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A Quarterly bulletin of the Inter-University Center for Astonomy and Astrophysics (An Autonomous Institution of the University Grants Commission)

Contents...

National Science Day 2006

Once again the National Science Day at IUCAA was celebrated in a grand manner. As has been the practice, these celebrations were carried out on two days. Schools students' quiz, essay and drawing competitions were conducted on Saturday, February 25, 2006. Five students (three for the quiz, one each for essay and drawing competitions) from eighty schools took part. Elimination round for the quiz, drawing and essay competitions were conducted in the morning. While the students took part in the competitions, their accompanying teachers listened to a lecture on book appreciation by Arvind Gupta, and were shown a film "Truth and Joy of Science".

After a brief break, all the participants were invited to watch films on the life and works of two great Indian science legends Professor A. K. Raychaudhuri and Professor P. C. Vaidya, who were respected internationally for their research work. The films are of inspiration to the students and teachers alike.

After the elimination round for the quiz competition, five teams were selected to compete in open on-the-stage for the quiz finale.

Drawing, Essay and Quiz competitions were coordinated by T. Padmanabhan, Tarun Souradeep and Sunu Engineer respectively, and were assisted by members of academic and scientific staff.

This year winners had a surprise gift too. The winners were taken to IUCAA Observatory at Girawali on March 4th. During the two hours that the students spent at the telescope, they had an informal chat with A. N. Ramaprakash, who also gave the students a special guided tour of the observatory and showed its functions. Vijay Mohan showed how astronomical images were acquired.

The Open Day for public was on the National Science Day, February 28, 2006. About 3500 people visited IUCAA from 11:00 a.m. till 5:15 p.m.

The Director, inaugurated the Science Attitude Promotion Van of Maharashtra Andhashradha Nirmoolan Samiti (M-ANiS), marking the start of Open Day. M-ANiS, had also set up a poster exhibition along with exposition of Science Behind Miracles in the foyer of Chandrasekhar Auditorium.

Special attraction of this year was screening of films on life and works of Professor A. K. Raychaudhuri and Professor P. C. Vaidya to the general public. A film on "Truth and Joy of Science", showing glimpses of the Science Exploratorium at IUCAA was also screened.

IUCAA faculty and students showcased their work done in their field through poster presentation, including scaled model of IUCAA Observatory. They patiently answered questions put to them by the visitors.

A demonstration on how seeing affect astronomical observations and how telescope dome operates, were set in the instrumentation laboratory.

Brownian motion of milk fat globules was demonstrated by fixing a simple web camera to a microscope. This demonstration was carried out by the students of Fergusson College, Pune.

contd. on page 3....

Glimpses of the National Science Day 2006

contd from page 1....

At Muktangan Vidnayan Shodhika, the Science Exploratorium, students of Aksharnandan School explained various scientific principles through simple demonstrations. These 10 demonstrations included Newton's laws of motion, hydraulic pressure, biology models (digestive system and skeleton system), electricity and magnetism, etc. Radio telescope demonstration was set up to show how radio observations were carried out. This demonstration was done by Joydeep Bagchi.

The Open Day programmes were ended with Ajit Kembahvi's popular talk on "Nobel Prize in Physics - 2005". Members of the Sky Watchers Association of Pune participated in explaining exhibits in the science park and later on carried out sky observing programme for general public.

The National Science Day 2006 activities were coordinated by Ranjeev Misra and Arvind Paranjpye

Winners of the Drawing, Essay and Quiz Competitions

Drawing Competition
First prize
Akshay Hargude, New English School, Raman Baug
No second prize was awarded
Honorable mention
Neelu Binod Kumari , Judson High School

Essay Competition Marathi
First Prize
Deepti Dilip Patil, Mahialshram High School
Second Prize
Bhakthraj Thombre, Shri Fattechand Jain Vidyalay
Honorable Mention
Monali Nadakumar Krupale, Aranyeshwar Madhyamik School

Essay Competition English
First Prize
Kshitij Gautam, Army School, Kirkee
No Second Prize was awarded
Honorable Mention
Prachi A Joshi, Abhinava Vidyalaya English Medium High School
Uttara Purandare, Sahyadri School

Science Quiz Competition
First Prize:
Team: Muktangan English School & Jr. College
Saurabh Rajendra Gandhi
Shantanu Rajendra Bhate
Ninad Hemant Watve

Second Prize:
Team: S. P. M. English School
Ameya Karambelkar
Aniket Panse
Devdnya Deshpande

Third Prize:
Team: P. E. S. Modern High School
Tushar Sanjay Shrotriya
Suraj Rajesh Ahuja
Shreyansh Dyanesh Daga

Cosmology for Everyone ; Lecture series by Mark Whittle

Mark Whttle delivering a lecture

Mark Whittle, (University of Virginia, USA), who was visiting IUCAA, gave a series of informal evening letures at Muktangan Vidnayan Shodhika, the Science Exploratorium from January 4 to 7, 2006.

