

7 October 2004

Dr Raja Ramanna – Down the Memory Lane

B V Sreekantan, NIAS

Praxis / Dr. Raja Ramanna at the TIFR:

All those who ever had the opportunity to have some interaction with Dr Raja Ramanna always wondered how this ^{individual} ~~man~~ with such diverse interests, charged with so many responsibilities and so many accomplishments and embellishments to his credit, managed to keep himself so cool, so collected, so calm, so easily approachable, always with a very positive attitude, very straight forward and transparent in his thoughts and dealings. As is well known ^{Dr. Ramanna} ~~he~~ was a nuclear scientist of the highest ^{order} ~~level~~, a nuclear technologist, Advisor to the Ministry of Defence and even Ministers of State for Defence in the Government of India, Chairman ^a and Secretary to the Department of Atomic Energy, Chairman of the Governing Bodies of many top institutions, a Member of Parliament, besides being a philosopher, a musicologist and a musician. It is indeed a remarkable fact of history that Dr Homi Bhabha, the Father of the Atomic Energy Programme of India during one of his trips to London in 1947 had spotted and identified this young 23 year old who had already obtained a Ph.D from the London University as one of the promising and potential leader ^s ~~^~~ of the Atomic Energy Programme that was just beginning to take shape. Dr Bhabha straight away offered Dr Ramanna a job and allowed him to stay on in London for another year or so to become familiar with the latest developments in the field of nuclear physics and nuclear technology in ^{the} ~~^~~ UK.

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at Apollo Pier Road, next to the Gate Way of India. It may be recalled that Dr Bhabha always identified TIFR as the "Cradle" of the Atomic Energy Programme of India". It has been my privilege to have known Dr Ramanna right from the time he joined TIFR and this association lasted for 55 years.

When Ramanna joined, the TIFR had just been shifted from its first premises ^{at} 54, Kenilworth, Pedder Road, Cumbala Hills in Bombay to the Yacht ^C club premises and the ~~building~~ ^{of the building} alteration work was in full swing. The so-called servants' quarters of the Yacht club was converted as the hostel for the unmarried scientists of TIFR. Dr Bhabha who had known Ramanna's interests and abilities in music allotted him ^{two} adjacent rooms in the top-most fourth floor of the hostel, one for ~~Dr~~ Ramanna and the other for his piano. The ground floor of the hostel became the nuclear physics laboratory of Ramanna where he started his work on nuclear fission and neutron scattering. My work at that time was on cosmic ray particle physics. Our professional interests over-lapped considerably ^{particularly} because of the ^{common problem we faced} ~~necessity~~ of building suitable particle detectors and the associated pulse electronics. I just cannot resist pointing out that in the late ~~40~~ ⁴⁰'s and the early 50's of the 20th century we are concerned with here, India was still very backward in industry and in the field of electronics only imported radio communication electronics was all that was available. There was no expertise on pulse electronics any where in the country. Also books and journals had to come by sea and most of the journals were atleast a year old. So to work in advanced areas of nuclear physics and cosmic rays and keep pace with ^{competitors in} Europe and USA was quite a challenge. Combined discussions and ^{collaborative} developments between our groups helped a lot. One saving grace was that there was plenty of discarded electronic components – valves, resistors, condensers, oscilloscopic tubes etc left by the US and UK military ^{services} establishments – which has ^d all

