluto er nu en dværgplanet. Det samme gælder UB313 (med det midlertidige øgenavn 'Xena' efter tv-serien 'Xena – Amazonekrigeren') og Ceres. Men astronomer vil i de kommende år finde mange flere. (dalle)

NATURE|Vol 442|31 August 2006 NEWS

M. CIZEK/AFP/GETTY

The ayes have it: astronomers have criticized the vote to define a planet.

Pluto: the backlash begins

The future of the Solar System — or at least that of some of its nomenclature — may be thrown into turmoil by scientists who are calling for a boycott of a new definition of a planet.

On 24 August, delegates at the general assembly of the International Astronomical Union (IAU) in Prague voted to define the planets of the Solar System by three criteria. To deserve planet status, the assembly agreed, a chunk of rock or ball of gas must be big enough for its gravity to have made it round, must orbit the Sun but not be a satellite of another planet, and must have cleared other bits of debris from its orbit. Round objects, including Pluto, that failed on the final count became not planets but 'dwarf planets'.

"We do not classify objects in astronomy by what they are near, we classify them by their properties."
—Alan Stern

The definition originally proposed on 16 August by the IAU would have had just two criteria — roundness and not being a moon. This was rejected by members at the meeting where the three-part definition was voted on as the final word on the subject. But many IAU members were not in Prague for the vote, and some are furious at the outcome.

"I am just disgusted by the way the IAU, which is meant to represent the best in science, handled this matter," says Alan Stern, a planetary scientist at the Southwest Research Institute in Boulder, Colorado. As principal investigator for NASA's New Horizons mission to Pluto, he has a particular interest in its status. But he says the issue is not really Pluto's status so much as the idea of putting objects in orbital contexts. "We do not classify objects in astronomy by what they are near," he says. "We classify them by their properties."

The day after the new definition was unveiled, Stern was among a dozen scientists who launched a petition to contest it. By e-mail, they sought the support of their colleagues for the following statement: "We, as planetary scientists and astronomers, do not agree with the IAU's definition of a planet, nor will we use it. A better definition is needed." More than 200 people had added their names to the petition as *Nature* went to press on Tuesday.

Stern thinks that requiring a planet to have 'cleared its orbit' rules out some of the Solar System's other eight planets. These include Neptune, the orbit of which is crossed by Pluto, and Jupiter, which shares its orbit round the Sun with the Trojan asteroids.

The 'clearing' criterion was introduced when astronomers who study the dynamics of the Solar System insisted that the definition should recognize their idea of what constitutes a planet — an object with a mass that dominates its orbital zone. Owen Gingerich, chair of the committee that proposed the 16 August resolution, thinks the IAU had no choice but to bend to the dynamicists' demands. "They may not have had a majority for anything positive, but they could rouse a strong negative majority simply because there are so many little fiefdoms," he explains.

"The dynamics part of the definition is a rather complex one," says Ron Ekers, past IAU president. Couching the idea in terms of a planet 'clearing its orbit' was intended to make the issue easier for the public to understand. But it may well end up confusing matters.

Some organizations have already said they will accept the IAU's new definition. *Encyclopaedia Britannica*, for example, issued a statement saying that some of its articles on Pluto and the Solar System were updated online the same day the IAU's pronouncement was made. According to a spokesperson, later revisions may reflect any uncertainty, but "the vote by the IAU is considered binding — until the next vote, whether it's next year or next century". NASA, too, promised to abide by the definition, adding that it will "continue pursuing exploration of the most scientifically interesting objects in the solar system, regardless of how they are categorized".

Others are waiting to see how strong the counter-movement becomes. A black ribbon was tied around the Pluto panel at the Smithsonian Institution's National Air and Space Museum in Washington DC when the IAU's verdict was announced, says curator Andrew Johnston. But

Nature, 31.08.06

it has since been removed. "We're going to let things calm down for at least a few weeks before we decide to make any changes," he says.

One thing that particularly irks critics is the way the decision was made. The IAU has nearly 9,000 members, but only 2,500 people attended the Prague meeting and only a few hundred were present for the vote. The IAU should have used the Internet to gauge wider opinion, and then allowed electronic voting, according to those who oppose the definition.

"The IAU seems to be rooted in the pre-Internet age," says Mark Sykes, director of the Planetary Science Institute in Tucson, Arizona, who instigated the petition. "The rules of the IAU say that resolutions are passed by those present and voting," says Catherine Cesarsky, director of the European Southern Observatory and newly elected president of the IAU.

Sykes admits that a "better definition" might be hard to come by, but is still pressing for the current one to be scrapped. He thinks the IAU would be better off without any definition at all rather than the one they have chosen. "If they can determine that this process was flawed and nullify it, then I think that would be in their best interests," he says.

"If enough people are completely unhappy, we could go through the process again," says Ekers. But a new resolution would have to wait for the next general assembly in 2009 in Rio de Janeiro. The IAU may issue a clarifying statement in the next week or two, but is hesitating to do so now. "Perhaps we need to make our next statement when things are a little less emotional," says Ekers. ■

Jenny Hogan

JHUAPL/SWRI

NASA's New Horizons probe should reach Pluto in 2015, regardless of whether it is still a planet.

Diary of a planet's demise

While attending the International Astronomical Union's meeting in Prague, **Jenny Hogan** kept the world up to date on the Pluto debate through our newsblog. Edited excerpts:

Monday 21 August

The proposal to define a planet as anything round that isn't a moon, and thus increase the tally in our Solar System to 12, is scheduled for discussion at lunchtime tomorrow. But many astronomers have already conveyed their objections to the executive committee of the International Astronomical Union (IAU) by e-mail — and some are supporting a second, rival definition.

This alternative definition argues that a planet, as well as being round, must also be "by far the largest object in its local population". This definition knocks Pluto off its planetary pedestal (although it offers it concessionary 'dwarf planet' status), and destroys the chances of promotion for Ceres, queen of the asteroid belt.

Of the 100 people in the closed meeting last Friday where the alternative definition was floated, a show of hands showed about 50 for it and only 20 for the IAU's suggestion.

23:00 My dinner companions tonight include some (very tired) members of the Planet Definition Committee. They say they have received hundreds of e-mails over the past few days from geologists complaining about the proposal in the original definition to use 'pluton' to mean an object in the same class as Pluto. Pluton is a term of long-standing and wide use in geology, where it refers to an intrusion of igneous rock.

Another problem has emerged in translation. The French name for Pluto is — you've guessed it — Pluton. The definition committee thought this linguistic borrowing would give the pluton label special appeal for French-speaking astronomers, but apparently some of them object.

All this leads to speculation that tomorrow's revised definition, whatever other changes it contains, will include a replacement word for 'pluton'.

Tuesday 22 August

15:00 For people who often tell journalists that defining a planet is a meaningless labelling exercise, astronomers actually seem to care a great deal. The open discussion on what makes a planet stopped just short of fisticuffs.

The official resolution has been divided into three parts, each of which will be voted on separately on Thursday at the closing ceremony. These cover the requirement of roundness; the distinction between a binary planet

Dwarf planet in quotes

"I'm here. I'm a sphere. Get used to it."
Pluto itself, talking to Gady Epstein of the *Baltimore Sun* about its recent demotion.

"I don't know about the public, but... the astrologers will be upset."
Patrick Moore, astronomer and veteran presenter of the BBC's *The Sky at Night*.

"Please don't turn Pluto into a dwarf planet because that makes me sad. I'll miss Pluto a lot."
Daniel Dauber, aged six, on *Nature*'s Newsblog.

"This is as if botanists had found something between trees and bushes and invented the word 'animal' to describe it."
Allen Glazner of the University of North Carolina, Chapel Hill, on the proposal to call dwarf planets 'plutons' — a term that geologists have long used to describe certain bodies of rock.

"Since the term is not in the Microsoft Word or WordPerfect spellcheckers, we thought it was not that common."
Owen Gingerich, chairman of the Planet Definition Committee, which proposed the use of the term pluton.

"The comments were intelligent, but they came with a passion that makes me think this debate has a non-intelligent dimension."
Paul Murdin, Cambridge astronomer, at the annual meeting of the International Astronomical Union.

"It's over, it's done."
Richard Binzel, an astronomer at the Massachusetts Institute of Technology and member of the Planet Definition Committee, on the Prague vote.

Sources: Baltimore Sun, Guardian, Nature, news@nature.

Nature, 31.08.06

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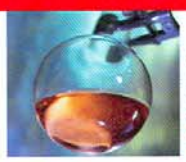


CHEMISTRY BLOG
Live reports from the first European Chemistry Congress in Budapest.
http://blogs.nature.com/news

and a planet–moon system; and the naming of Pluto-like objects.

Within seconds of comments being invited, queues form at the microphones. One by one, astronomers denounce the definition in tones ranging from offended to furious. The representatives of the Planet Definition Committee slump into their chairs, heads propped on their hands.

Andrea Milani of the University of Pisa is first to reach a microphone. He articulates the concerns of the 'dynamicists' — astronomers interested in orbits, many of whom feel strongly that the condition of dominating an orbital zone should be a central part of the definition. Milani becomes more incensed as he speaks, ending by saying "your paper is a kind of offence to the entire dynamical community".

Meanwhile, those who work on extrasolar planets — some with many times the mass of Jupiter — feel that their field has been neglected. Why does the definition not set an upper mass limit? As this point was raised again and again, IAU president Ron Ekers became more and more frustrated. "We want your input, but not right now," he eventually snapped.

17:30 We are now on version three of the planet definition. I was expecting another lively show of dissent — but it is not to be, thanks to Jocelyn Bell Burnell, the astronomer who discovered the first pulsar. A member of the IAU's resolution committee, which decides what gets voted on, she takes formidable control of the meeting. With only 45 minutes available, she requires comments to be no more than 'elevator pitches' — sold in the time it takes a lift to travel one floor. The astronomers meekly follow her orders.

"Your paper is a kind of offence to the entire dynamical community".

The latest version requires that a planet be both round and, at the insistence of the dynamicists, dominant. Round objects that don't dominate their local orbital zone are 'dwarf planets'. Bell Burnell spells out the consequences: "This means that Pluto is a dwarf planet, but it is not a planet." Would that be acceptable to the assembled astronomers?

It seems so. In a quick show of hands, more arms are raised in favour than against.

Thursday 24 August

The final text of the resolution (version four by my count) is posted in today's edition of the conference newspaper *Nuncio Sidereo III*. According to this resolution, the Solar System has eight top-flight planets, with Pluto in a second class of dwarf planets. Separate votes will be held on whether to label these top-flight planets 'classical planets' and what, if anything, to do about putting Pluto and other round trans-neptunian snowballs into a 'plutonian object' category. "Only minor corrections can be accommodated at this stage," the paper warns.

L. HOLM NIELSEN/IAU

Moment of truth: Jocelyn Bell Burnell uses props to liven up the voting on whether Pluto is a planet.

11:30 I'm skipping down the stairs of the conference centre on my way to a 10.30 interview (not about planets) when I encounter a charge of scientists led by the esteemed Brian Marsden. "You're the press," one of his cohort notices. "Show us to the press room."

I retrace my steps. Marsden has, for many years, been the head of the Minor Planet Center at Harvard, a clearing house for orbital data on asteroids and comets. (This week's redefinitions are set to turn them into 'small Solar-System bodies'.) Today marks his retirement, but he enters the press room with youthful vigour.

He holds up an A4 sheet of paper, on which is written in very large letters the word 'Planetino'. "Planetino is what they say in the resolution is a dwarf planet," he proclaims.

Pointing to the ten or so astronomers straggling in behind him, Marsden says his proposal to call 'dwarf planets' 'planetinos' instead has support from representatives of Uruguay, Brazil, the Czech Republic, the Netherlands, Norway, Serbia and the United Kingdom — at least. The press room descends into a hubbub as reporters grab their notepads or leap to their laptops. The press officers trying to run the show look on, bemused.

