



COMMISSION 46
THE TEACHING OF ASTRONOMY
Newsletter 52 – March 2000

The mandate of Commission 46 is “to further the development and improvement of astronomy education at all levels, throughout the world”.

Contributions to this newsletter are gratefully received at any time.

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This newsletter is also available at the following website
<http://physics.open.ac.uk/IAU46>

EDITORIAL

In my last editorial I expressed the hope that in this edition I would be able to give you details of an education session at the forthcoming IAU General Assembly. Happily I can do that, and details are in “News of meetings, and brief announcements”. Although, with Margaret Penston and others, I am organising the meeting, I greatly regret that I will not be there – I am leaving the UK for two weeks the day before. But I *will* be at the General Assembly before that, so I hope to meet many of the members of Commission 46 then.

Looking ahead to the next edition of this newsletter, I would like to have your opinion of the sort of content that would be most useful and relevant, assuming (should we?) that the newsletter continues to be circulated mainly through the C46 National Representatives and the C46 website.

Useful and relevant content could include: news of forthcoming meetings and reports on past meetings; information on various astronomical resources (books, websites, etc); discussion of astronomy curriculums; the need for public understanding; delivering astronomy to students and to the public; accounts of interesting visits and places; ideas for projects and other activities, including those that require little equipment; and training courses, at all levels, including those available over the world-wide-web. Please comment on this list, adding to it, deleting from it, and suggesting priorities. An article for the next edition on what this newsletter should contain would be particularly welcome.

The next round of triennial reports is due in three years, and if I am then still editor of this Newsletter I would like to collect *all* the reports into a special supplement, rather than have them scattered over several newsletters. There is a precedent for such an attempt. I suggest that this supplement is published just before the 2003 General Assembly and covers the period up to mid 2003. What is your opinion of this suggestion?

Finally, I would like to thank Julieta Fierro for all her work as president of Commission 46 over the last few years.

Barrie W Jones

MESSAGE FROM THE PRESIDENT

These will be my final words after having served as president of Commission 46. I would like to acknowledge all the fine work that has been carried out by the members of our Commission, in particular by the Organising Committee. I am sure that our new president Syuzo Isobe will do very fine work for our Commission with his characteristic enthusiasm, and will promote astronomy education world-wide, aided by our wonderful group of organizing committee people.

I shall end this message with a few personal comments on education. I believe there are no general rules for good astronomy teaching. Not only every culture, but each classroom has its own particularities. Nevertheless a few guidelines for good teaching can be mentioned that have been useful for many educators throughout the world, and that are much to do with emotions.

1 Acknowledgement

Which elements of astronomy do we wish to convey and why do we feel they are important? This also includes finding out what students want to know and what are their misconceptions and expectations.

2 Joint participation

In order to have a good teacher-student relation it is necessary to have common activities. These should include: activities during recess, engagement in common words, play, going on outings, laughing.

3 Special agreeable experiences

If the teacher conveys agreeable experiences (s)he will integrate positively, especially if these are uncommon. That is to say, special details, surprises, gifts, laughter, poetry, fantasy, among other possibilities.

4 Agreeable physical contact

In many non Anglo-Saxon cultures physical contact is an important factor of life. Eye-contact, hand-shaking, dancing, and music listening, can enliven a lecture.

5 Cooperation

Team activities, especially on a voluntary basis, are ideal for a good education. They can involve simple tasks that could seem irrelevant such as rearranging chairs in a classroom. They can also involve helping classmates, that is to say giving voluntary work. In these endeavors reciprocity is essential.

6 Shared creativity

There are many creative activities where one can participate with pupils – making a home page, a video, writing a play. The glory of creation as a joint venture bonds pleasure with knowledge in a strong fashion.

7 *Shared success*

8 *Telling about one's own experience*

Using scientific language is essential to understanding it. One must allow students to use their own words to convey scientific knowledge.

9 *External contrast*

An ingredient that can serve as coherence for a group is comparing one's own experience to others.

As can be seen, astronomy teaching has a lot to do with love and with giving.

