

new taxa, including *Poecilotheria nallamalaensis* (Arachnida), *Pholcus andhraensis* (Arachnida), *Hipposideros ater nallamalaensis* (Chiroptera); occurrence of the Western Ghats elements like *Indirana leithii* (Amphibia), *Hylarana* sp. (Amphibia), *Lygosoma guentheri* (Reptilia); and faunal endemics, including *Hemidactylus reticulatus* (Reptilia), *Eutropis nagarjuni* (Reptilia), *Lygosoma ashwamedhi* (Reptilia) and *Coluber bholanathi* (Reptilia) highlight the importance of the Nallamala Hills. A rich variety of invertebrates, fishes and other groups of fauna too have been documented in the recently concluded All Taxa Biodiversity Inventorization Programme conducted with state sponsorship.

The biodiversity of the Nallamala Hills accounts for an average greater than 70% of the known diversity recorded from Andhra Pradesh (AP) and around 60% of the known diversity of the Eastern Ghats. As much as 80% of the endemic taxa reported from AP occur here. A recent study indicates that the Nallamala Hills hold an estimated 26% of the known plant, 18% of the known spider, 12% of the known butterfly, 90% of the known amphibian, 85% of the known reptile, 65% of the known bird and 70% of the known mammal diversity of AP¹⁻⁵. Furthermore, the Nallamala Hills is home to more than 90 threatened taxa, both flora and fauna. The foothill areas of the Nallamala Hills

are home to the endangered Great Indian Bustard *Ardeotis nigriceps* (Aves) and Jerdon's or Double-banded Courser *Rhinoptilos bitorquatus* (Aves).

Two Protected Areas (PAs), namely the Nagarjunasagar Srisailem Tiger Reserve (spread over 3568 km²) and the Gundla Brahmeshwaram Metta Wildlife Sanctuary (spread over 1100 km²), have been set up to conserve the floral and the faunal elements unique to the Eastern Ghats of AP. Escalating human population coupled with recent developmental activities in tribal hamlets has led to habitat alteration in many locations, either patchily or in a great span of area. Habitat alteration expedited by expansion of agriculture, livestock grazing, fuelwood collection, non-timber forest produce collection, forest fire – both intentional and accidental, has negatively affected the biodiversity of this region. Although the State Government, in whose jurisdiction both the PAs are, has been strictly implementing the legislations and acts to check biodiversity loss and ensure habitat and species conservation, the scenario in Reserve Forest Area (outside the PA) is grim. In some areas of the Nallamala Hills, the habitat has been totally destroyed and biodiversity has been greatly affected. The rich biodiversity that has been documented by our studies⁵⁻⁷ indicates that despite all negative pressures on habitat, a vast zone espe-

cially in the two contiguous PAs is biodiversity-rich. The Government, both at State and Central, in collaboration with national and international societies that are active in biodiversity conservation needs to put in its best efforts to ensure that the Nallamala Hills gets the recognition, protection and conservation efforts that it deserves.

1. Srinivasulu, C. and Nagulu, V., *Zoos'Print J.*, 2002, **17**, 675–684.
2. Rao, R. K., Proceedings of the National Seminar on Conservation of Eastern Ghats, EPTRI, Hyderabad, 1998, pp. 316–321.
3. Rao, K. T. *et al.*, *Zoos'Print J.*, 2004, **19**, 1713–1715.
4. Rao, K. T. and Siva Rama Krishna, I., *EPTRI-ENVIS Newsl.*, 2007, **13**, 2–6.
5. Srinivasulu, C. and Das, I., *Asiat. Herpetol. Res.*, 2008, **11**, 110–131.
6. Srinivasulu, C. *et al.*, *Zoos'Print J.*, 2005, **20**, 65–66.
7. Srinivasulu, C. *et al.*, *Rec. Zool. Surv. India Occ. Pap.*, 2006, **245**, 1–57.