He lecture titles were: *Evidence for the hot big bang, Witnessing the sound and flash of big bang* and *Assembly of the cosmic structure - from stars to galaxies to the tapestry*. These talks were attended by about 15 amateur astronomers and visitors to IUCAA. Even though the talks were meant to be for 'every one' it turned out that those attended the talks had more deeper interest in the subject and Mark, who had planned only three talks, delivered one more talk!

Thank You!

The following letter to our Senior Administrative Officer, from Abhay Ashtekar, who is a member of the current SAC as well as a well-wisher of IUCAA right from the early days, says it all:

Director
IUCAA.

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Dear Mr. Nair,

This is a quick note to express my appreciation of the IUCAA staff. After our SAC meeting on Friday, I recalled how IUCAA has evolved. I was associated with it right from the beginning —in fact, even before the UGC decided to create IUCAA, I had written to Professor Yash Pal saying that creation of such an Institute would be a major step for Indian A & A and pointing out that Pune would be an ideal location for it. It has been pure joy to see how well the Institute has blossomed to become a strong international presence over a relatively short period of time. A lot of the credit goes to the vision of its Founding Director, Professor J. V. Narlikar and there was some concern about what would happen after he retired. The fact that IUCAA has remained so robust and has continued to rise is largely due to the sense of dedication and pride everyone has. It is very rare to see this spirit -- especially among the administrative staff. On behalf of the international community, I would like to thank all the staff. Please let them know how much their spirit is appreciated by the scientific community worldwide. I hope this spirit will continue to retain its freshness for many many years to come -- this will take a lot of care and wisdom and I trust the administrative staff and core faculty will continue to value these qualities.

Sincerely,

Abhay Ashtekar

*Mr. Nair is the Senior Administrative Officer

Welcome to ...

Swara Ravindranath, who has joined as a Core Faculty Member. Her areas of research are extragalactic astronomy, morphological evolution of galaxies over cosmic time, co-evolution of galaxy bulges and supermassive blackholes, and Properties of super star clusters in starbursts.

Sudhanshu Barway, who has joined as a Post-doctoral Fellow. His areas of research are observational astronomy : surface photometry of galaxies, scaling relation for early-type galaxies and variable stars.

Minu Joy, who has joined as a Post-doctoral Fellow. Her areas of research are cosmology, and cosmic microwave background observations.

Suparna Roychowdhury, who has joined as a Post-doctoral Fellow. Her areas of research are physics of the intracluster medium, structure formation, and cosmology.

Rita Sinha, who has joined as a Post-doctoral Fellow under the Virtual Observatory India - The Next Generation project. Her area of research is cosmology, in particular cosmic microwave background.