been brought during the second world war period. These had been cornered by some of the enterprising Char Bazar dealers at the Mohammedali Road, Bombay. Ramanna and I along with some of our colleagues used to venture into these areas in search of our needs. These were forbidden zones in Bombay because of the communal disturbances and one did take a risk in going there. With these disposal equipment we build our amplifiers, scalars, pulse generators, triggered oscilloscope tubes for our work in the advanced fields of research. I remember however, that some of the leading scientists of the time who came for the first ever International Conference on Elementary Particles organized by Dr Bhabha at the Yacht club building in December 1950, were amazed at the quality of research that had been started in experimental physics in these frontier areas. Soon Dr Ramanna obtained a Cockcroft-Walton type Cascade Generator and installed it in what came to be known as the Giraffe hut at the Holiday camp premises at the Lands End in Colaba, which is now known as Navy Nagar and where the present buildings of TIFR were in the stage of construction. The recruitment and training of man power for the Atomic Energy work had also started in TIFR-glass-ship, work-shop, vacuum pump fabrication facility, fabrication facilities for electronic equipments for radioactive mineral survey and so on. The first team of Atomic Energy Scientists with Dr Ramanna as one of the key members made a year long trip to Paris to get familiar with the French work in reactor building and instrumentation during 1953-54. In March 1955, the Atomic Energy Commission of India decided to build a Swimming Pool Reactor at the newly acquired Trombay site. The fuel elements for this reactor came from UK. The remarkable feature is that with in a year, by August 56, the Swimming Pool Reactor became critical and became operational for neutron physics research. All the mechanical parts were fabricated in the TIFR workshop and all the control electronics were made in the hutments of the Holiday Camp.

been brought to india

World

Search in those days

es tubes

high

Glass Shop,

facility, fabrication facilities for

from 9n 1953-54

visit during 53-54

associated control

had

* Aditi (infinite) is the advaita or unitary form of all things and beings.
The bond of multiplicity is due to Diti, the dualizing force.

* Einstein: What is the use of explaining Beethoven's Symphony both in terms of pressure waves?

Expectation = Correlation. Are there more because of our experience.

> Expansion of the Horizons of the Universe - Micro and Macro
The mysterious gravity - attracts and repels

> Quantum Theory and Relativity do not fit together.

* Physical Reality is intrinsically random, but randomness in a way that we could never have expected.

How can the apparent order of the world be built on intrinsic randomness?

Dr. Ramanna and the DAE Training School

~~Dr. Ramanna and the National Institute of Advanced Studies:~~

In the oft quoted letter to Sir Sorab Saklatvala, Chairman of the Sir Dorab Tata Trust dated 12th March 1944, Dr Homi Bhabha while proposing the setting up of a fundamental research institute had said "..... More over, when nuclear energy has been successfully applied for power production in a couple of decades from now, India will not have to look abroad for its experts, but will find them ready at hand". The concrete way of achieving this man-power development came about by the setting up of the DAE Training School in 1958 under the leadership of Dr Ramanna and with the help of TIFR in the initial years. Through thorough and elaborate interviews of candidates from all parts of India, the best of young talent was identified for admission to the training school, given ~~a year's~~ courses by experts in various field and then admitted to the different research groups at TIFR and BARC and trained in theoretical and experimental and analysis techniques, and then given regular appointments in one of the centres of DAE.

This ~~unique~~ scheme of identification, nurturing ~~(???)~~ and training was so successful that over the last 56 years of its exis... ~~(???)~~ it has produced more than 6000 scientists and engineers who are ~~managing~~ the various divisions of the Atomic Energy Establishment in different parts of the country. It is indeed remarkable that some of the older alumni of this school have ~~become~~ chairman of Atomic Energy and Space Commissions, Advisers to the Ministry of Defence, Directors of several ~~Laboratories~~, Secretaries to Science Departments of Government of India, Senior Professors at institutions like TIFR, some have moved to industry and some have settled abroad in good positions. Looked at retrospectively, it shows that steps taken by Dr Bhabha and Dr Ramanna in the years following independence resulted in just the kind of technical

The modality of training was unique.
Science and engineering graduates with a good academic records
for almost a year,
got
methods,
most importantly they have
re

achieved such distinctions as becoming
these pioneering
the creation of
creating

hence the school
manning
leading
and
and are

The space-time geodesics near the surface of the earth ensure that the bodies fall vertically.

Einstein declared "The observed speed of light is the same for any observer. What changes is the rate of flow of time."