13:50 Just before the closing ceremony starts, a television crew searches for a miserable American. Pluto, after all, was discovered at the Lowell Observatory in Flagstaff, Arizona, by the American Clyde Tombaugh. The search so far seems to have been fruitless. But I do see someone waving a picture of Pluto the Disney dog somewhere near the front...

14:35 "You will need a pen or a pencil," says Bell Burnell, who is chairing the session. The audience duly rummages in its bags, in order to add inverted commas to the category 'dwarf planets' and clarify the situation over satellites.

A speaker from the floor suggests, to much laughter, dropping all the resolutions except footnote 1 to 5A: "The eight classical planets are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune."

14:43 At last, the vote. Astronomers wave little yellow cards in the air to indicate their support for resolution 5A — that's the one that recognizes three categories of object: planets, 'dwarf planets' and small Solar-System bodies. A few people wave their cards to vote the resolution down, a few abstain.

A moment's hesitation from the chair. Then: "I believe the resolution is clearly carried."

Amazing! A decision! I wouldn't have predicted that at the week's beginning.

Bell Burnell brings out teaching aids from under the table. A blue balloon to represent the planets. A stuffed Disney Pluto and a box of cereal (Ceres, therefore cereal, get it?) stand in for the 'dwarf planets'. There's something indistinguishable and lumpy for the small Solar-System bodies.

Next, a vote on resolution 5B. Are classical planets and 'dwarf planets' all planets proper, giving us two classes of planets and making 'planet' an umbrella term? (Out comes an umbrella labelled 'planets'.) Ninety-one in favour. The number against is overwhelming — no need to count again.

"It's clear that resolution 5B is not passed," the chair reports. So, we have eight planets only. Pluto is out.

Straight after the vote, I see Richard Binzel of the Massachusetts Institute of Technology, a member of the Planet Definition Committee. He says, with some relief, "it's over, it's done."

Oh no it's not. ■

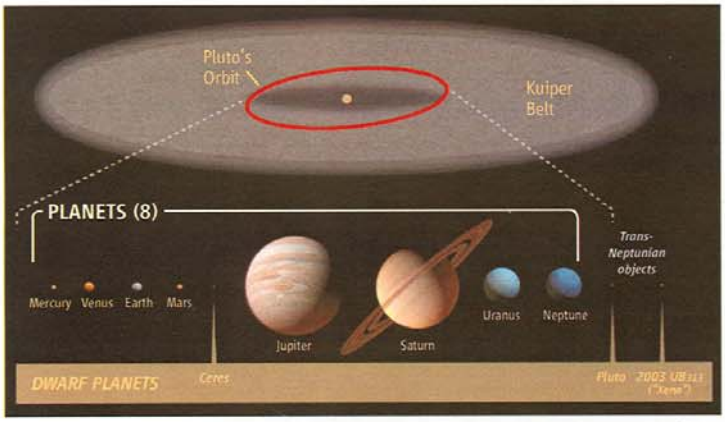
Nature, 31.08.06

PLUTO

Underworld Character Kicked Out of Planetary Family

PRAGUE, CZECH REPUBLIC—The debate wasn't even supposed to be about Pluto. Last week's vote by the International Astronomical Union (IAU) to define the term "planet" was intended to set rules for the classification of new discoveries in the outer solar system. Instead—in a pair of votes that made headlines around the world—IAU not only dropped the small, distant ice ball from the roster of planets but also all but guaranteed that no more planets would be discovered in the solar system in the future.

Pluto has always been an oddball. Smaller than Earth's moon, it follows a skewed, elongated orbit into a region known as the Kuiper belt, home to a population of countless "ice dwarfs": rubble left over from the baby days of the solar system. After Pluto was discovered in 1930, IAU declared it a planet by fiat but never clearly defined what a planet is.



Reclassified. Under new rules adopted by the International Astronomical Union, Pluto becomes one of three "dwarf planets" as well as the innermost member of a still-unnamed class of Kuiper belt objects.

The decision, made here at the closing session of the IAU's triennial meeting,* reclassifies Pluto as a "dwarf planet"—but not a planet. That is "patently incorrect," says astronomer and Pluto buff Alan Stern of the Southwest Research Institute in Boulder, Colorado, who heads the New Horizons mission that set off last January to explore the tiny ex-planet in 2015. "If the IAU wants to proclaim that the sky is green, that doesn't make it so." But other astronomers and planetary scientists—including some who supported Pluto's planetary status—say it's time to move on.

* 26th General Assembly, International Astronomical Union, 14–25 August, Prague.

The question became impossible to ignore in the summer of 2005, when Michael Brown, a planetary scientist at the California Institute of Technology in Pasadena, announced the discovery of 2003 UB_{313} (nicknamed "Xena"), an icy world farther from the sun than Pluto and some 10% larger. Had Brown discovered the 10th planet? Without a formal definition, there was no way to tell. So earlier this year, the IAU Executive Committee asked seven people (including award-winning science writer Dava Sobel) to write one.

Chaired by Owen Gingerich, a professor of astronomical history at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts, the committee met in Paris on 30 June and 1 July and unanimously agreed that planet club membership would be open to any sun-circling body big and massive enough to become spherical under its own self-gravity. That would include not only Pluto and "Xena" but also Ceres, the largest member of the rocky asteroid belt between the orbits of Mars and Jupiter. The definition also opened the door for scores of yet-to-be-discovered Kuiper belt planets. In addition, the committee proposed that Pluto's large moon Charon should be considered a planet in its own right and that Pluto-like objects in the Kuiper belt should be called "plutons."

IAU presented the resolution to its General Assembly on 16 August, giving the roughly 2500 attendees more than a week to discuss it. But the committee expected clear sailing. "We felt we had a resolution that anybody could love," Sobel says.

Instead, the "12-planet proposal" went down in flames. Critics objected that planets should also be defined by their orbital dynamics, not just their size and shape. All eight "major" planets, they pointed out, were massive enough to sweep up, fling away, or gravitationally control all the debris in their parts of the early solar system, but Ceres and Pluto—and a host of other candidate "planets"—were not.

Many astronomers lambasted the resolution during a tumultuous lunchtime meeting on 22 August. To Gingerich's argument that the proposal rested on physical criteria, asteroid researcher Andrea Milani of the University of Pisa in Italy, literally screamed, "Dynamics is not physics?" Other astronomers protested the committee's neglect of extrasolar planets, only to be angrily silenced by outgoing IAU President Ronald D. Ekers, who declared such issues to be "out of order!" Some in the audience expressed chagrin. "It should never have become this emotional," says astronomer George Miley of Leiden University in the Netherlands.

On the morning of 24 August—the day of the vote—IAU issued a revised resolution (5A) adding gravitational dominance to the requirements for planethood and omitting any reference to Charon or "plutons." Ceres, Pluto, "Xena," and other spherical sun-circling bodies were labeled "dwarf planets." But to the surprise of many, IAU added an optional amendment (resolution 5B) that would have changed the term "planet" in ▶

SOURCES: INTERNATIONAL ASTRONOMICAL UNION AND JPL/NASA

Science, 01.09.06

resolution 5A into "classical planet." By restricting the new definition to the eight existing "classical planets," the second resolution implied that dwarf planets were a subcategory of planets, too. To "Pluto-bashing" planetary scientists, it looked as if the committee had made a final attempt to keep the small balls in the planet league.

As it turned out, resolution 5A (including the dynamical criterion) passed by a margin so wide that no formal count was deemed necessary, and its sibling 5B was soundly defeated. At 3:32 p.m. European time, Pluto ceased to be a planet.

The Plutonic wars aren't over yet. "This is a sloppy, bad example of how science should be done," says Stern, who was not at the meeting. In protest, he and others have already withdrawn articles from an upcoming edition of a professional solar system encyclopedia after the editor requested them to change Pluto's status in the articles. A petition against the accepted planet definition is already circulating among planetary scientists.

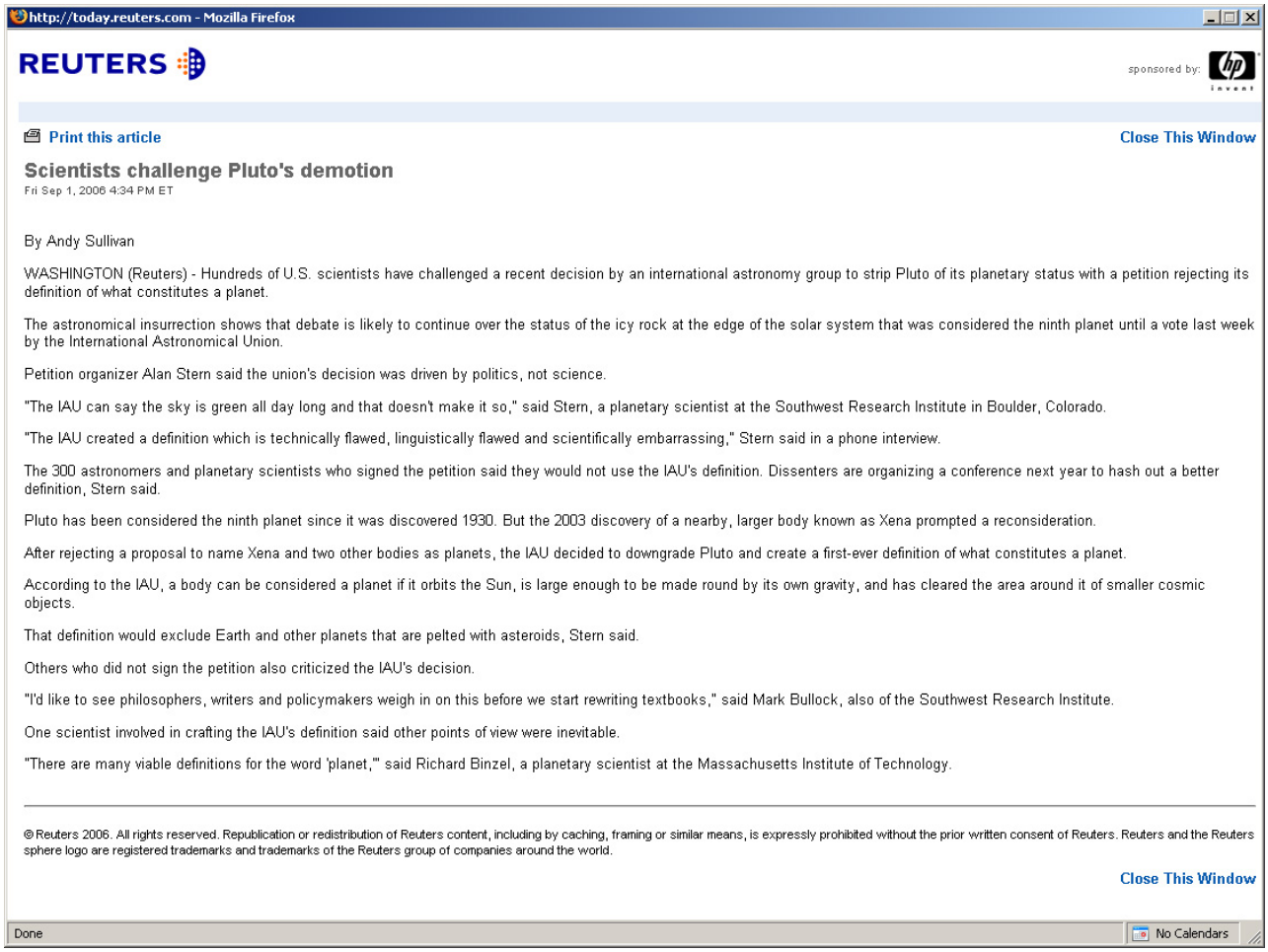
But 2003 UB_{313}'s discoverer Michael Brown (who is not an IAU member and thus had no say in the matter) urges peace. "It was the right scientific choice. As scientists, we should say, 'It's fine. Let's let it go and get on with the business.' "

The business includes coining a word for dwarf planets beyond Neptune, of which Pluto has been designated as the prototype, and setting an official name for dwarf planet 2003 UB_{313}. Planetary scientists must also decide whether dwarf planets belong in their large and steadily growing list of minor planets or in a new catalog.