... Farewell to

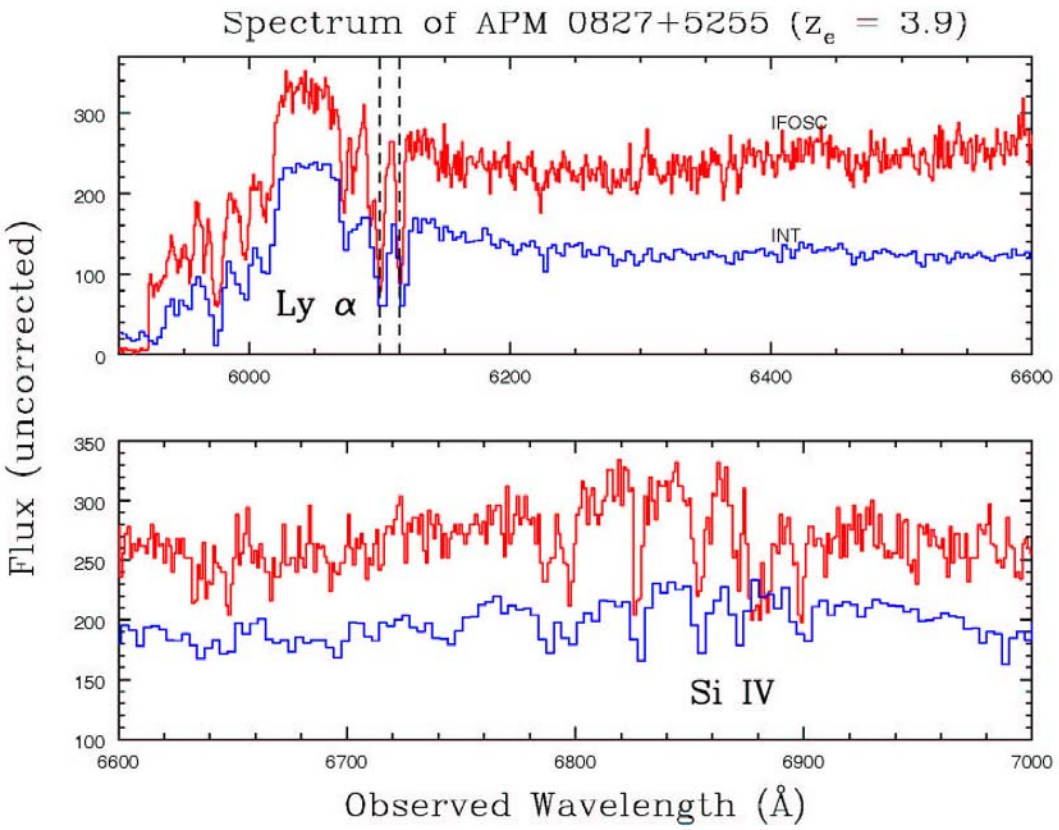
Amir Hajian Forushani, who has joined the Princeton University, USA, as Post-doctoral Fellow.

IUCAA Observatory starts operations

The 2 m observatory being set up by IUCAA at Girawali, a village about 80 km away from Pune, crossed an important project milestone early this year, on its hand over from Telescope Technologies Ltd., UK to IUCAA on February 14, 2006. The installation work of the telescope was completed by December 2005. This was followed by a brief period, when tests of the main performance parameters of the telescope (pointing, tracking, autoguiding, optical quality, etc.) were carried out by IUCAA staff. Figure below shows the first deep sky (z = 3.9) spectrum taken with the telescope on January 19, 2006. In early February 2006, the formal final acceptance tests were conducted by TTL and IUCAA staff. A summary of the results of these tests are available at http://www.iucaa.ernet.in/~itp/Progress.htm.

At present, a team of observers and engineering staff are carrying out regular observations with a view to (i) understand the capabilities and limitations of the telescope and back end instrumentation under real scientific observations employing photometry, spectroscopy and polarimetry, and (ii) improve the efficiency of usage, by reducing down time. This phase is expected to be completed by the beginning of the coming observing season later this year.

IUCAA Faint Object Spectrograph Camera (IFOSC) is the main work horse instrument at the f/10 Cassegrain main port of the telescope. [Further information about IFOSC can be found in Ranjan Gupta, et. al. (BASI, 30, 785-790, 2002).] In addition to IFOSC, a direct imaging CCD camera will be available on one of the side ports of the Cassegrain station and a near-IR (J, H, K) imager will be available on another side port. It is also expected that a mirror aluminization plant will be commissioned at the observatory by the end of this year. [Details about the site characteristics can be found in Das, et. al. (BASI, 27, 609, 1999).]



3.5A resolution spectrum of AMN 0827+5255 obtained with IUCAA Faint Object Spectrograph Camera (IFOSC) on IUCAA telescope with 30 minute exposure. Shown for comparison, is a 6A resolution spectrum of the same object taken with Isaac Newton Telescope with 60 minute exposure.

Inaugural Symposium for IUCAA Telescope
May 13-14, 2006

IUCAA 2 metre Optical Telescope has been fully installed and commissioned and it has been performing very well indeed. To mark the event, an Inaugural Symposium has been organised on May 13-14, 2006. It will include a visit to the site at Girawali and talks on performance status of the telescope and on astronomy with moderate size telescopes.

It is hoped that this facility will open new vista in astronomy in universities.