Julieta Fierro

FABULOUS PLANETARIUMS IN VALENCIA AND NEW YORK

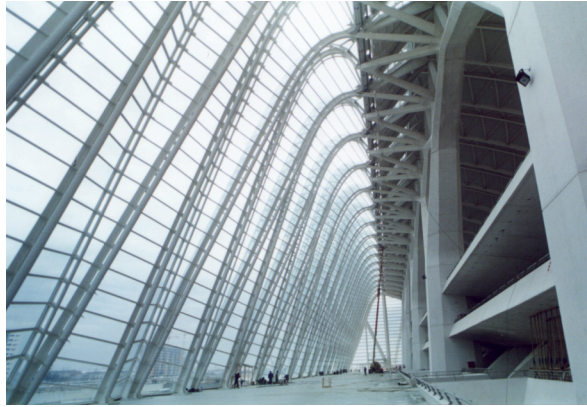
Two exceedingly fancy planetariums, in New York City and in Valencia, Spain, use the latest Zeiss projectors to bring the sky indoors for the general public.

In November 1999, I visited L'Hemisfèric, as part of an expedition to view the Leonid meteor shower (which we did quite successfully from El Saler, a beach resort south of the city). This planetarium is designed in a futuristic shape (see *Nature* 23 April 1998, p 747) by the Spanish architect Santiago Calatrava. (Coincidentally, Calatrava won the competition to design the New York Times's millennium time capsule now on display at the American Museum of Natural History, parent to the Hayden Planetarium in New York.) See also <http://www.cac.es>



L'Hemisfèric, with (left to right) Mariola Partida (public relations), Naomi Pasachoff, Jay Pasachoff, José-Carlos Guirado (staff astronomer), and Antonio Camarasa (Director)

The planetarium is part of a huge cultural complex, the Ciutat de les Arts i de les Ciències in Valencian (the language spoken in the region of Valencia) and Ciudad de las Artes y las Ciencias in Spanish, reportedly the largest construction project in Europe. The planetarium is open to the public; it uses a Zeiss Mark VIII projector in an IMAX theatre with seats all facing one way. It is in the shape of a human eye, with a building-long curved sunshade that moves up and down to mimic an eye's blinking. The science museum next door, Museo de las Ciencias, Príncipe Felipe – planned to rank with the Deutsches Museum in Munich and the Field Museum in Chicago in scale – has its shell erected. L'Oceanogràfic, an aquarium, to be Europe's largest, and a concert hall, Palacio de las Artes, remain to be constructed. Valencia is vying with the new Guggenheim Museum in Bilbao for the tourists who come to Spain.



The empty main hall of the Science Museum, under construction next to L'Hemisfèric

My host, José-Carlos Guirado, came from the University to be the main astronomer in L'Hemisfèric. I gave the inaugural lecture in their lecture series: “Qué eclipse el de aquel año (El eclipse total de Sol de 1999)”. I was faced with an IMAX screen, so put a series of four eclipse images across the bottom, selected separate series of images for four projectors, and showed a video in the middle, all simultaneously. My lecture, like the planetarium shows, was available in English, Spanish, and Valencian.

The new planetarium in New York is the successor to the 1935 Hayden Planetarium, now demolished. A huge sphere, the Hayden Sphere, 23 m (87 feet) across, is held aloft in a glass cube, making a striking view from outside. The Hayden Planetarium is in the Hayden Sphere, which is in the Rose Center for Earth and Space. (You have to raise \$210 million somehow, and “naming opportunities” is how.) It opened on 19 February 2000, though The New York Times reported that the New Year's party held there earlier was one of the city's most prestigious. The Rose Center is linked to the north side of New York's American Museum of Natural History. See <http://www.amnh.org/rose>

The planetarium contains a Zeiss Mark IX projector, whose main astronomical system is the same as that in the Mark VIII. The fibre-optics star images are so small that they had to overcome the problem with some of them falling in the acoustic holes in the dome. The planetarium is in the traditional orientation, centred in a hemisphere with concentric circles of seats. Seven video projectors blanket the sky, allowing voyages to be taken through space.

The Chairman of the Rose Center, Neil deGrasse Tyson, gave my family and me a tour prior to its 19 February 2000 formal opening. He is particularly proud of the academic side, with a scientific department run in parallel with other scientific departments at the American Museum of Natural History. Astronomers Michael Shara and Mordechai Mac-Low join him as professional researchers.