And of course, schoolbooks have to be rewritten. Despite the flood of news stories speculating about the effect of the IAU vote on students' fragile psyches, Brown predicts that children will adapt easily to the revised solar system. "People are not as upset about schoolkids as they think they are," he asserts. "They're actually upset about their memories of themselves as schoolkids. The kids will be fine." **–GOVERT SCHILLING**

Govert Schilling is an astronomy writer in Amersfoort, the Netherlands. With additional reporting by John Bohannon and Robert Coontz.

Science, 01.09.06



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Scientists challenge Pluto's demotion

Fri Sep 1, 2006 4:34 PM ET

By Andy Sullivan

WASHINGTON (Reuters) - Hundreds of U.S. scientists have challenged a recent decision by an international astronomy group to strip Pluto of its planetary status with a petition rejecting its definition of what constitutes a planet.

The astronomical insurrection shows that debate is likely to continue over the status of the icy rock at the edge of the solar system that was considered the ninth planet until a vote last week by the International Astronomical Union.

Petition organizer Alan Stern said the union's decision was driven by politics, not science.

"The IAU can say the sky is green all day long and that doesn't make it so," said Stern, a planetary scientist at the Southwest Research Institute in Boulder, Colorado.

"The IAU created a definition which is technically flawed, linguistically flawed and scientifically embarrassing," Stern said in a phone interview.

The 300 astronomers and planetary scientists who signed the petition said they would not use the IAU's definition. Dissenters are organizing a conference next year to hash out a better definition, Stern said.

Pluto has been considered the ninth planet since it was discovered 1930. But the 2003 discovery of a nearby, larger body known as Xena prompted a reconsideration.

After rejecting a proposal to name Xena and two other bodies as planets, the IAU decided to downgrade Pluto and create a first-ever definition of what constitutes a planet.

According to the IAU, a body can be considered a planet if it orbits the Sun, is large enough to be made round by its own gravity, and has cleared the area around it of smaller cosmic objects.

That definition would exclude Earth and other planets that are pelted with asteroids, Stern said.

Others who did not sign the petition also criticized the IAU's decision.

"I'd like to see philosophers, writers and policymakers weigh in on this before we start rewriting textbooks," said Mark Bullock, also of the Southwest Research Institute.

One scientist involved in crafting the IAU's definition said other points of view were inevitable.

"There are many viable definitions for the word 'planet,'" said Richard Binzel, a planetary scientist at the Massachusetts Institute of Technology.

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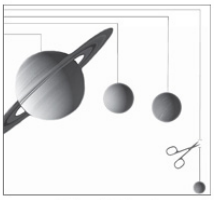
Done

No Calendars

Reuters, 01.09.06

Planet politics

How I tried -- and failed -- to save Pluto



The Boston Globe

By Owen Gingerich | September 3, 2006

NAMING HAS ALWAYS been a tricky business in astronomy. When Galileo discovered four ``planets'' accompanying Jupiter, he intended to name them ``Medicean stars,'' after his hoped-for patron. He got the job, but lost on the names. Kepler introduced the word ``satellites,'' and Medicean never stuck.

William Herschel tried to name his new planet ``Georgium Sidus'' for King George III, but the international astronomy community would have none of that, calling it Uranus instead.

Lowell Observatory in Flagstaff, Ariz., was luckier with Pluto, which was discovered there in 1930. The name, suggested by an 11-year-old Oxford school girl, incorporated the initials of Boston Brahmin Percival Lowell, who had initiated the search for the object decades earlier.

Yet controversy finally caught up with Pluto in 2006. Pluto, it had turned out, was not a massive object influencing Uranus and Neptune in their courses, as Lowell and his contemporaries had assumed. It was a dwarf, smaller than our moon, and 400 times less massive than the earth. The supposed wobbles in Neptune's positions resulted from using an incorrect mass for Neptune itself when calculating its orbit. Had these facts been known in 1930, Pluto's planetary status would have been disputed at the outset.

The International Astronomical Union has for 80-odd years been naming comets and asteroids without controversy, but when Mike Brown of Cal Tech and his colleagues recently found an object even bigger than Pluto plying the frozen reaches beyond Neptune, it ignited a crisis of nomenclature. Had he found a 10th planet? And were there more candidates waiting to be discovered among the numerous icy chunks in the so-called Kuiper belt?

In a quandary, the IAU decided to appoint a small but broadly based committee to look into the matter. As both an astrophysicist and historian of science, I was tapped to chair it.

There are two distinct scientific ways to approach the problem of defining planethood. One is extrinsic, to define a planet in terms of its neighbors and its interactions with its environment. This route would select the dominant bodies in the solar system, the ones whose gravity perturbs one another.

It was the flash of insight that not only the sun holds the planets in orbit, but that each planet attracts each other one, that led Isaac Newton to the concept of *universal* gravitation. Neptune attracts Pluto, locking it into a resonant orbit so that in the time Neptune takes to round the sun three times, Pluto revolves exactly twice. But Pluto is too lightweight to have an observable effect on giant Neptune. The eight dominant heavyweights, from Mercury to Neptune, are big enough to rule their zones and swallow up most of the smaller bodies or kick them out of the way.

Choosing such dominance is a comfortable way to go when defining what constitutes a planet: While it would dismiss Pluto, it would forever place the other eight planets in an exclusive club.

An alternative way to define a planet, however, is intrinsic-that is, by the properties of the body itself, more or less independent of its environment. This is the way planetary geologists look at the problem, and pretty much the way astronomers looking at the hundred-plus planets circling other stars do. The idea of using the basic physics of the object appealed to our committee as the forward-looking way to define planets, for it could apply not only to the far stretches of the solar system, but to the objects being found around distant stars as well.

Rather than arbitrarily drawing a line in the sand that would either include or exclude Pluto, we opted to let nature pick a dividing line between planets and the hundreds of thousands of lumpy asteroids now known-nearly 140,000 numbered objects and an equal number awaiting their catalog numbers. If a body is massive enough, with enough self-gravity to pull itself into a ball, let it be planet. If it's just a lump, let it be an asteroid or a comet.

Of course, the roundness definition could open the gates to a dozen or more snowballs in the Kuiper belt, and we were quite aware that these bodies would be minor lightweights in a system of traditional heavyweights. So we decided to distinguish the eight classical planets from the Kuiper belt planets. As a group, these Kuiper belt planets needed a name, something that gave a tip of the hat to the longstanding eminence of Pluto. We eventually backed the name ``plutonian.'' Thus Pluto, while being demoted, would be cast in the position of being a group leader and would still be a planet, though of a different sort.

In August our committee took this recommendation to Prague, to the triennial IAU congress, where it became the most-talked-about issue of the meeting. (I recently put ``Pluto'' and ``Gingerich'' into Google and got 41,000 hits!) The media there had two questions: Was Pluto still a planet? and how many planets would there be?

In the committee it had never occurred to us to count the current number, because we knew the tally of plutonians would rapidly grow. We also knew that the Hubble Space Telescope had recently shown that the earliest known asteroid, Ceres, was round. Ceres would thus fit our definition of a planet, though it would be in a category of its own, being neither a heavyweight nor a plutonian-a term we reserved for the lightweight planets beyond Neptune.

All this was more complexity than could be accounted for in any handy mnemonic phrase. We felt, however, that our definition reflected the new-found diversity in our solar system, which modern science shows is far more complex than dreamt of by Percival Lowell. Our definition suggested the growing richness of our environment. But it also proved to be the Achilles' heel of our proposal.

The media, eager to promote controversy, quickly found vocal critics to say that the whole business was too complicated. In the final days of the congress, a group of astronomers persuaded enough of their colleagues that a simpler result was desirable (even if it required a more complicated definition), and the intrinsic approach was voted down.

The IAU thereafter defined a planet in our solar system as an object large enough to clear the smaller bodies from its orbit, a definition just murky enough to give teachers a considerable challenge to explain precisely what this means. Taking the exclusive club approach for the heavyweights, the IAU went on to create a class of ``dwarf planets,'' including Pluto, that by definition are not planets. To me this is a linguistic absurdity, a contradiction that could have been avoided if they had chosen to define only the eight classical planets as the basic type of planets, allowing dwarf planets to be considered planets too, albeit of a different kind. But this cultural compromise was specifically rejected.

In their muddled wisdom, the IAU members did at least vote to make Pluto the prototype object for a new category. Ceres will stand alone as a dwarf planet in the asteroid belt while Pluto will be the charter member of a new class of dwarf planets beyond Neptune, much as our committee originally proposed. But, by a virtual tie vote, the IAU decided not to adopt the obvious name ``plutonians'' for that category. The name awaits in the wings.

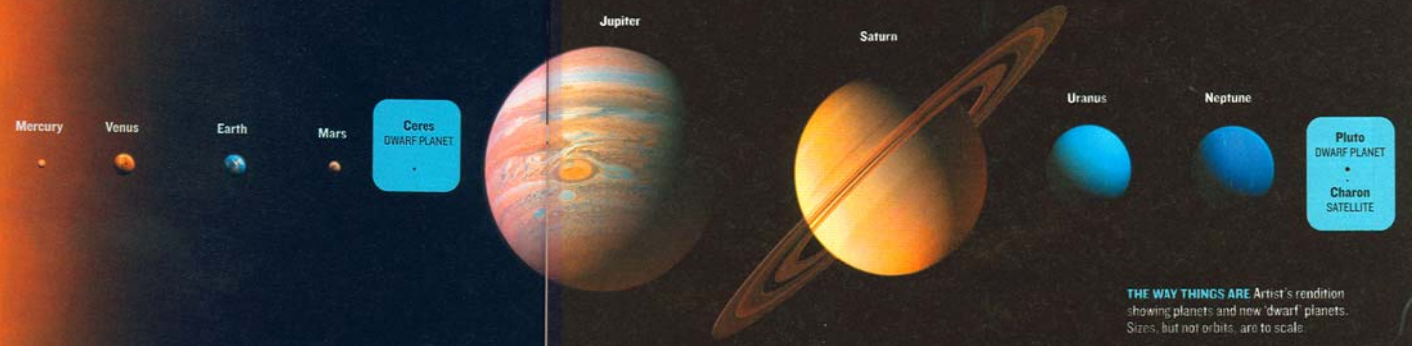
Owen Gingerich is professor emeritus of astronomy and history of science at the Harvard-Smithsonian Center for Astrophysics and the author of ``God's Universe,'' to be published this month. ■

Boston Globe, 03.09.06

Newsweek, 04.09.06

Of Cosmic Proportions

Astronomers decide Pluto isn't a real planet anymore. Why they did it — and how our view of the universe is changing.



THE WAY THINGS ARE Artist's rendition showing planets and new 'dwarf' planets. Sizes, but not orbits, are to scale

BY JERRY ADLER

IT'S A MERCIFUL THING THAT CLYDE Tombaugh wasn't around to see this day. Tombaugh, the ambitious Kansas farm boy who discovered the ninth planet, Pluto, in 1930, departed Earth in January 1997, when he died at the age of 90. And then Tombaugh departed it again this past January, when his cremated ashes were blasted into space aboard the New Horizons space probe. But while New Horizons was streaking through the asteroid belt last week en route to a rendezvous with Pluto in 2015, a group of astronomers on Earth decreed that its destination now belonged to a new category of heavenly body, a "dwarf planet." Tombaugh knew something like that was afoot before he died, according to his 93-year-old widow, Patricia, who added that as a man of science, he would have understood the decision. For her part, though, she confessed some disappointment. "I feel like I sort of got demoted from my job being the wife of the discoverer of Pluto," she told the Arizona Daily Star. "Now I'm the wife of the discoverer of a dwarf planet."