Seminars

02.01.2006 Juergen Ehlers on *The Einstein Hilbert Debate*; 13.01.2006 Rob Crittenden on *Probing dark energy with CMB anisotropy*; 17.01.2006 Badri Krishnan on *The trapped region of a blackhole spacetime*; 26.01.2006 Amrit Lal Ahuja on *A novel technique of pulsar DM estimation using the GMRT*; 27.01.2006 Emmanuel Rollinde on *Lithium between big bang nucleosynthesis POP III and VMPHS*; 03.02.2006 Jishnu Dey on *Strange star hypothesis and its implication for nuclear particle phenomenology*; 08.02.2006 Francois Hammer on E*volution of the Tully-Fisher relation and scenarios of galaxy evolution*; 10.02.2006 J.E. Pringle on *Spinning Black Holes- Which way do they point?*14.02.2006 Y.P. Viyogi on *Experimental search for quark gluon plasma and Indian contribution*; 16.02.2006 Jayanti Prasad on *Gravitational collapse in an expanding background and the role of substructure*; 02.03.2006 Uma P. Vijh on (i) P*hotoluminescence by interstellar dust* and (ii) *A look at the dust charachteristics in the LMC using the Spitzer Space Telescope*; 13.03.2006 K. Nakamura on *Second order gauge invariant perturbation theory*; 16.03.2006 H. Maeda on *Final fate of the gravitational collapse in Einstein-Gauss-Bonnet gravity*; and U. Miyamoto on *New stable state of inhomogeneous black string*.

Colloquium

13.03.2006 Reza Tavakol on *Inflation, oscillating universes and loop quantum cosmology.*

IUCAA Preprints

Hum Chand, R. Srianand, P. Petitjean, B. Aracil, R. Quast and D. Reimers *On the variation of the fine-structure constant : Very high resolution spectrum of QSO HE 0515-4414*, IUCAA-1/06; S. Chandra, P.G. Musrif, R.M. Dharmkare and Monika Sharma *Search for 111 - 110 and 211 – 212 transitions of H2CCO, H2CCC, and H2CCCC, in cosmic objects*, IUCAA-02/06; K.P. Harikrishnan, R. Misra, G. Ambika and A.K. Kembhavi *A non subjective approach to the GP algorithm for analysing noisy time series*, IUCAA-03/06; R. Misra, K.P. Harikrishnan, G. Ambika and A.K. Kembhavi *The non-linear behaviour of the black hole system GRS 1915+ 105*, IUCAA-04/06; C. Ledoux, P. Petitjean and R. Srianand *Molecular hydrogen in a damped Lyman-alpha system at z_abs = 4.224*, IUCAA-05/06; Kandaswamy Subramanian *Primordial magnetic fields and CMB anisotropies*, IUCAA-06/06 ; A. Shukurov, K. Subramanian and N. E. L. Haugen *The origin and evolution of cluster magnetism*, IUCAA-07/06; Anvar Shukurov, Dmitry Sokoloff, Kandaswamy Subramanian and Axel Brandenburg *Galactic dynamo and helicity losses through fountain flow,* IUCAA-08/06; Axel Brandenburg and Kandaswamy Subramanian *Strong mean field dynamos require supercritical helicity fluxes*, IUCAA-09/06; Kandaswamy Subramanian, Anvar Shukurov, Nils Erl and L. Haugen *Evolving turbulence and magnetic fields in galaxy clusters*, IUCAA-10/06; Axel Brandenburg and Kandaswamy Subramanian *Astrophysical magnetic fields and nonlinear dynamo theory*, IUCAA-11/06; Prasad Subramanian and Peter A. Becker *Further constraints on electron acceleration in solar noise storms*, IUCAA-12/06; Bhim Prasad Sarmah, S.K. Banerjee, S.V. Dhurandhar and J.V. Narlikar *On searches for gravitational waves from mini creation events by laser interferometric detectors*, IUCAA-13/06; K.D. Patil *Analysis of trapped surfaces in higher dimensional dust collapse*, IUCAA-14/06; Edmund J. Copeland, M. Sami and Shinji Tsujikawa *Dynamics of dark energy*, IUCAA-15/06; Soumen Basak, Amir Hajian and Tarun Souradeep *Statistical isotropy of CMB polarization maps* IUCAA-16/06; Ujjaini Alam and Varun Sahni *Confronting braneworld cosmology with supernova data and baryon oscillations*, IUCAA-17/06; Petr Tretyakov, Aleksey Toporensky, Yuri Shtanov and Varun Sahni *Quantum effects, soft singularities and the fate of the universe in a braneworld cosmology*, IUCAA-18/06; A. Shafieloo, Ujjaini Alam, Varun Sahni and Alexei A. Starobinsky *Smoothing supernova data to reconstruct the expansion history of the universe*, IUCAA-19/06; Varun Sahni, Yuri Shtanov and Alexander Viznyuk *Cosmic mimicry: Is LCDM a braneworld in disguise?* IUCAA-20/06.