Neil deGrasse Tyson, Chairman, in front of the 23 metre Hayden sphere

A visitor to the Hayden Planetarium first enters the lower part of the Hayden Sphere to see a brief pre-show that simulates the Big Bang with various light and sound effects. The planetarium show itself follows. A square walkway around the Sphere's midsection provides a sense of scale, often relating things to the size of the Hayden Sphere. For example, a globe shows the size of the Earth relative to the Sphere as the Sun; another globe shows the size of the Sun relative to the Sphere as Antares; yet another globe shows the size of our galaxy relative to the Sphere as the Virgo Cluster.



The outer planets in comparison with the Hayden sphere as the Sun

You later wind your way from the mid-level on a spiral ramp that gives a sense of time, starting with the Big Bang some 14 billion years ago. Photographs mounted all along show objects with the respective look-back time. It is quite near the end that we get to the dinosaurs, and in a tiny region at the end recorded history is represented.

The base floor, under the Sphere, contains mounted descriptions of comparative planetology, of other astrophysical concepts, and the Willamette meteorite. Circles on the floor from time to time show your weight on various planets and other objects.



The Willamette meteorite

Tyson is especially proud that the Hayden Planetarium is part of an academic department in the Museum, with a major research component. Michael Shara and Mordechai Mac-Low have been recruited to join Tyson; still others do educational programming. I look forward to giving a lecture in the Planetarium's lecture series in May.

Both planetariums are spectacular and are worth a trip – the Guide Michelin's equivalent of three stars (***)).

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A CONTINUING APPEAL FOR ASTRONOMY EDUCATION MATERIALS

I am still seeking both astronomy education materials and sources of need. I continue here at Luther College as an adjunct and am now the President of the Iowa Academy of Sciences and as such feel a personal responsibility to share resources with those needful of them in the developing countries. Anyone wishing to assist with materials should contact me at my email address. I provide the shipping costs when they are distributed from here, or, in some cases where the needs are clearly known and the resources are clearly available, I will ask for direct shipment between donor and donee.

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NEWS OF MEETINGS, AND BRIEF ANNOUNCEMENTS

JENAM-2000

The 9th European and 5th Euro-Asian Astronomical Society conference takes place in Moscow 29 May-3 June 2000. The title of this joint European and national astronomy meeting (JENAM) is "European astronomy at the turn of the millennium". There is a connected colloquium 27-28 May "Astronomical education" at the M V Lomonosov Moscow State University campus. For further details contact Edward Kononovich konon@sai.msu.ru or V Stefl stefl@astro.sci.muni.cz

Barrie W Jones

THE 4TH EAAE INTERNATIONAL SUMMER SCHOOL

The 4th EAAE International Summer School organised by the European Association for Astronomy Education (EAAE) will take place in Tavira (Algarve) Portugal, 3-8 July, 2000. It is open to primary, secondary and tertiary education teachers interested in the teaching of astronomy. The theme of this year's Summer School is "Astronomy and navigation". More information is available at <http://www.algonet.se/~sirius/eaee.htm>

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THE RAS/IAU MEETING AT THE IAU GENERAL ASSEMBLY

At the end of the IAU General Assembly at Manchester UK, in August, there will be a meeting organised by me and Margaret Penston on behalf of the UK Royal Astronomical Society and IAU Commission 46. It is called "Astronomy research projects for school and university students", and will be held in Manchester, UK, at a venue to be announced, at 10:30 on Friday 18 August 2000, finishing at about 17:00.

This discussion meeting will explore ways in which students at school and university can participate in research projects, and at the same time increase their understanding of astronomy and develop useful skills. The increase in access to robotic telescopes and to astronomy data bases is making research by school and undergraduate students ever more feasible. In addition, useful research can be done with very modest telescope systems, of the sort a school could afford. A range of international speakers will describe and demonstrate the possibilities, and lead the discussion.

If you pay the registration fee for the General Assembly then there is no further fee for attending this discussion meeting. Otherwise there is a fee of ten pounds sterling. Refreshments will be provided at no charge.