C. SRINIVASULU*
BHARGAVI SRINIVASULU

*Wildlife Biology Section,
Department of Zoology,
University College of Science,
Osmania University,
Hyderabad 500 007, India
e-mail: csrinivasulu@osmania.ac.in

India as a global leader in knowledge economy

The World Bank report (2005) under 'India and the knowledge economy: Leveraging strengths and opportunities' argues that, when supported by the right kind of government policy incentives, the country can increase its economic productivity and the well-being of its population by making more effective use of knowledge. Jacob¹ quoting certain reasons is optimistic about India becoming a global leader in knowledge economy by 2010. A similar optimism was expressed by A. P. J. Abdul Kalam, the former President of India. This optimism just means that there is potential. It also means there is an urgent need for India to look into the efforts it needs to put to make this happen. It needs to be realistic and practical to the situation. It is necessary to identify the short-

comings India faces. In this connection the editorials in *Current Science*² are of relevance as in the whole concept of knowledge economy and knowledge society universities and other higher educational institutions play a pivotal role. It is important to see how we can establish strong relationships between universities and the knowledge needs of the post-industrial society, focusing on the increased importance of knowledge generation and organization for the economic and social well-being of the society.

There are several papers published on the major issues faced by the Indian higher education system. Balaram³ gives an account of how the state-funded universities in India appear to be sinking with politicization (as evident from the con-

troversies that dog the appointment of Vice-Chancellors), negligible importance given to academic performance of the faculty, professors who do no research and do little teaching, fall in scholarly output, mechanization of education with hard steel moulds of syllabuses and examinations and deadly routine of formal teaching, administration that dominates the outlook of our universities, etc. Balaram mentions that we need to urgently reflect on the state of our publicly funded universities as the field of higher education is in the throes of a major transition. In this connection, C. V. Raman's concerns about higher education in his convocation address at the Banaras Hindu University in January 1927 is still relevant today³: 'Our Universities are so en-

grossed today with the task of conducting examinations and with innumerable meetings of Boards and Faculties, Courts and Councils, Senates and Syndicates that they have no time to perform the highest function of a University which is to stimulate intellectual activity and advance knowledge. There is a danger today of its being forgotten that examinations and Faculty meetings are only a means to an end and not an end in themselves. There is a danger today of the production and advancement of knowledge receding into the background in the intellectual outlook of our Universities, of their being regarded as something beautiful and great, like the white snow in the top of the Himalayas, to be admired from a distance but not to be grasped or touched.'

The universities had seen better times and Balaram⁴ observes that 'even as the city around it (referring to Andhra University where he studied) had evolved under the selective pressures of a liberalized economy, the intellectual environment of the University had probably declined'. This phenomenon appears to have permeated the entire university system in India. Balaram questions, 'Can anything can be done?'. The Knowledge Commission's report (2007) says 'We recognize that a meaningful reform of the higher education system with a long-term perspective is both complex and difficult. Yet it is imperative'. Indeed, if reform and restructuring must happen, the movement for change must come from within the universities. The faculty and administrators at our universities must be active participants in defining the reform process². Will this happen particularly in state-fund universities where several non-academic issues come in the way of making things happen? And things change once the Vice-Chancellor or the government changes? Can we analyse impartially and objectively to list other things besides the meetings mentioned by Raman, which make our universities to give less importance and no focus on their main aim of production and advancement of knowledge and preparing future citizens of high caliber who are useful to the society?

Our country is vast and there are devoted Vice-Chancellors and administrators. There are examples of excellence and best practices, but only a few. It may be mentioned that there is no dearth of ideas and projects. For example, in the Tenth Plan document the University Grants

Commission (UGC) emphasized the importance of extension. First, its objective was to extend knowledge and other institutional resources to the community and vice-versa. Secondly, its objective was to gain insights from a contact between knowledge resources and socio-cultural realities. This is in tune with the international trends. Outreach is now considered to be a critical form of scholarship of an effective university that cuts across teaching, research and service⁵. How many universities have taken the cue from this? It may be relevant here to quote the example of the University of Mysore, which had introduced several new ideas in the last few years.