It's not surprising that she should care. But what about the rest of us? Why is the world so captivated by the fate of this remote and almost invisible world? This knob of rock and frozen nitrogen dwells so far out in the solar system—averaging about 3.6 billion miles, or almost 40 times the distance from Earth to the Sun—that in the 76 years since its discovery it hasn't completed even a third of its orbit. And, of course, it was not really its "fate" that was at stake, but an arbitrary designation whose impact will largely fall on textbook publishers, planetarium gift shops and astrologers. The debate and vote by the International Astronomical Union at its meeting in Prague was a little reminiscent of the earnest discussions a few years back about whether the 21st century began on Jan. 1, 2000, or 2001.

But then why was Matthew Malkan, a UCLA astronomer, deluged with e-mails from people he hadn't heard from in years, wanting to talk about the IAU meeting. Why did Jan Weiss, visiting the Rose Center for Earth and Space at the American Museum of Natural History, feel a pang of sadness at the news about Pluto? "You grow up and there are nine planets, and now there aren't," she mused. "Imagine all those dorm rooms where they have to scrape Pluto off the ceiling."

But the solar system we thought we knew is changing faster than most of us can keep up with—part of a larger process of expanding our view of the universe. Planets, once thought to form gradually out of coalescing dust and gas, are now viewed as the survivors of a violent process of collision and accretion, the winners in a Darwinian competition to build up enough gravity to control one's own orbit. A planet the size of Pluto has no place in the 21st-century solar system.

The sad truth is, Pluto's claim to planethood has been shaky ever since its discovery. It is by far the smallest of the canonical nine planets—about 2,300 kilometers (1,400 miles) in diameter, smaller even than Earth's moon—and with a unique orbit(graphic). Too faint to be seen by the naked eye and barely crawling across the night sky, it remained unknown to the ancients. By 1846, astronomers had discovered Uranus and Neptune, which together with Earth made eight relatively large bodies circling the Sun.

No one suspected there might be another until the early 1900s, when astronomers—notably Percy Lowell, who founded the observatory that bears his name in Flagstaff, Ariz.—detected a perturbation in the orbits of the outermost planets, suggesting they were being tugged by the gravity of something not yet seen. Lowell, who died in 1916, devoted the last years of his life to the fruitless search for this "Planet X." In 1929, the job of looking for Planet X was turned over to Tombaugh. His job was to take two photographs of the same part of the sky on different nights and compare them, looking for objects that had moved. Each photographic plate contained hundreds of thousands of stars. Yet in less than a year, he picked out of some 15 million specks of light the one that would be called Pluto, in just the part of the sky that Lowell had predicted.

At first, no one really knew the size of Pluto, so calling it a planet was uncontroversial. But as more was known, astronomers began to question whether it belonged in the same category as the other

A New World Order

Last week astronomers relegated tiny Pluto to "dwarf planet" status, altering the long-established map of our solar system. Over the last few decades, astronomers have used new telescopes and data from spacecraft exploring the planets upclose to study what's out there:

Getting to Know the Planets

Since launching Explorer 1 in 1958, the U.S. has led a global effort to get a better look at the solar system. Recent missions to our planetary neighbors:

JUNE 1983: Pioneer 10, which took the first vivid shots of Jupiter in 1973, becomes the first spacecraft to fly beyond the orbits of all the planets.

JAN. 1986: NASA's Voyager 2 gives an upclose view of Uranus; its rings, 10 new moons and a boiling ocean of water are discovered.

MAY 1989: Launched from the space shuttle Atlantis, Magellan orbits Venus and sends back new images of the planet's surface—85% of which is covered by lava.

AUG. 1992: After years of searching, astronomers detect a reddish object just beyond Neptune's orbit. The sighting confirms the existence of a region on the solar system's edge—the Kuiper Belt—that's home to Pluto and thousands of comets and other icy bodies.

JUNE 1994: Sent into space to explore Jupiter, Galileo captures a comet smashing into the gaseous planet. Eighteen months later Galileo releases a special probe to investigate the planet's atmosphere.

JULY 1997: The Mars Pathfinder lands on the Red Planet, releasing a rover to explore its surface.

OCT. 2002: Astronomers at Caltech identify Quaoar in the Kuiper Belt. One of the largest objects found since Pluto was named in 1930, it consists of rock and ice, and orbits the Sun once every 288 years.

MARCH 2004: A second NASA Mars explorer, Opportunity, confirms there was once water on this planet.

JULY 2004: Cassini—launched through a partnership between NASA and two European space agencies—becomes the first spacecraft to orbit Saturn.

JAN. 2006: New Horizons sets off to explore Pluto and the Kuiper Belt. First shots: 2015.

Hubble Telescope

Since it orbits above Earth's atmosphere, its images of space are better than those taken from the ground. It needs repairs. Will it be fixed?

Launched: 1990
Mission duration: Up to 20 yrs.
Length: 43.5 ft.
Weight: 24,500 lb.
Diameter: 14 ft.
Altitude: 380 mi.
Power: Solar panels

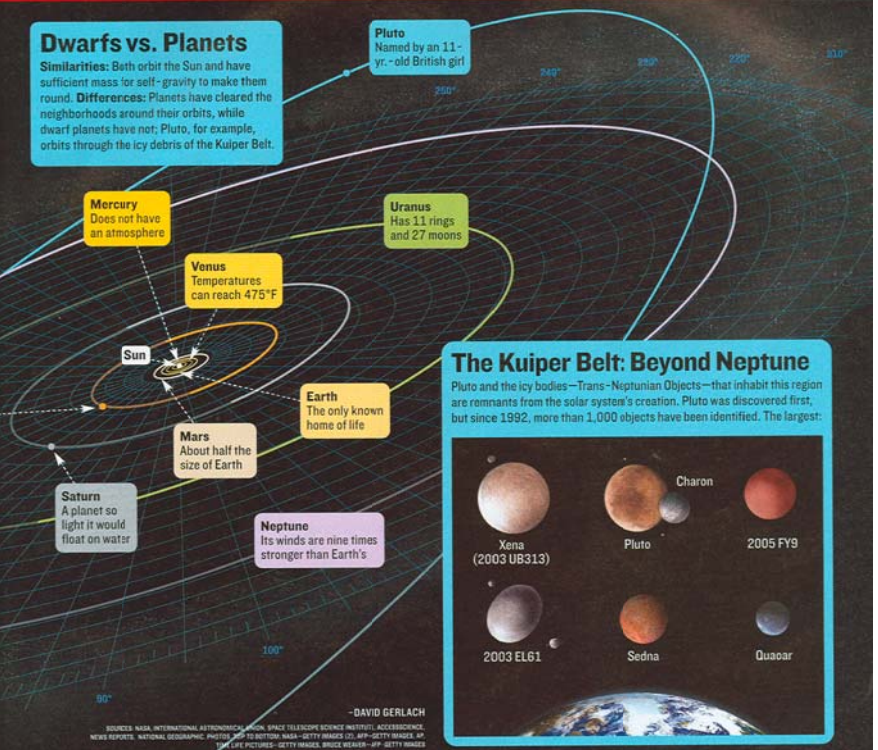
Pluto: The Numbers

Pluto's mass is 1/500th that of Earth. And its diameter is just 1,400 miles: the distance between Las Vegas and Des Moines. A look at how Pluto compares with Earth and our moon.

	EARTH	MOON	PLUTO
Diameter (mi.):	8,000	2,100	1,400
Orbit around Sun (yr.):	1	n/a	248
Min./max. temp. (°F):	-126/136	-387/253	-387/-369
Orbital circumference (mi.):	574 mil.	1.4 mil.	20.4 bil.

Dwarfs vs. Planets

Similarities: Both orbit the Sun and have sufficient mass for self-gravity to make them round. **Differences:** Planets have cleared the neighborhoods around their orbits, while dwarf planets have not; Pluto, for example, orbits through the icy debris of the Kuiper Belt.



The Kuiper Belt: Beyond Neptune

Pluto and the icy bodies—Trans-Neptunian Objects—that inhabit this region are remnants from the solar system's creation. Pluto was discovered first, but since 1992, more than 1,000 objects have been identified. The largest:

-DAVID GERLACH

SOURCES: NASA, INTERNATIONAL ASTRONOMICAL UNION, SPACE TELESCOPE SCIENCE INSTITUTE, ACCESSSCIENCE, NEWS REPORTS, NATIONAL GEOGRAPHIC. PHOTOS, TOP TO BOTTOM: NASA—GETTY IMAGES (2), AFP—GETTY IMAGES, AP, TIME LIFE PICTURES—GETTY IMAGES, BRUCE WEAVER—AFP—GETTY IMAGES

eight planets. Some even wanted to call it a "comet." When the Rose Center opened in 2000, its solar-system exhibit had only eight planets—provoking a flood of angry letters from kids, according to Michael Shara, curator of astrophysics. "We're trying not to gloat," he said after the IAU vote, "but it's hard not to say we told you so."

This has nothing to do with Pluto's inherent scientific interest. "Whether you're in favor of Pluto being a planet or not, every astrophysicist is cheering on the New Horizons mission," says Shara. "We've never been to a dwarf planet before. What's it like? Is it smooth, like an ice cube, or does it have cracks, which would indicate radioactive or volcanic activity?" Pluto's orbit runs through the Kuiper Belt, a doughnut-shaped region of rocks at the very edge of the solar system that astronomers have just begun to explore.

What they are finding there are clues to the origins of planets and of life itself.

What forced the issue of Pluto's status was a discovery last year by a Caltech astronomer named Mike Brown. Since 1998, Brown and his collaborators, David Rabinowitz at Yale and Chad Trujillo of the Gemini Observatory in Hawaii, have been doing more or less what Tombaugh did back in 1930: taking repeated pictures of the sky and looking for things that move. The pictures are now digital, of course, and computers do the initial screening, flagging as many as 100 objects a night for Brown to look at the next morning. The great majority are meaningless, but every now and then he turns up a new Kuiper Belt object, glinting in the light from the distant Sun. The one he spotted one morning last January, in an image originally recorded in October 2003, was unusual, uncommonly bright and in an orbit that took it far beyond Pluto. No Earth-based telescope can measure the size of a planet at that distance, so Brown had to wait until he could get time on the Hubble Space Telescope. By April of this year, he had his answer: the pinpoint of light—officially designated 2003 UB313, but temporarily nicknamed Xena—was about 2,400 kilometers across, around 5 percent bigger than Pluto.

Suddenly, the cozy certainties about the solar system with which an entire generation had grown up were called into doubt. Was Brown's discovery the 10th planet? It certainly looked that way—and if it weren't, then why should Pluto be one? The whole episode called attention to the fact that astronomers had never formalized exactly what they meant by "planet." It had always seemed obvious, but the definition that seemed to be emerging by default—"something orbiting the Sun, about the size of Pluto, or bigger"—seemed embarrassingly ad hoc.

So the IAU proposed, at first, to set a threshold for planethood defined by shape. Planets form out of an accumulation of dust and rocks. Below a certain diameter, roughly 1,000 kilometers, they tend to stay in whatever random shape emerges from that process; above that size, their own gravity molds them into a sphere. So the first criterion was that a planet had to be round. But many moons are large enough to be round, so the second part of the definition was that a planet had to orbit the Sun, and not another planet.

The IAU—perhaps anticipating endless future wrangling—decided that the solar system had enough planets already. More than enough: it added a third condition that a planet had to dominate its own orbit, clearing the immediate region of smaller objects, that in effect draws the line at eight. No asteroids can qualify, no Kuiper Belt objects. And no Pluto. They are now "dwarf planets."

Was this fair? Was it just? Joel Parker of the Southwest Research Institute, one of the New Horizons' lead institutions, said he didn't think American astronomers would take the vote lying down, and predicted there might be a move to revise the definitions when the IAU meets again in 2009. His preferred solution would be to give Pluto "special dual citizenship" as both a Kuiper Belt object and a planet, in recognition of its special cultural status.