To obtain a registration form, and further details for this discussion meeting, please contact Alan Pickwick at, Alan_C_Pickwick@compuserve.com or fax +44 161 257 2446

or at Manchester Grammar School, Old Hall Lane, Manchester M13 0XT, UK.

Barrie W Jones

THE 6TH INTERNATIONAL CONFERENCE ON TEACHING ASTRONOMY

The 6th International Conference on Teaching Astronomy, organised by the UNIFF of the Technological University of Catalonia, will take place in Vilanova (near Barcelona), Spain 23-25 November 2000. It is open to primary, secondary and tertiary education teachers wanting to present teaching activities based on

astronomy, or to find out about activities developed by other teachers. Those interested in attending should contact Rosa M Ros (addresses above).

A NEWSLETTER AVAILABLE ON THE WEB

The newsletter of the Working Group on Astronomical Education of the American Astronomical Society is available at http://www.aas.org/~wgae/wgae_index.html and is edited by Stephen J Schwal shawl@ukans.edu

Jay Pasachoff

TRIENNIAL REPORTS

FINLAND

General Information Astronomy is spreading its popularity in Finland, as seen in the rising numbers of students at university level, rising numbers of courses and workshops for teachers, new textbooks, and rising membership in amateur astronomical societies.

Elementary and Secondary Schools In elementary schools, astronomical subjects are only touched on in the geography or physics courses. At secondary level, more schools than before give special astronomy courses. Finland is taking part, with five other European countries, in a project of the European Association of Astronomy Education, to plan a common European curriculum for secondary level. The results will be published in the Comenius 3.2 programme. Finland is represented in the workgroup by Ms Irma Hannula. University Institutes for Continuing Education have been organising 1-3 astronomy courses each year for teachers to raise their competence in the subject.

University Education When Finland joined the European Space Agency in 1994, this was reflected in the Finnish universities by added interest in space-related courses. Now Finland is negotiating with the European Southern Observatory to become a member of ESO, and this may mean a step forward in research and teaching activities in the universities. The number of students attending the basic courses in astronomy has continued to rise and is now twice as large as ten years ago.

Public Education Ursa Astronomical Association continues its strong role in public astronomy education, and its membership has risen from about 6000 at the end of 1995 to over 8000 at the end of 1998. The number of amateur astronomers in Finland as compared to the total population (about 5 million) is larger than in any other country in the world. Ursa publishes a magazine "Tähdet ja avaruus" ("Stars and space"), two astronomical yearbooks, and several other astronomical books each year. One of Ursa's books, "Polaris - astronomy for the young" by Heikki Oja (which attained its fifth Finnish printing in 1999), is being used as a textbook at secondary level. It has just been translated into Estonian to be used in Estonian schools. Ursa has also portable planetariums which are rented to schools with or without an instructor. Attendance at these planetariums has been 8000-17000 visitors yearly.

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HUNGARY

General Information Although astronomy has always been a very popular discipline and free-time activity in Hungary and normally need not compete with astrology, this situation is abruptly changing now. With the mushrooming of profit-oriented publishers, and illustrated monthlies and quarterlies, more and more valueless fiction and false "parascientific" essays cover our towns and communes. Hungarian scientists and scientific journalists have no adequate training and experiences to battle effectively, and the media are not interested in helping in this struggle.

Public Understanding and Outreach The Association of Science Teachers as well as the Hungarian Astronomical Association continued to call the public's attention to important or interesting astronomical events. The visibility of a spectacular comet, a lunar eclipse, intensive meteor showers, or a total solar eclipse at noon on a hot and bright summer day attracted from tens of thousands to millions of people under the heavens. The 1999 August solar eclipse became a real folk-fest. Luckily enough a great part of the country, and especially the path of totality, cleared up during the morning of 11 August, and many TV channels aired the spectacle, giving a chance to some astronomers to explain every detail of it. (Budapest,

the capital of 2 million citizens, was in the partial eclipse zone.)

Primary and Secondary School Education In most Hungarian schools astronomy is not taught as a separate subject. It is treated in the framework of Geography (this is the case in elementary schools) or Physics (in secondary schools). The teachers and the leaders of colleges are allowed to offer astronomy lectures and in a hand-full of the institutions it is accepted and regularly taught. There are 2-3 books available for the students of these courses. Teachers and pupils participating in the best projects started to compile attractive and informative websites. These are accessible to everybody involved in educational activities in secondary schools, because all of the latter are connected to the Internet. Most of these sites offer their content in Hungarian but their editors are to widen the service.