The University of Mysore, which is one of the oldest universities in the country (a state-funded university), was accredited and graded A⁺ in 2006 and five star prior to that by the NAAC (National Assessment and Accreditation Council). This university is one among the three universities selected for a grant of Rs 100 crores by the Finance Minister. The university is given this special grant as it is recognized as a potential centre for excellence on the basis of past performance. It started a Centre for Outreach Programmes in 2006 and offered certain unique and specialized courses. The university has signed memorandum of understanding with various institutions/organizations covering business schools, NGOs, finishing schools, education trusts in rural areas, hotel management institutes, IT industries, infrastructure management and software development training institutes, clinical research organizations, animation industries, etc. During the interaction with the chairpersons of various departments of the University, several other unconventional but relevant courses were suggested for the outreach concept. All this is in tune with what Alison Richard, the Cambridge University Vice-Chancellor, states with regard to world-class universities. World-class universities must have permeable boundaries. This means encouraging interdisciplinary research and teaching; it means working with the private sector, for example, fostering and encouraging partnerships with the industry; and it means encouraging international collaboration². This is also in tune with what the UGC had stated in its Tenth Plan document and the need for expansion of the higher education and university system without compromising on quality.

The university also took an initiative in introducing certain other trends in the university education system. It started a unique centre – Centre for Information Science and Technology (CIST) to benefit the general public by offering various certificate and diploma-level computer courses, which are otherwise offered in the market by many private players for a hefty price. Other concepts like five-year integrated courses in science subjects to prepare students for a career in science; collaboration with universities of foreign countries through twinning in programmes; on-line courses for Nairobi, Kenya (tie-up with UNICEF); offering specialized programmes according to the requirements of some industries, NGOs, and some developing countries; tie-ups with other foreign universities for academic collaboration, etc. The university also entered into an agreement with the Department of Atomic Energy, Government of India for participating in the India-based Neutrino Observatory (INO) involving many nations. These tie-ups may alleviate the problem of 'directed universities' mentioned by Balaram³.

It may be seen as a classical example of how our universities function, how most of these initiatives are treated once the Vice-Chancellor's term is over. The University is without a regular Vice-Chancellor for the last 9 months, with two 'incharges' during this period! The initiatives which were approved by the then University syndicate and appreciated by NAAC peer team members consisting of several Vice-Chancellors, were questioned by an administrator (from the State Administrative Service), who is posted in a key position in the university. The State Government under the Governor's rule (with administrators at the helm of affairs) strangely questioned these initiatives and even gave directions to the university to cancel many of these programmes, including CIST outreach and on-line courses immediately. The whole outlook was changed at the behest of the administrators and the University Syndicate (which also has seen changes in its key members) reversed the decisions of the earlier Syndicate. All this happened despite the fact that these developments in the university were appreciated by the NAAC peer review members, external academic audit committee consisting of renowned educationists and former Vice-Chancellors from different states, getting the Rs 100 crore special grant from the

Union Government, conducting a national seminar on the outreach concept successfully inviting highly reputed academicians, including the former UGC Vice-Chairman, Director, NAAC, a few former Vice-Chancellors, personnel from the industries, NGOs, etc. Does this reflect anything on our system or people? With this kind of approach, can any reform take place from within in an effective way? Would any Vice-Chancellor like to get into unnecessary trouble by starting new initiatives in the University? Even if one wants to take some bold steps, will he/she be able to give them full shape within a short term of 3–4 years? With these kinds of happenings in the university system, Balaram's question of 'can anything be done' is thought-provoking.

In the past few years, many countries have witnessed significant transforma-

tions and reforms in their tertiary education systems, including the emergence of new types of institutions, changes in patterns of financing and governance, establishment of evaluation and accreditation mechanisms, curriculum reforms and technological innovations. In India also, some universities when headed by a dynamic and visionary Vice-Chancellor, have introduced some reforms and restructuring in the system, which has been later opposed or nullified. Our governments and the university authorities and academics should not forget that India has a great chance of becoming a global leader in the knowledge economy and it is in their hands to make this happen. We should not forget the objective of each of our activities (as mentioned in the case of meetings by Raman quoted above³) and we should work towards it with a purpose.