In other words, we are fond of it. "A lot of kids like Pluto because it has a cute name," says Parker, and if even one of those kids grows up to be the next Einstein—or, almost as good, the head of the House appropriations committee—shouldn't that be reason enough to keep it? Louis Friedman, executive director of the Planetary Society, doesn't think kids will mind memorizing the name of one fewer planet. "It won't upset the schoolchildren," he predicts. "It's those of us who used to be schoolchildren."

With MARY CARMICHAEL in Boston, NOMI MORRIS in Los Angeles and A. CHRISTIAN JEAN in New York


The Asahi Shimbun
新定義案による太陽系の惑星（各惑星の大きさや距離の比率は実際とは異なる）
冥王星
カロン
木星
土星
太陽
水星
金星
地球
火星
天王星
海王星
2003 UB 313
セレス
（国際天文学連合と米航空宇宙局の資料から）

Für Io gilt: Mond bleibt Mond. Der Trabant des Jupiter ist so klein, dass er auch nach einer neuen Definition des Begriffs Planet ein Mond bliebe. Plutos Begleiter Charon aber könnte ein Aufstieg vergönnt sein. Weltbild Löppert

Andrang im Klub der Planeten

Dutzende weitere Himmelskörper sollen Vollmitglieder des Sonnensystems werden

Seit mehr als 70 Jahren wird es so in der Schule gelehrt. Und auch in den Lehrbüchern der Astronomie steht, dass neun Planeten die Sonne umkreisen. Doch das könnte sich nun ändern, falls die Internationale Astronomische Union (IAU) auf ihrer derzeitigen Tagung in Prag den Vorschlag eines Expertenteams annimmt. Zwölf Planeten könnten es dann sein, und in den kommenden Jahren dürften noch Dutzende hinzukommen.

Dass der Begriff Planet eine neue Definition braucht, diskutieren Astronomen, seitdem drei ihrer Kollegen aus den USA im August 2005 einen neuen Himmelskörper im Sonnensystem entdeckt haben. Das Problem: Das Objekt, das von seinen Entdeckern Xena genannt wird, aber offiziell noch die vorläufige Bezeichnung 2003 UB313 trägt, ist größer als der Planet Pluto.

Der Neuling kreist jenseits von Pluto um die Sonne, in einer Zone, die Astronomen „Kuiper-Gürtel" nennen. Auch früher hatten Wissenschaftler im Kuiper-Gürtel immer wieder Kleinplaneten gefunden, denen sie Namen wie Orcus, Sedna und Quaoar gaben. Allerdings sind all diese Neulinge weniger als halb so groß wie Pluto. Weil aber nicht auszuschließen ist, dass weitere Brocken entdeckt werden, die Pluto übertreffen, hat die IAU ein siebenköpfiges Expertenteam beauftragt, den Begriff Planet neu zu definieren. Jetzt liegt der Vorschlag des Komitees um Owen Gingerich, einen emeritierten Astronomie-Historiker vom Harvard-Smithsonian Center for Astrophysics, auf dem Tisch.

Vier Bedingungen sollen demnach darüber entscheiden, was ein Planet ist. Erstens: Der Körper muss so groß sein, dass die Schwerkraft ihm eine nahezu runde Form verliehen hat. Das geschieht erfahrungsgemäß erst bei einem Durchmesser von mehr als 800 Kilometern. Zweitens muss er einen Stern umkreisen. Drittens darf er selbst kein Stern sein, also keine Kernfusion zünden. Und viertens darf er keinen anderen, deutlich größeren Planeten umkreisen, sonst gilt er als Mond.

Die Sprengkraft liegt in der ersten Bedingung. Demnach wären nicht nur die bisher bekannten neun Himmelskörper von Merkur bis Pluto Planeten, sondern auch die bisher noch inoffizielle Xena. Weitere neun Kandidaten im Kuiper-Gürtel stehen schon auf der Liste. Weil sie selbst in den größten Teleskopen nur als Lichtpunkte erscheinen, kennt man aber weder ihre Größe noch ihre Form genau.

Doch die neue Kategorisierung treibt noch wundersamere Blüten. Ihr zufolge würde auch der tausend Kilometer große Ceres in den Rang eines Planeten erhoben – ein Brocken, der bisher als Asteroid die Sonne zwischen Mars und Jupiter umkreist. Drei weitere große Mitglieder des Asteroidengürtels, Vesta, Pallas und Hygiea, kämen in Frage. Hier müssten künftige Beobachtungen zeigen, ob ihre Rundung sie zum Planeten qualifiziert.

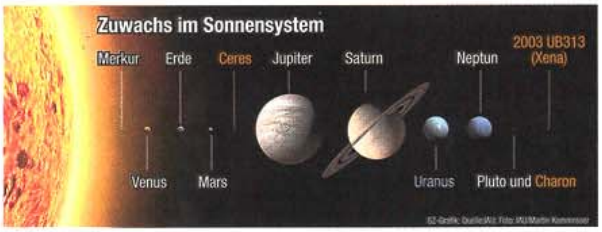
Damit nicht genug. Wenn es nach dem Willen der Expertengruppe geht, wird auch der 1200 Kilometer große Pluto-Mond Charon zum Planeten – obwohl er einen Planeten umkreist und damit der vierten Bedingung widerspräche. Der Grund: Charon ist etwa halb so groß wie Pluto, wodurch der gemeinsame Schwerpunkt – anders als beim System Erde-Mond – außerhalb der beiden Körper liegt. Owen Gingerich sieht das als hinreichenden Grund, Charon in den Planetenstand zu erheben. Gemeinsam mit Pluto soll er künftig als Doppelplanet gelten.

Die Plutons und die Zwerge

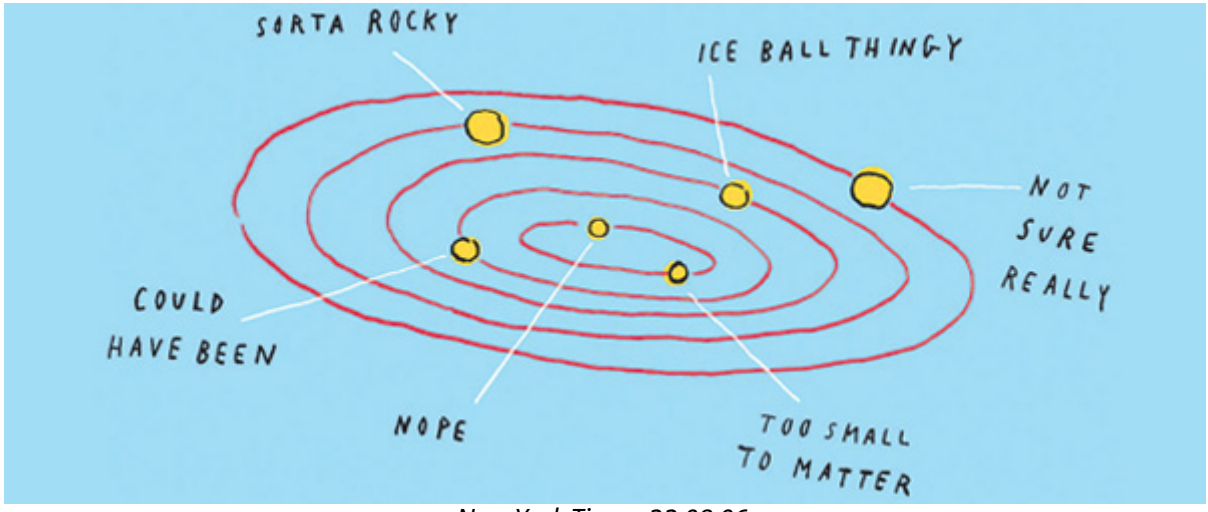
Gemäß der Neudefinition würden zu den neun klassischen Planeten sofort Ceres, Charon und Xena hinzukommen. Auf der Kandidatenliste stünden zwölf Körper, und weitere Zugänge sind wahrscheinlich. Weil auch der Expertengruppe beispielsweise die Gleichstellung von Ceres und der Erde wohl etwas gewagt erschien, schlagen sie eine feinere Unterteilung vor. So bezeichnen sie Pluto, Charon und die weiteren Planeten im Kuiper-Gürtel als „Plutons" und kleine Planeten im Asteroidengürtel, wie Ceres, als „Zwergplaneten". Beide Begriffe seien aber nur beschreibende Zusätze und keine Definition, beont Gingerich. Die neue Kategorisierung hat nicht nur zur Folge, dass die Zahl der Planeten in unserem Sonnensystem zukünftig leicht mehrere Dutzend erreichen kann. Sie setzt vor allem voraus, dass man die Form der Kandidaten bestimmt, was in vielen Fällen nur schwer möglich sein wird.

Bereits vor sieben Jahren haben Lutz Schmadel vom Astronomischen Rechen-Institut in Heidelberg und sein Kollege Brian Marsden, Leiter des Minor Planet Center an der Harvard-Universität, ein vereinfachtes System vorgeschlagen. Sie würden Pluto den Planetenstatus aberkennen und alle Objekte im Kuiper-Gürtel als Planetoiden einstufen, die Trans-Neptune heißen könnten. Diesen Vorschlag lehnte die IAU jedoch ab.

Dabei lässt sich an einigen Eigenschaften festmachen, dass die Körper in den Außenbereichen des Sonnensystems nicht zur Gruppe der klassischen, großen Planeten gehören. So sind ihre Umlaufbahnen gegenüber denen der großen Planeten stark geneigt und elliptisch verformt. Gingerich und seine Kollegen werden sich mit ihrer neuen Definition also auf einigen Widerstand einstellen müssen. „Die IAU macht sich lächerlich, wenn ein derartiger Beschluss gefällt wird", sagt Schmadel, der seit 15 Jahren deutscher Vertreter in der IAU-Kommission für Kleinplaneten ist. Und Marsden schrieb im britischen *Guardian*: „Wie viele Planeten wollt Ihr? Ich bin mit acht vollkommen glücklich." In zwei Sitzungen wollen die IAU-Mitglieder die historische Frage diskutieren. Am kommenden Donnerstag werden sie dann abstimmen. THOMAS BÜHRKE



Mehrere Neuzugänge könnte es bald im Planetensystem der Sonne geben: Ceres, Charon und Xena stehen auf der Kandidatenliste ganz oben.