University Education Despite severe cutbacks in the real value of university funding, there has been no fall-off in candidates for degrees in astronomy. At the same time the administration of the two universities at which this discipline is taught is forced to increase the enrolment. The total number of students enrolled for astronomy modules is about 150 at the two institutions at this time and seems to increase by a factor of 1.15 per annum. The great majority of them are at 1st and 2nd levels, and about half of the students intend to continue in another subject too. Each year approximately 5-10 students obtain a BSc-equivalent degree with astronomy as a major subject, and somewhat fewer obtain their MSc-equivalent degree (the diploma). The Ph.D school of the Eötvös University awards 2-3 Ph.D degrees annually while the Szeged University started its astronomy programme in 1999 with an undergraduate course.

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JAPAN

General Information There was a sequence of astronomical events such as comet Hyakutake in 1997, comet Hale-Bopp, and the Leonid meteor shower, and many people enjoyed watching them. Especially, over a million people tried to watch the Leonids even in the early morning. However, interest easily declined after the events. In 1999, the Japanese 8.2 m Subaru telescope started to distribute high quality images to mass media, and many people enjoyed them in newspapers, public magazine, and home pages. Over 100 astronomical books were published for the general public, and people can choose from many different types of astronomical books.

Planetariums, Public Observatories and Science Museums The number of planetariums approaches its saturation level (~400), and some fraction of planetariums have difficulty getting visitors. The number of public observatories is still increasing. This year, Gunma observatory with a 1.5 m telescope was opened. However, since the Japanese economy declined after 1991, the support of local government to the public observatories has also declined. We are requesting local government to keep a high cultural standard.

Planetariums, public observatories, and science museums have public lectures in astronomy once a month or once a few months. However, their staff work hard to maintain the number of public lectures in a year.

Elementary and High School The Japanese government announced reformation of the elementary and junior high school curriculum in November 1998, and the senior high school in March 1999. The target is to educate pupils so that they have self-study skills. However, the government reduced the number of lectures per week to two-thirds of previous values. We believe this reduction will lead to pupils having a small knowledge of science. One example is that pupils will lose the opportunity to study the lunar surface.

University Level There are many students who have not had astronomy courses at high school. Therefore, they have to start at an elementary level. This situation cannot be solved at the next reformation.

Graduate Programme Students who want to be an astronomer are increasing in number, but because of the small number of jobs it is very difficult to stay within the astronomical community. Because of the rapid development of our astronomical instruments, there is a fairly large opportunity to work at the international level.

Internet Internet communication is becoming more important for the transfer of different ideas within the astronomical community and the teachers' community, and therefore, if a teacher intends to study, (s)he has an internet system to reach specialists in his/her community. I believe that within the next three years, we may have a totally new system for efficient astronomical education.

YUGOSLAVIA

General Information Astronomy education in Yugoslavia follows the pattern of education in general: it is a subject upon which each republic may decide independently. A serious astronomy education exists only in Serbia.

Unless stated otherwise, the period concerned covers the interval from 1 June 1996 to 1 June 1999.

This report contains a review of changes introduced in astronomy education in Yugoslavia within the last three years, plus facts collected within this period and not known to the author at the time the previous report was written.

Elementary Schools No substantial changes have occurred in programmes concerning astronomical topics.

Secondary Schools No changes occurred in the programmes of secondary schools within the last three years. Astronomy topics are still incorporated in Physics and partly in Geography, according to the law passed in 1990.

The programme is the same for normal secondary schools in Serbia and Montenegro. The situation concerning teaching is more difficult in Montenegro because there are no graduate astronomers working in education.

The situation with astronomy is slightly better in the special Mathematical High School (Matematička gimnazija), and equivalent classes attached to the gimnazija type of schools. They have astronomy as a separate course with one lesson per week, and pupils get separate marks.

The textbook for the secondary school programme was written by Milan S Dimitrijevic and Aleksandar Tomic. The third edition was printed in 1998. The translation into Albanian was printed in the same year by the same publisher (Zavod za udzbenike i nastavna sredstva, Beograd).