1. Jacob, K. K., www.rediff.com/money/2006/nov/11guest.htm
2. Balaram, P., *Curr. Sci.*, 2008, **94**, 1229–1230.
3. Balaram, P., *Curr. Sci.*, 2005, **88**, 529–530.
4. Balaram, P., *Curr. Sci.*, 2008, **94**, 153–154.
5. Boyer, E., *J. Pub. Serv. Outreach*, 1996, **9**, 11–20.

B. PANDURANGA NARASIMHARAO^{1,*}

*Centre for Outreach Programmes,
University of Mysore,
Manasagangothri,
Mysore 570 006, India*

¹*On deputation from Indira Gandhi
National Open University,
New Delhi 110 068, India*

**e-mail: narasimhabpr@gmail.com*

On the resolutions of the twin paradox

Lorentz transformation equations (LTEs) predict that if an electric dipole stationary in the free space oscillates n times/s, then the same dipole must oscillate $n \times \sqrt{1 - u^2/c^2}$ times/s when it moves with a velocity u in the direction perpendicular to the direction of oscillation of the dipole. Curiously, the same equations also predict that even if the dipole is at rest in free space and the measuring apparatus moves with the same but opposite velocity, then also the apparatus will record that the dipole is oscillating $n \times \sqrt{1 - u^2/c^2}$ times/s. Classical physics of electrodynamical phenomena does not accept this.

Albert Einstein was in favour of the LTEs and thereby tried to justify their reality by his well-known principles (assumptions) which constitute the special theory of relativity (STR). Instead of classical time independent of coordinates, it uses relative time as a function of coordinates and imports equivalent observers to make the frequency-shift phenomenon (derived from LTEs in both ways) intelligible from its novel setting.

Abolition of both the preferential observer in free space and classical absolute time makes it difficult to settle the real time in the clock of each equivalent observer. The constancy of the speed of light to all equivalent observers further complicates the situation.

Though overlooked, relative time struggles hard to survive at the noose of many alien concepts in spite of measures of symmetry adopted by its originator. This is evident in the twin paradox. The paradox centres on the problem of time in case when a man and his twin have a steady relative motion. From the consideration of STR, each twin would claim that the other's clock runs slow compared to the synchronized clock in his own frame.

Unnikrishnan's arguments¹ suggest that the resolution of the twin paradox as presented by the relativists is devoid of any rationality. He is in favour of the rejection of the STR, which is however not unique. Many others also equally share the same conviction with Unnikrishnan.

Grøn² has tried to counter Unnikrishnan with the consideration of the STR. But, unfortunately, he has evaded the central question relating to the problem.

We may now clarify here the central question of the twin paradox in the following simple examples.

(a) The STR predicts that the lifespan of radioactive particles increases with velocity, which has been verified by experiments when the observer with his measuring apparatus is at rest on the surface of the earth and the radioactive particles moves with respect to it. To establish the validity of the STR, Grøn has to show that similar results are confirmed by ex-

periments when the radioactive particles are stationary while the observer with his measuring apparatus steadily moves. In the absence of such a clear-cut experiment, Grøn's analysis is meaningless.

(b) Similarly, the STR predicts transverse Doppler effect (time-dilation effect) for steadily moving radiating dipoles. To establish the validity of the STR, similar results should be confirmed by experiments when the radiating dipoles are at rest on earth, while the observer moves steadily.

We expect that experiments with latest techniques will not detect any of these phenomena when the radiating dipoles are at rest on earth, while the observer with his measuring apparatus moves.

However, we maintain that physics should be based on the available experimental data and not on data which could never be verified, nor on data which are expected to be verified later. Therefore, Grøn's discussion is a matter of philosophy, not of physics.

'Time dilation' could easily be explained from classical electrodynamics as the natural increment of the period of an electromagnetic event due to motion, time remaining the same to all observers according to classical physics. The gist of this explanation is given below.

When a radiating electric dipole moves steadily on earth, the electric and the in-