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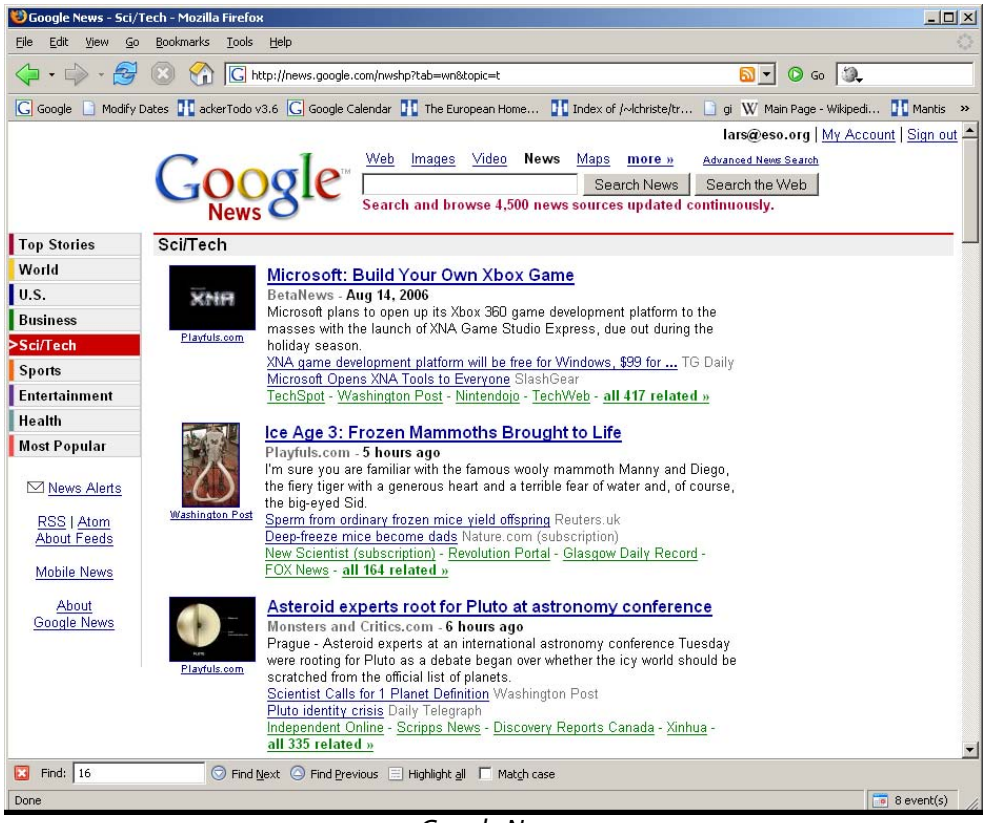

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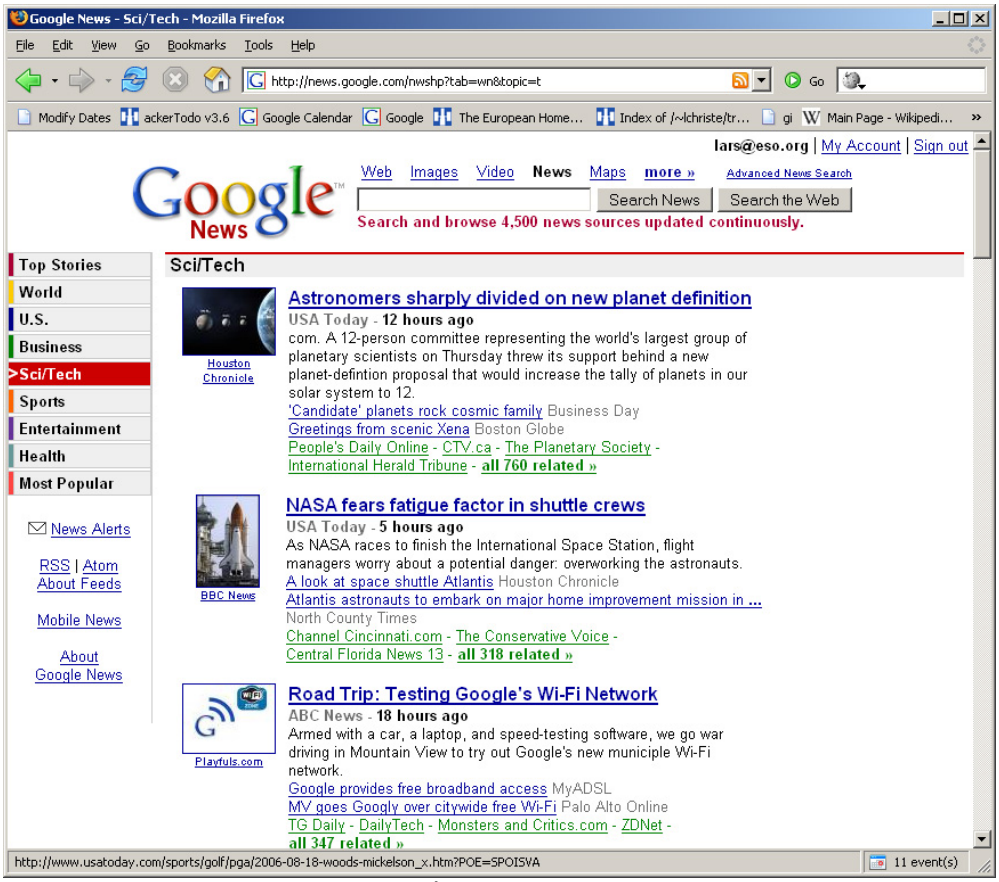

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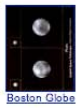
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Appendix I: Excerpts from GA Newspaper

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IAU Planet Definition Committee

The IAU has been the arbiter of planetary and satellite nomenclature since its inception in 1919. The various IAU Working Groups normally handle this process, and their decisions primarily affect the professional astronomers. But from time to time the IAU takes decisions and makes recommendations on issues concerning astronomical matters affecting other sciences or the public. Such decisions and recommendations are not enforceable by any national or international law; rather they establish conventions that are meant to help our understanding of astronomical objects and processes. Hence, IAU recommendations should rest on well-established scientific facts and have a broad consensus in the community concerned.

Ron Ekers, President of the IAU

The boundary between (major) planet and minor planet has never been defined and the recent discovery of other "Trans-Neptunian Objects" (TNOs), including some larger than Pluto, triggered the IAU to form a working group on "Definition of a Planet" from its Division III members. While there was general agreement on all the scientific issues related to Solar System dynamics and physical properties of planets, the IAU Division III Working Group could not agree on aspects that were related to social and cultural issues, such as the status of Pluto. In order to include these broader aspects, the IAU Executive Committee (EC) formed a new committee whose membership had backgrounds in history, science publishing, writing and education as well as in planetary science.

Terms of Reference

The Planet Definition Committee of the IAU Executive Committee was charged with:

(i) discussing the broader social implications of any new definition of a planet and recommending a course of action that balances the scientific facts with the need for social acceptance of any change;
(ii) addressing the status of Pluto, and of the newly discovered TNOs in the light of recommendation (i);
(iii) considering whether the current naming procedures for planets and minor planets have exacerbated the problem of defining a planet and recommending whether revisions are needed; and
(iv) attempting to frame these recommendations as a resolution, or resolutions, that could be put before the Prague GA in August 2006 for possible adoption.

The Path to Defining Planets

Owen Gingerich, Harvard-Smithsonian Center for Astrophysics/IAU EC "Planet Definition" Committee chair

Celestial nomenclature has long been fraught with controversy. Galileo proposed to name the large satellites of Jupiter the "Medicean planets"; William Herschel named his new planet after the English monarch, George III; Hevelius honoured the defender of Vienna with "Scutum Sobieski"; and Bode named a northern constellation after the comet hunter Charles Messier. None of these appellations have stood the test of time except for the fragment "Scutum".

At its inaugural meeting in 1922, the IAU standardized the constellation names and abbreviations. More recently IAU Committees or Working Groups have certified the names of asteroids, satellites, and planetary and satellite features. Until now, however, the IAU has never named a planet, and it has been unclear whether there are potential planets to be named.

How, in fact, should the word "planet" be defined?

This was the controversial question facing the committee established by the IAU Executive Committee with the charge to recommend a definition for an IAU resolution. The seven members represented a spectrum of opinion and expertise. We all knew that modern scientific advances have taught us that the Solar System is a far more complicated place than William Herschel and his contemporaries ever imagined, not only containing an assortment of planets, asteroids, and comets, but rocks, gravel, dust, and ions. We met in Paris for a vigorous discussion of both the scientific and the cultural/historical issues, and on the second morning several members admitted that they had not slept well, worrying that we would not be able to reach a consensus. But by the end of a long day, the miracle had happened: we had reached a unanimous agreement.

On the scientific side, we wanted to avoid arbitrary cut-offs simply based on distances, periods, magnitudes, or neighbouring objects. One physical criterion seemed pre-eminent: was the object shaped by hydrostatic equilibrium, that is, was it basically a round object? This criterion became the basis of our proposed definition. Objects with mass above 5×10^{20} kg and diameter greater than 800 km would normally be considered to be in hydrostatic equilibrium, but borderline cases would have to be established by observation. Even among these round Solar System objects there is a distinct difference between the major planets, whose orbits lie near the ecliptic plane, and those smaller objects with more eccentric, tilted orbits. Had astronomers realized in 1930 that Pluto was smaller than our Moon and with a mass well under 1 % that of the Earth, perhaps some special designation would have been devised for it. On the cultural/historical side, combined with contemporary science, our committee felt that the time was ripe to recognize Pluto as the prototype of a different sort of planet. Consequently, we propose to distinguish between the eight classical planets discovered before 1900, and a new class of Trans-Neptunian Objects, for which we recommend the name "plutons."

The question immediately arises about the status of Pluto. Although Pluto remains a planet by the proposed definition, it will generally be preferable to call it a pluton to emphasise its role as the prototype for a physically distinct category of planetary bodies.

Specialists will at once recall that there are over a hundred so-called "plutinos," Trans-Neptunian lumps of rock, ice, and snow, each with the period 248 years (thus in a 3/2 resonance with the period of Neptune). These faint objects are in general not plutons. Plutons are at present very rare objects: Pluto, Charon, 2003 UB_{313}, and perhaps several more, and anyone who finds a new pluton should be appropriately celebrated.

Savvy astronomers will notice that our definition also makes Ceres a planet, and if Pallas, Vesta, and Hygeia are found to be in hydrostatic equilibrium, they will also have to be considered planets. Without making a formal definition, we suggest that it might be convenient simply to refer to these small round members of our inner Solar System as "dwarf planets."

Did our committee think of everything, including extra-solar system planets? Definitely not! Science is an active enterprise, constantly bringing new surprises. Undoubtedly some future IAU committee will have to revisit this question and define the upper limit for "planet", probably well before 2106!

Members of the Planet Definition Committee

Dr. Richard Binzel is Professor of Earth, Atmospheric and Planetary Science at MIT and a specialist in asteroids and outer Solar System small bodies, and is also a well known and respected educator and science writer.

Dr. André Brahic is Professor at Université Denis Diderot (Paris VII) and is Director of the Laboratory Gamma-gravitation of the Commissariat a l'Energie Atomique. He specializes in planetary rings, and has co-discovered the rings and arcs of Neptune. For the French-speaking public, André Brahic is one of the best known popularisers of science and astronomy, having authored a number of books.

Dr. Owen Gingerich [chair], Professor of Astronomy and History of Science Emeritus at the Harvard-Smithsonian Center for Astrophysics, is an esteemed historian of astronomy with a broad perspective, and a prize-winning educator.

Dava Sobel is the author of the very successful books *Longitude*, *The Planets*, and *Galileo's Daughter*. She has a solid background in, and knowledge of, the history of science, astronomy in particular.

Dr. Junichi Watanabe is an Associate Professor and also Director of the Outreach Division of NAOJ. He is a Solar System astronomer and highly appreciated in Japan as interpreter and writer of astronomy for the public and students. He has strong connections with amateur astronomers, science editors, school teachers and journalists.

Dr. Iwan Williams, Queen Mary University of London, is an expert on the dynamics and physical properties of Solar System objects. He is the current President of IAU Division III (Planetary Systems Sciences).

Dr Catherine Cesarsky, Director General of ESO and President-Elect of the IAU, took part in the work of the committee, bringing in the perspective of the IAU Executive as well as that of an astronomer at large.

The Process of making a Resolution on the Definition of a Planet

Robert Williams, Space Telescope Science Institute, Vice President of the IAU

Statements of scientific importance are expressed by the IAU in resolutions of the General Assembly. Although resolutions are non-binding they do represent the consensus scientific judgment of the members, and are arrived at by a process that involves member input and debate. As explained in the accompanying articles the question of the definition of a planet is of great interest within the Union and among the public, and Division III and the Executive Committee are attempting to set forth criteria that define planets and provide for a nomenclature for the different Solar System objects.

A Working Group under Division III was established to formulate a recommendation on the definition of a planet that could be put before the Executive Committee. Although that Working Group did not achieve a clear consensus, it did succeed in defining the important criteria and framing the discussion of issues to be considered. The EC studied the Division III Working Group report and decided to form its own advisory group, the Planet Definition Committee, to attempt to resolve the issue in a manner that had a solid scientific basis and which might achieve consensus support among members of the Union. Prof. Gingerich has described the work of the Planet Definition Committee, whose report has been received by the EC and used as a basis for framing the draft resolution that is now being put before the General Assembly. The current draft of the resolution "The Definition of a Planet" that has been approved by the EC and the Resolutions Committee appears with these articles.