The same book was published by Jugoreklam and the Macedonian Astronomical Society, as a monograph, in Skopje, in 1998.

In order to help secondary school teachers to keep in touch with new achievements in astronomy and with ways of teaching astronomy, special lectures were presented at regular yearly meetings of teachers. Altogether six lectures by seven astronomers have been held since the previous report. They cover 30 pages in the Publications of lectures. Eleven books and one video tape, which can be used in astronomical education, were reviewed in the Publications, on 14 pages.

University Education There are eight universities in Yugoslavia; seven are state universities while one is private (The University Braca Karic). Only six universities have natural sciences (and mathematics). The seventh state university is The University of Arts, in Belgrade.

The University of Beograd is the only one with a Department of Astronomy. Within the past three years, there were no changes in the programmes of study. Fourteen students graduated in the astrophysical division and three in the astronomical one – 17 altogether. Three postgraduate students obtained MSc degrees and one candidate obtained a PhD degree.

The course “Astrophysics and astronomy” has not been changed since the last report. Neither did the course “Fundamentals of astrophysics” at the Department of Physics of the University of Nis.

A course “Astrophysics and astronomy” was introduced in the 3rd year of the studies of Physics at the University of Kragujevac, as a one semester course (the 6th semester), with two 45 minutes lectures and exercises (2+2) per week. The official decision dates from 1997 and the lectures started in the spring 1999.

The University of Pristina has had a course “Fundamentals of astronomy”, with two 45 minute lectures per week (2+0), in the 3rd semester, at the Department of Physics, since 1990.

The professors of astronomical courses in Novi Sad, Nis and Kragujevac are plasma physicists while the professor in Pristina is a nuclear physicist.

The University of Podgorica has no courses related to astronomy.

Four university text books were recently published, all in Serbian: “Fundamentals of astronomy” by Bajram Jakupi, in 1996, in Pristina; “Celestial mechanics” and “History of astronomy from its beginnings until 1727”, both by the late Milutin Milankovic, in 1997, and “Astronomy” by Robin Green (translated from English), in 1998, all three in Beograd.

Public Education Public astronomy education in Yugoslavia had been realised through lectures at popular universities, on radio and TV programmes, in popular journals and books, in the Planetarium, in popular observatories, and astronomical societies.

Kolarcev Popular University in Beograd organised two sets of lectures: “Astronomy at the end of the XXth century” (4 lectures) in spring 1998, and “The total solar eclipse of the 11th of August 1999” (two lectures) in February 1999.

The astronomical society Rujer Boskovic (ASRB) in Beograd organised courses each autumn and spring (22 per season), with a total of 9007 participants in the last three years. The course in spring 1999 was not continued to the end. There have been 23 participants who passed the final examination within the same period. At the beginning of spring 1997, the lecture about the constellations attracted a record 300 visitors. The total number of visitors at the Public Observatory of the ASRB within the period concerned was 25997. The members of the ASRB, having free entrance, are not included in this number. Their visits are estimated to be about one quarter of the total. The comet Hale-Bopp attracted 3105 visitors. The telescope itself and its functioning were demonstrated to 875 visitors. The number of pupils who visited the Planetarium and had 360 lectures was 15541.

The ASRB organised the Beograd Astronomical Weekend (BAV) in June 1996, 1997, and 1998 (the 16th). They were devoted to various astronomical subjects, starting from observations of the comet Hyakutake to preparations for observation of the solar eclipse of 11 August 1999. The last BAV was accompanied by an exhibition of pictures with astronomical subjects painted by one of the staff members. All three BAV meetings were followed by visits to observatories and by observations.

The ASRB organised its first summer lecture in August 1997. Since this pilot programme was successful, a set of four lectures named “Summer astronomical meetings” started in 1998. The subject in 1998 was processes in galaxies. The set was extended in September with an extra lecture on the harmony between stars and planets. Those lectures attracted about 300 listeners.

The courses were run by the staff of the Public Observatory and Planetarium, professional astronomers from the Astronomical Observatory and the University in Beograd, students of astronomy, and partly by amateur astronomers.