Visitors Expected

April: M. Anju, M.G. University, Kottayam; Shashank Araokar, Mumbai Engg. College; P.S. Goraya, Punjabi University; Shanthi Krishnan, Academic Staff College, Mumbai; Hagai Netzer, Tel Aviv University, Israel; B. Nisarg, Mumbai Engg. College, Fini E. Prasad, M.G. University, Kottayam; Somak Raychaudhury, University of Birmingham, UK; A.A. Usmani, Aligarh Muslim University; V. Vinu, M.G. University, Kottayam, Tarun Deep Saini, IIA, Bangalore; Bhaman Karimi, Zanjan University, Iran.

May: G. Ambika, Maharaja's College, Cochin; Asis Chattopadhyay, Calcutta University; Tanuka Chattopadhyay, Shibpur D.B. College, West Bengal; G. Date, IMSc., Chennai; Ranabir Dutt, Visva Bharati University, West Bengal; Golam Hossain, IMSc., Chennai; K.P. Harikrishnan, The Cochin College; Deepak Jain, Deen Dayal Upadhyaya College, N. Delhi; Sanjay Jhingan, University of Kyoto, Japan; Kanti Jotania, The M.S. University of Baroda; Manoranjan Khan, Jadavpur University, W. Bengal; Pushpa Khare, Utkal University, Bhubaneswar; A.C. Kumbharkhane, SRTM University, Nanded; N.K. Lohani, M.B. Govt. PG College, Uttaranchal; Makarand Paranjype, JNU, Delhi; Pradip Mukherjee, Presidency College, Kolkata; S.K. Pandey, Pt. Ravishankar Shukla University, Raipur; K.D. Patil, B.D. College of Engg., Wardha; M.K. Patil, SRTM University, Nanded; B.C. Paul, North Bengal University, W. Bengal; Akash Priya, M.B. Govt. PG College, Uttaranchal; Saibal Ray, Barasat Govt. College, W. Bengal; Anirban Saha, Presidency College, Kolkata; Pankaj K. Shrivastava, Govt. Model Science College, Rewa; G.P. Singh, VNIT, Nagpur; H.P. Singh, University of Delhi; P.K. Suresh, University of Hyderabad; Ramesh Tikekar, Sardar Patel University, Gujarat; M. Sami, Jamia Millia Islamia, New Delhi;

June: Raj Bali, University of Rajasthan; Tuhin Ghosh, IIT, Kharagpur; Ayan Mukhopadhyay, MRI, Allahabad; Anirudh Pradhan, Hindu PG College, U.P.; Lalan Prasad, M.B. Govt. PG College, Uttaranchal; S.S. Prasad, Padrauna, U.P.; S. Rastogi, D.D.U. Gorakhpur University, U.P., Sandeep Sahijpal, Panjab University, Chandigarh; K.Y. Singh, Manipur University; B.K. Sinha; Nagendra Kumar, K.G.K. (P.G.) College, U. P.

Visitors during January to March

Amit Pathak, Madhavan Varadarajan, Sanjay K. Pandey, S. Sriramkumar, Sudhanshu Barway, Sandeep Sahijpal, V.C. Kuriakose, A. Omont, John Hearnshaw, Nagendra Kumar, U.C. Joshi, S.K. Pandey, Moncy John, Ashok Goyal, P.K. Srivastava, A.K. Sen, Pushpa Khare, Bindu Bambah, Ashoke Sen, M. Kurtadikar, Pradeep Kulkarni, P. Kokne, A. Abraham, J. Gupchup, T.P. Prabhu, N. Banerjee, A. Mahabal, L. Chaware, Jishnu Dey, Mira Dey, V. Vinu, Manjiri Bagchi, Udit Narain, Nishant Mittal, Manodeep Sinha, Rabin Chhetri, Robert Crittenden, Shiv Sethi, Hameeda, Tabasum Bhat, Dar Azar Ahmad, Fayaz Ahmad Najar, Badri Krishnan, Gary Ferland, Gargi Shaw, Hideyaki Tagoshi, V.R. Singh, S. Nayak, A. Rane, V.N. Varada, M.V. Ingle, T. Aditya, Naseer Iqbal Bhat, E. Rollinde, D.C. Srivastava, Laishram Dharendra, C.D. Ravikumar, P.P. Divakaran, S. Araokar, B. Nisarg, S. Bhattacharyya, Anand Sengupta, S. Kasar, V. Bagul, Y. Gangurde, J. Nikam, F. Hammer, G.C. Anupama, R. Pitchiah, Patrick Dasgupta, Jim Pringle, S.M. Chitre, F. Ochsenbein, Kim Griest, Guilet Jerome, Mir Faizal, B.S. Kushvah, B. Ishwar, Rajib Saha, Jayanti Prasad, Uma Vijh, Dulmani Deka, D.B. Vaidya, S. Chatterjee, Asis Kumar Chattopadhyay, David Vale, Reza Tavakol, Tanwi Bandyopadhyay, Harvinder K. Jassal, Jasjit Singh Bagla, Filipe Mena, Hideki Maeda, U. Miyamoto, K. Nakamura, Subenoy Chakraborty, Shirish Shevade, U.C. Pandey, A. Senorita Devi, Somak Raychaudhury and Geoffrey Burbidge.