The process by which resolutions are considered by the IAU is set forth in the Working Rules. It involves consideration by the Resolutions Committee and the Executive Committee, and discussion by the General Assembly before a vote taken in the second business meeting of the GA. Because of the potential impact of this resolution the EC is undertaking extra measures to assure full discussion of the draft during the General Assembly that will allow for possible revisions to the current version before it is presented to the GA at the closing business meeting. They include a discussion and debate of the resolution by Division III-Planetary Sciences at its scheduled meeting this Friday, 18 August. In addition, the EC is convening an extraordinary plenary session of the General Assembly to take place next Tuesday, 22 August, during the lunch break, which will be devoted entirely to a discussion of the draft resolution, and after which a "sense of the meeting" vote will be taken on the resolution as presented. We are fully aware of the potential

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difficulty in achieving a consensus on this complex issue, and we wish to provide ample opportunity for input from members in the formulation of the final resolution to be considered next week.

The key events that bear on the substance of the final resolution to be presented at the closing business meeting, and in which all IAU members are encouraged to participate, are (1) the discussion at the meeting of Division III on Friday, 18 August at 11:00 am in Club B, and (2) the Plenary Session on the Definition of a Planet on Tuesday, 22 August at 12:45 pm in Forum Hall. The Closing Session of the GA will be held Thursday 24 August at 14:00 in the Congress Hall and here the final resolution will be presented, discussed, and voted upon.

The EC reiterates our desire to benefit from members' input into this issue by your participation in these events, which are an important part of the IAU's mission to communicate the discoveries of astronomy to the public. ❐

Planet Definition Q & A Factsheet

The following Question and Answer sheet may help readers to interpret the "IAU Resolution 5 for GA-XXVI".

Q: What new terms are proposed as official IAU definitions?
A: There are two new terms being proposed for use as official definitions of the IAU. The terms are: "planet" and "pluton".

Q: What is the proposed new definition of "planet"?
A: An object is thus defined as a planet based on its intrinsic physical nature. Two conditions must be satisfied for an object to be called a "planet." First, the object must be in orbit around a star, while not being itself a star. Second, the object must be large enough (or more technically correct, massive enough) for its own gravity to pull it into a nearly spherical shape. The shape of objects with mass above 5×10^{20} kg and diameter greater than 800 km would normally be determined by self-gravity, but all borderline cases would have to be established by observation.

Q: Does an object have to be in orbit around a star in order to be called a "planet"?
A: Yes.

Q: Based on this new definition, how many planets are there in our Solar System?
A: There are currently 12. Eight are the classical planets Mercury through Neptune. Three (Pluto, Charon, and 2003 UB_{313}) are in a newly defined (and growing in number) category called "plutons", for which Pluto is the prototype. One is Ceres, which may be described as a dwarf planet.

Q: What is a dwarf planet?
A: A dwarf planet is a term generally used to describe any planet that is smaller than Mercury. Note that the term "dwarf planet" is simply a descriptive category and not an IAU definition. Terms such as "terrestrial planets" and "giant planets" are additional examples of descriptive categories that are not IAU definitions.

Q: What is a "pluton"?
A: A pluton is a new category of planet now being defined by the IAU. A "pluton" is an object satisfying the technical (hydrostatic equilibrium shape in the presence of self-gravity) definition of "planet." Plutons are distinguished from classical planets in that they reside in orbits around the Sun that take longer than 200 years to complete (i.e. they orbit beyond Neptune). Plutons typically have orbits with a large orbital inclination and a large eccentricity.

Q: Is Ceres a planet?
A: Yes. Ceres is found to have a shape that is in a state of hydrostatic equilibrium under self-gravity. Therefore Ceres is a planet because it satisfies the IAU definition of "planet." [Published reference for shape of Ceres: P. Thomas *et* al. (2005), Nature **437**, 224–227. Dr. Peter Thomas is at Cornell University. Historically, Ceres was called a "planet" when it was first discovered (in 1801).

Q: Is Ceres a "pluton"?
A: No.

Q: Why is 2003 UB_{313} a planet?
A: Recent Hubble Space Telescope images have resolved the size of 2003 UB_{313} showing it to be as large as, or larger than Pluto. Any object having this size, and any reasonable estimate of density, is understood to have sufficient mass that its own gravity will pull it into a nearly spherical shape determined by hydrostatic equilibrium. Therefore, 2003 UB_{313} is a planet because it satisfies the IAU definition of "planet."

Q: Is 2003 UB_{313} a "pluton"?
A: Yes.

Q: What is an object called that is too small to be a "planet"?
A: All objects that orbit the Sun, which are too small (not massive enough) for their own gravity to pull them into a nearly spherical shape are now collectively referred to as "small Solar System bodies." This collection includes the category of objects we continue to call asteroids and comets. This collection also currently includes, near-Earth objects (NEOs), Mars- and Jupiter-Trojan asteroids, most Centaurs and most Trans-Neptunian Objects (TNOs). In the new system of IAU definitions, the term "minor planet" is no longer used.

Q: Is the term "minor planet" still to be used?
A: No. The term "minor planet" is no longer to be used for official IAU purposes. Under the new definition of "planet", nearly all objects currently called "minor planets" are not planets. For IAU purposes, a definition and name is needed that clearly distinguishes between objects that are officially recognized as planets and those that are not.

Q: When is an object too large to be called a "planet"?
A: The new definitions proposed by the IAU seek only to define the lower boundary between an object that is a "planet" or a "small Solar System body." At this time there is no official IAU definition in place or proposed that defines the upper limit for when an object is, for example a "planet" or a "brown dwarf." This limit is generally thought to be about 13 times more massive than Jupiter, but is subject to discussion.

Q: Is the new definition for "planet" intended to apply also to objects discovered in orbit around other stars?
A: Yes.

Q: Are objects that have planetary sizes and masses, but which are free floating in space (and not orbit a star) officially "planets" by the IAU definition?
A: No. At this time there is no official IAU definition in place that addresses this class of objects. ❐

Resolution 5 for GA-XXVI: Definition of a Planet

Contemporary observations are changing our understanding of the Solar System, and it is important that our nomenclature for objects reflect our current understanding. This applies, in particular, to the designation "planets". The word "planet" originally described "wanderers" that were known only as moving lights in the sky. Recent discoveries force us to create a new definition, which we can make using currently available scientific information. (Here we are not concerned with the upper boundary between "planet" and "star".)

The IAU therefore resolves that planets and other Solar System bodies be defined in the following way:

(1) A planet is a celestial body that (a) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape[1], and (b) is in orbit around a star, and is neither a star nor a satellite of a planet.[2]

(2) We distinguish between the eight classical planets discovered before 1900, which move in nearly circular orbits close to the ecliptic plane, and other planetary objects in orbit around the Sun. All of these other objects are smaller than Mercury. We recognize that Ceres is a planet by the above scientific definition. For historical reasons, one may choose to distinguish Ceres from the classical planets by referring to it as a "dwarf planet."[3]

(3) We recognize Pluto to be a planet by the above scientific definition, as are one or more recently discovered large Trans-Neptunian Objects. In contrast to the classical planets, these objects typically have highly inclined orbits with large eccentricities and orbital periods in excess of 200 years. We designate this category of planetary objects, of which Pluto is the prototype, as a new class that we call "plutons".

(4) All non-planet objects orbiting the Sun shall be referred to collectively as "Small Solar System Bodies".[4]

[1] This generally applies to objects with mass above 5×10^{20} kg and diameter greater than 800 km. An IAU process will be established to evaluate planet candidates near this boundary.

[2] For two or more objects comprising a multiple object system, the primary object is designated a planet if it independently satisfies the conditions above. A secondary object satisfying these conditions is also designated a planet if the system barycentre resides outside the primary. Secondary objects not satisfying these criteria are "satellites". Under this definition, Pluto's companion Charon is a planet, making Pluto-Charon a double planet.

[3] If Pallas, Vesta, and/or Hygeia are found to be in hydrostatic equilibrium, they are also planets, and may be referred to as "dwarf planets".

[4] This class currently includes most of the Solar System asteroids, near-Earth objects (NEOs), Mars-, Jupiter- and Neptune-Trojan asteroids, most Centaurs, most Trans-Neptunian Objects (TNOs), and comets. In the new nomenclature the concept "minor planet" is not used.

Table 1: Overview of the planets in the Solar System as per 24 August 2006 if "Resolution 5 for GA-XXVI" is passed.

Object	IAU definition	IAU planet category	Descriptive category	Unofficial mean diameter estimate
Mercury	Planet		Classical	4,879 km
Venus	Planet		Classical	12,104 km
Earth	Planet		Classical	12,746 km
Mars	Planet		Classical	6,780 km
Jupiter	Planet		Classical	138,346 km
Saturn	Planet		Classical	114,632 km
Uranus	Planet		Classical	50,532 km
Neptune	Planet		Classical	49,105 km
Ceres	Planet		Dwarf	952 km
Pluto	Planet	Pluton	Dwarf	2,306±20 km
Charon	Planet	Pluton	Dwarf	1,205±2 km
2003 UB_{313}	Planet	Pluton	Dwarf	2,400±100 km

Other objects that appear large enough so that their shape satisfies the definition of "planet" will be further considered on a case by case basis.

Table 2: Planet candidates as per 24 August 2006 to be given future consideration if "Resolution 5 for GA-XXVI" is passed.

Object	Unofficial diameter estimate
2003 EL_{61}	2000×1000×1200 km
2005 FY_9	1500±300 km
(90377) Sedna	1200-1800 km
(90482) Orcus	1000±200 km
(50000) Quaoar	~1000 km
(20000) Varuna	600±150 km
(55636) 2002 TX_{300}	<700 km
(28978) Ixion	500±100 km
(55565) 2002 AW_{197}	700±100 km
(4) Vesta	578×560×458 km
(2) Pallas	570×525×500 km
(10) Hygiea	500×400×350 km

Appendix J: Selected public responses

My name is Silky Sullivan, owner of the World Famous Silky O'Sullivan Bar and Restaurant on Beale street in Memphis, Tennessee, USA, home of Elvis Presley. We salute you on the discovery of the new planets and understand that new names should be of mytholigical orgin. I would like to appear before the IAU to explain why this new body should be named ***planet Elvis****. I have expressed my view on our local news station and in our weekly publication The Memphis Flyer. Response from these activites has been over whelming. Thank you for your time and consideration.*

Sincerly,
Sily Sullivan

I ask you why then if Pluto has been reclassified by your definition why has Neptune also not been reclassified by the same definition.

If Pluto has not cleared the neighourhood around its orbit do to the fact that it crosses Neptune's orbit, than at the same time Neptune has not "cleared its orbit" because Pluto crosses Neptune's orbit.
Please explain.

Virginia Strogen

Dear Mr. Lindberg Christensen;

I was reading the article regarding planets and I thought you might appreciate this illustration. Enjoy.

Kindest regards,
Connie Pecoraro
Artist-Loft
691 Bridgeway
Sausalito, California 94965
415-332-7633
FX:415-332-1263
connie@nonamegirl.com

My ten year old daughter was interested to learn the resolution of the definition of planet. She has been following the subject closely.

In school my daughters were taught to remember the planets names in order with the acronym MVEMJSUNP

My Very Educated Mother Just Showed Us Nine Planets

My = Mercury
Very = Venus
Educated = Earth
Mother = Mars
Just = Jupiter
Showed = Saturn
Us = Uranus
Nine = Neptune
Planets = Pluto

They have edited the acronym as follows:
MVEMJSUN
My Very Educated Mother Just Showed Us Nothing

My = Mercury
Very = Venus
Educated = Earth
Mother = Mars
Just = Jupiter
Showed = Saturn
Us = Uranus
Nothing = Neptune

So much for motherhood. The trickle down effect of the change will be far reaching.