The ASRB published 14 issues of its non-profit journal for the popularisation of astronomy “Vasiona”, in the period concerned. Two issues were double. Five articles were written by students as a part of their teaching practice.

The astronomical society in Novi Sad, ADNOS, organised courses every autumn and spring (except in 1999), with 12 lectures per season and about 1250 participants. ADNOS organised regular public observations called “Astronomical evenings”, each summer, once a week. There were about 2000 visitors within the period concerned. The Society was active in photographic observation of all major events during these years.

The astronomical society named Nis, founded in 1996, changed its name into Alpha in 1997. During the last three years they organised 35 lectures, presented either by members of the Society or invited lecturers. The average number of visitors was about 80. The society organised public observations of all major events during this period. The peak number of visitors – about 200 – was achieved for observations of the comet Hale-Bopp within the fortress of Nis where the instruments were installed. The Society took part in observations of Leonids from Mongolia as well.

The organisation of young researchers in Valjevo, Vladimir Mandic-Manda celebrated 25 years of the astronomy section in 1998. Presently it has 53 active members. The group was particularly active within the period concerned. Its members were observing and demonstrating celestial bodies to the public with their modest instruments, and used those in Petnica for more serious work. The group started yearly astronomical meetings in Valjevo in 1997.

The astronomical society Belerofont, founded in August 1995 in Kragujevac was working in the period concerned mainly using the telescope and premises (the Belerofont observatory) of the Faculty of Sciences in Kragujevac. Several hundreds visitors were served. In the first phase primary schools were the main clients. Nevertheless, several outdoor expeditions were made for obtaining photographs of the comet Hale-Bopp. The number of members varies; it was about 30 in 1997, and is 15 presently.

A group of enthusiasts in January 1996 founded the astronomical society Milutin Milankovic in Zrenjanin. It was active in public astronomical education within the last three years. They used school telescopes for demonstrating celestial objects. The society has about 50 members.

The Petnica Science Center (PSC) deserves a special place in this review. Its main activity is educating the young who are ambitious enough to start research projects. The participants are chosen through collaboration with schools. In the period concerned the PSC continued with the two-year education astronomy programme. There were 23 regular seminars, lasting 8 days on average, with about 20 participants. The projects cover a wide range of subjects.

The PSC published two issues of “Papers of participants in educational programs” within “Petnicke

sveske” (“Petnica notes”), in the period concerned. There were six astronomical papers in each of the 1996 and 1997 issues, and two in the 1998 issue. They are of a quite high level and are related to solar physics, radio astronomy, practical astrophysics, stellar photometry, calculations of orbits, numerical simulations, astronomical instruments and accessories, and astronomical software. The PSC also published the booklet on observation of Perseids “Perseidi '97”.

The PSC mounted within the period concerned a f/9 Meade 178 mm APO refractor in its cupola (3m diameter). Observations with it started in 1997. The PSC possesses two CCD cameras. Presently the PSC has 7 different telescopes in total.

The PSC section for observation of meteors was very active. It organised 17 meteor camps and took part in the expedition to Mongolia for the Leonids of 1998. It was the host of the ninth conference of the International Meteor Organization – “International Meteor Conference '97”. The PSC organised a three day seminar for secondary school teachers of physics on physical and astronomical topics, in April 1998. The PSC collaborates with practically all Yugoslav professional astronomers. Members have been acting as lecturers, supervisors or advisors. The astronomy courses and camps organised by the PSC had eight participants from abroad within the period concerned.

The organisation Nauku Mladima (Science to the Young) had, during 35 years of its existence, about 13500 pupils participating in competitions by tests. About a hundred of the best pupils participated in higher level competitions by doing projects, some of them several times. Twenty of them got medals. Three projects were published. From June 1996 until June 1999 about 500 pupils competed in tests and about 70 pupils participated in projects. During these years the organisation changed in a formal way but not in the essential activity.

The Astronomical Observatory in Beograd was also active in the field of education, being occasionally open for visitors, and their members were active in university and public education. The universities have provided considerable help to the astronomical societies.

The above societies, institutions, and individual amateurs have been participating in observations of all important astronomical events in these years and undertook extensive preparations for observation of the solar eclipse of 11 August 1999, which was total in the north of Yugoslavia.

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