Workshop on Telescope making at Jhansi

Arvind Paranjpye conducted a workshop on telescope makin at Bipin Bihari College, Jhansi during January 27 - 28 , 2006. In this workshop, ten teams from different schools and colleges participated. The telescopes were of refracting type with 42 mm f /10 achromatic lens. The mount for these telescopes were made using PVC pipes and pipe joints.

There were lectures on history and types of telescope. The participants estimated the focal lengths of the lens by focusing on the Sun. In the night, actual observations were carried out. Next day, the participants were shown how to image the sun on a sheet of paper for the purpose of seeing the sunspots and solar eclipse. A session on telescope maintenance and a question/answer was conducted. Sunanda Kirtane and Chandrakant Gandhi were the local organizers of the workshop.

Participants of the workshop on Telescope Making

For The Younger Minds - 16

T. Padmanabhan

Estimate the strength of a small bar magnet starting from first principles and making reasonable assumptions.

Solution to For the Younger Minds - 15

Let us assume that a fraction α of the population has the feature which we are interested in and the detection works for a fraction x of the cases. In that case, in a sample of size N, we will detect $N\alpha x$ of genuine cases and $N(1-\alpha)(1-x)$ of "false positives" which arise because our procedure is not perfect. So the chance that any one item, which we declare as having the feature is genuine, is given by

$$P = \frac{\alpha x}{[\alpha x + (1-\alpha)(1-x)]}.$$

In our case $x = 0.98$ and $\alpha = 0.005$. This leads to $P \simeq 0.2$. which is significantly lower than 98%. [Many people tend to believe that if a procedure for detecting say, cancer, has 98% certainty and if a person tests positive there is a 98% chance that the person actually has the cancer. The above calculation illustrates that this is not the case; the statisticians know this as the effect of the "false positive".]

Know Thy Trees - 1

Arvind Gupta and Arvind Paranjpye

Bread-Fruit or Sausage Tree (Kigelia Pinnata)

Located about 1.0027 x 10^{-10}a.u. (if you are not astronomically minded then it is about 15 meters) in the north western direction from the entrance of Chandrasekhar Auditorium is a nice little evergreen tree, with technical name Kigelia Pinnata. If you drop a stone from the top of the tree, it would take about $\sqrt{2}$ seconds (the tree is about 10 m tall) to reach the ground.

This is a native of South and Central Africa and found near riverbanks. Kigelia is its native (Mozambique) name and Pinnata refers to the pinnate formation of the leaves. Pinnate (from Latin pinna for feather) is a term used to describe feather-like or many-divided features arising from both sides of a common axis in plant or animal structures.

It is mainly grown as a curiosity and ornamental, both for its beautiful red flowers and it's strange looking fruit (which is not palatable for humans). It is however popular with hippos, baboons, and giraffes. None of these creatures exist in their natural form in this part of the universe.

Flowers are large and hang on long pendant peduncles. These blood-red flowers bloom at night. The fragrant, nectar-rich blossoms are pollinated by bats and insects. It's gourd like fruits are 30 cm to 1 m long and 7 to 12 cm in diameter. Fruits are solid fibrous inside and hang like big sausages from the branches.

There is a range of traditional uses for the fruit, varying from topical treatments for skin afflictions, to treatment for intestinal worms. There are some steroid chemicals found in the sausage tree that are currently added to commercially available shampoos and facial creams.

The Green Finger for this tree: This tree was planted by **Hermann Bondi** on 2450119.8 +/- 0.2 JD (i.e. 6 Feb 1996).

Khagol **(the Celestial Sphere) is the quarterly bulletin of IUCAA. We welcome your responses at the following address:**

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