L Humes

Appendix K: Praise from journalists

Thanks a lot for your outstanding service. This was by far the best press service I have ever experienced at an IAU General Assembly. Your and your team's efforts enabled me to work very efficiently. Thanks to all of them!

Dirk Lorenzen, Deutschlandfunk, book author

I followed the vote live on your website. Congratulations for the way you dealt with the press. Many could learn from you.

Nelson Marques, freelance journalist, Porto, Portugal

I want to thank you for all your help during the IAU conference. I know it was a busy time for you, but I appreciate you getting back to me by email.

Alicia Chang, Science Writer, Associated Press

This is an email to say thank you for your help in the lead-up to and during the General Assembly in Prague. We especially appreciate being able to use your telephone to interview astronomers; with all the difficulties we had at the start that made things much easier for us.

Stuart Lowe & Nick Rattenbury, The Jodcast

I had an interview with Mr.Zhu and another astronomer in domestic research organization on Aug.23 and Aug.24. So I could finish the report. And I want to say is that it is so kind of you. For your (maybe and your colleague's) help I appreciate very much. This is my first time to contact with some overseas interview. I was encouraged a lot by your kindness and patience.

Ms Hou Jianmei, reporter in Beijing

Appendix L: Worst case scenario 4: A change of Pluto's status creates anti-American feelings in the US

By Helen Sim

Pluto is a planet with many American connections. Percival Lowell devoted years to searching for "Planet X"; Clyde Tombaugh, hired to carry on the search, found Pluto at Lowell's observatory. The US-based Planetary Society has lobbied heavily for a mission to Pluto, now realised as the New Horizons mission. This American (NASA/JPL) mission is the first to the Pluto-Charon system.

Because of the stake they have in the discovery of Pluto and its current status, some of these parties may resist any attempt to change its status. Such a change may be seen as an anti-American move on the part of a European body (the IAU), and trigger or feed into American separatism in the planetary sciences.

Background

An American discovery

Percival Lowell, founder of Flagstaff Observatory in Arizona, devoted the last 13 years of his life to searching for "Planet X", a hypothetical ninth planet. The search continued after his death in 1916 and culminated in the discovery of Pluto by Clyde Tombaugh at the observatory in 1930. The first two letters of the name Pluto are also Percival Lowell's initials.

Lowell is buried in a mausoleum at Flagstaff Observatory. The Observatory also displays the telescope and Zeiss Blink Comparator with which Pluto was discovered. The discovery of Pluto is an important part of Arizona's astronomical history.

Clyde Tombaugh (1906-1997)

Clyde Tombaugh, the discoverer of Pluto, is presented as a self-made man, an archetypal American success story. Born on a farm in the Mid West (Kansas), his interest in astronomy began when he was a boy,

... without access to observatories, universities or even a large library. Unable to afford a college education, Tombaugh taught himself solid geometry and trigonometry, and studied the stars through telescopes he built himself.

Tombaugh, then an amateur astronomer, was hired by Lowell Observatory in 1929 to search for Lowell's Planet X. (At the time, Lowell Observatory was the only observatory in the country dedicated to studying planets, and Tombaugh had a particular interest in planets at that stage.) On January 23 and 29 of 1930, he exposed a pair of plates from which he discovered Pluto on 18 February. "By then Tombaugh had examined hundreds of plate pairs and millions of stars."

After his discovery, Tombaugh entered the University of Kansas to obtain a degree. He returned to work at the Lowell Observatory, taught navigation to the US military during World War II, and after the war used his expertise in optics in the development of missiles at the White Sands Missile range at Las Cruces, New Mexico. From 1955 until his retirement on 1973, Tombaugh was on the faculty of New Mexico State University. In later years, Tombaugh went on a speaking circuit in Canada and the USA to raise money for the University's

Tombaugh scholarship for post-doctoral students in astronomy. He died at home in Las Cruces at the age of 90.

The naming story

The name Pluto was suggested by Venetia Phair (nee Burney), an 11-year-old English schoolgirl at the time of the discovery. Mrs Phair is now in her late 80s and lives in Epsom, England.

Venetia suggested the name after reading about the discovery in *The Times* with her grandfather, Falconer Madan, a retired librarian from the Bodleian Library. Madan took the suggested name to a friend, Herbert Hall Turner, professor of astronomy at the University of Oxford and former astronomer royal. Turner agreed the name was a good one, and promised to send a telegram, forwarding the suggestion, to the Lowell Observatory.

Accounts of the naming process then simply note that the name was formally adopted on 1 May 1930, the announcement made by Vesto Slipher, director of the Lowell Observatory. Any role the IAU may have had is not mentioned.

Many other names were suggested by members of the public and those associated with the discovery (such as Percival Lowell's widow). The discovery was seen to be "public property".

A dust counter on the "New Horizons" mission to Pluto (described below), built by students and staff of the University of Colorado, has been named "Venetia" in honour of Venetia Burney/Phair. The asteroid 6235 Burney was also named in her honour.

The "New Horizons" mission

In 2003, the Space Studies Board of the US national Academy of Sciences published a report, "New Frontiers in Solar System Exploration". In its prioritised list of missions, the most highly ranked medium sized mission (<$650 million) was the Kuiper-Belt Pluto Explorer.

This mission, "New Horizons", launched on 19 January 2006; it is due to reach Pluto in 2015. This is the first mission to Pluto and Charon, and the so-called "double planet" is the last planetary system to be visited by spacecraft. Symbolically, this mission could be taken as a "final chapter" in a particular phase of planetary exploration.

NASA, however, positions the as a beginning rather than an end, invoking the important American notion of the "frontier":

Pluto and Charon are truly part of the current "frontier" in planetary science. No spacecraft has ever explored them, yet they promise to tell us much about the origins and outskirts of our solar system.

However, NASA also links Pluto with Ceres, in a class of "dwarf planets":

Ceres and Pluto have something in common: They are both dwarf planets. Ceres is about twice as small by roughly as dense as Pluto, despite the fact that it formed about 10 times closer to the Sun. With the discovery of other dwarf planets in the Kuiper Belt it has become clear that the solar system we once thought of as consisting of four terrestrial planets, four giant planets and a misfit planet named Pluto isn't that at all. In fact the solar system appears to contain at least dozens of dwarf planets—perhaps more—quantitative population estimates as high as 1,000 dwarfs can be found in the technical literature.

This suggests a useful positioning strategy: that any recategorisation of Pluto be presented not as a demotion but as the removal of its 'misfit' status. In other words, Pluto is a swan, not an ugly duckling.

The New Horizons spacecraft carries a CD containing the names of 430,000 people (recorded at their request). Those who have names recorded can print out a certificate recognising their participation, from an online database.

The PI for the New Horizons mission is Alan Stern of the Southwest Research Institute. The SwRI is headquartered in San Antonio, Texas; its Department of Space Studies is in Boulder, Colorado. Partners in New Horizons include Johns Hopkins University Applied Physics Laboratory; Boeing; the US Department of Energy; KinetX Inc.; University of Colorado; Ball Aerospace; NASA's Goddard Space Flight Center and Kennedy Space Flight Center; and the Jet Propulsion Laboratory.

Nix and Hydra

These two small moons of Pluto were discovered in 2005 with the HST (Weaver et al IAUC 8025). The names, Nix and Hydra, were proposed by the Southwest Research Institute and officially recognised by the IAU in June 2006.

The Planetary Society

Over several years, the US-dominated Planetary Society lobbied intensely for a space mission to Pluto—what is now "New Horizons". A detailed timeline of the campaign, from July 2000 to September 2003, is available on the Society's website. Specific actions included:

- in October 2000, presenting 10,000 postcards in support of a Pluto mission to specific members of Congress; and
- in November 2002, presenting Congress with a petition signed by 10,000 people, urging support for New Horizons.

The "New Frontiers in Solar System Exploration" report referred to earlier in this document was written by the Space Studies Board of the National Research Council (NRC), part of the National Academy of Sciences. At NASA's request, the NRC asked the planetary science community to assess the priorities in planetary exploration for the next ten years. The NRC steering committee also asked the Planetary Society to poll the public about their views on planetary exploration. More than 50,000 responded to the online poll within a fortnight.

The Planetary Society sums up its contribution in this way:

The Bush Administration cancelled it twice, NASA claimed its budget couldn't cover it, and Congress earmarked funds to be cut in mid-development; yet the trail-blazing New Horizons Pluto-Kuiper Belt mission has survived. This is no doubt due in part to the relentless public campaigning led by The Planetary Society.

Implications

The IAU is perceived as predominantly European body. Any 'demotion' of Pluto—the only one of the established planets to have been discovered by an American—may be perceived as an anti-American move, particularly by those who have a stake in the discovery story. **This could lead to moves—e.g. American separatism—that mirror what has been happening in the larger political arena under the Bush administration.**

The discovery and naming of Pluto feature attractive characters: the self-made man from America's mid west, and an 11-year-old schoolgirl. The IAU doesn't appear in popular accounts of the story and, if it did, it would be seen as a 'rubber stamp', not the driver of the action. Both the discovery and formal naming of Pluto were announced in the US by noted US astronomers (Shapley at Harvard for the discovery, Slipher for the naming).

Possible reactions

For those with a stake in the current status of Pluto or its discovery history, both active reactions (protests and lobbying) and passive resistance (that is, ignoring any reclassification) are possible. Specifically:

- Under political pressure, or spontaneously, NASA or the US planetary science community may develop its own categorisation for objects in the solar system—e.g. developing the "ice dwarf" category using criteria other than those proposed by the IAU.
- The AAS may be asked to develop policies on this and related issues that provide "American" alternatives to the "European" ones of the IAU.
- US astronomers may be lobbied (e.g. by the Planetary Society) to withdraw from the IAU as individual members.
- An individual member or members of Congress (e.g. from Arizona) might be lobbied to move for the US to withdraw from IAU at a national level.
- To generate ammunition for political lobbying, the Planetary Society may conduct a poll of the US public on the status of Pluto.
- The New Horizons team may perceive that a change in Pluto's status may weaken its funding status, and lobby the IAU Executive or members for any change in Pluto's status to be delayed (or, if it is changed, reversed).
- The family of Clive Tombaugh may protest against Pluto's change in status.
- Flagstaff Observatory is likely to maintain its current displays and materials about Pluto.
- New Mexico State University may continue to refer to Pluto as a planet and Clive Tombaugh as its discoverer.
- US book publishers, planetaria and generators of online content may be slow to change their current material on Pluto and its discovery, if they change it at all. They may do this spontaneously: they may also be lobbied to do so.
- Individual schools in the US may be slow to change what they teach about Pluto and its discovery, if they change it at all.

By contrast, reaction in the UK will probably be mild, and Venetia Burney/Phair and her family will probably not make much fuss about any change. Burney/Phair is on record as saying that, while she'd prefer Pluto to remain a planet, it's not an important issue for her.

Appendix M: Acronyms

IAU:	International Astronomical Union
GA:	General Assembly of the IAU
EC:	Executive Committee of the IAU
NPR:	National Public Radio
PDC:	Planet Definition Committee
ESO:	European Southern Observatory
AAS:	American Astronomical Society
IAP:	Institut Astrophysique de Paris
NOC:	National Organising Committee
WGCAP:	Working Group
LOC:	Local Organising Committee

Appendix N: Distribution list for this report

The following have received a hardcopy of this report:

- EC
- Ex-EC
- GA2009 NOC
- Jan Palous
- Press Room staff
- Monica Salomone
- Steve Maran (AAS)
- Lynn Cominsky (AAS)
- Larry Marshall (AAS)
- Illana Harrus (AAS)
- Commission 55 Officers and Organising Committee
- CBT/Zuzana Teserova
- Mariana Barrosa (Portugal)
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The report is also available as PDF file from:
http://www.spacetelescope.org/projects/iauga2006

Let lars@eso.org know if you would like a hardcopy.