• Deeper Statement of Uncertainty Principle - "A body cannot have simultaneously a definite position and definite momentum."

• Downward Causation - New Scientist Sperry - "Consciousness (Emergence) is a higher order emergent from the holistic neural properties that will in turn exercise "downward" control over neural functions"

• Wigner: In order to deal with the phenomenon of life the laws of physics will have to be changed, not only reinterpreted

• According to General Theory of Relativity, space is endowed with physical properties. According to Quantum Field Theory, vacuum is endowed with physical properties (Creation of gravitons etc.; character of fermion particles)

• Gödel's theorem may be stated as "We can find a statement within any system that we know to be true, but we cannot prove it to be true"

• According to Sāṃkhya, Puruṣa is the amorphous substratum of the Cosmos, Prakṛti is the amorphous substratum of Puruṣa. At its pleasure, Prakṛti manifests itself and takes forms. Prakṛti is dynamic and serene. Prakṛti is dynamic and serene. Prakṛti is dynamic and serene. Some of the forms are sentient and some are non-sentient.

• Faust: "on thy Nothing, may I find All!"

man-power ~~strength~~ that India needed for scientific and technological advancement that followed in some of the areas atleast. It is a pity that this very successful model ^{would have been made a big difference if this} ~~has not~~ ^{had} been adopted by many other fields of scientific activity ⁱⁿ ₂ too.

Years rolled on Dr Ramanna ^o got involved himself in many other activities of the Atomic Energy Establishment, then played a key role in modernizing the technical aspects of the Defence forces ^{our} and finally became a Member of Parliament. Yet the crowning glory of his achievements was the ^{also} ~~role he played~~ ^{role he played as the first Director of} ~~direction he gave to~~ the National Institute of Advanced Studies.

Dr. Ramanna and the National Institute of Advanced Studies:

Exdn
The National Institute of Advanced Studies at Bangalore is the brain child of Sri . J R D Tata whose Birth Centenary is being celebrated this year. Sri Tata, inspired by ^{the knowledge he had of} the influence of the Grand Ecoles in France on ^{Varieties of} French development ^{in France,} had dreamed of setting up similar institutions in India which would serve the important purpose of imparting multidisciplinary ^{training} knowledge to the senior administrators ^{who are the real 'decision makers' in the government, in public and private sectors and in industries - decisions} ^{which had direct on} ^{in the Country.} ^{when will} influence the future course of science, technology, industry and governance. This grand vision of JRD could fructify only in the late eighties ^{agreed to take on} when Dr Ramanna retired as Chairman of AEC and ^{took up} the onerous ^{Responsibility} and challenging ^{venture} of building up of the type of institution that JRD had envisioned.

Dr Ramanna, in the ^{true} ~~turn~~ style of Dr Bhabha who ^{had/as} ~~has~~ his motto - work first and buildings and other infrastructure later - started organizing a series of courses ^{for the senior executives} with the help of Prof. R L Kapur who had joined ^{him as} ~~full time~~ ^{as professor at NIAS.} at NIAS as Professor. The very first course was held at the Tata Management Centre ^{at Poona} ~~at Poona~~ ^{Pune} and the course lasted for a full month. The topic of the course was

Conclusions

- Reductionism is a phase in building any science
- "The future is always vaster than in extent than the past, since the tiny bay of assimilated knowledge is a drop compared to the enormous ocean of unknown"

Yu. Vladimirov, N. Mitskevich and J. Harsley (Space, Time, Gravitation)

- How can be physics be complete when it does not concern itself with happiness and ~~xxx~~ "anxieties" higher.

- Elements of a mathematical system have no absolute meaning
 - A knowing theory is not necessarily an understood theory
- Ruthven and Sudarshan
QM knows but floats Comma Sutra

- Holism "The beauty in the form of plant or animal is not made less but more apparent by more accurate insight into its constituent properties and their handshake on science

Gravitational Force: In GR matter distorts space.

Einstein's theory does not include the force of Gravity as a separate property of matter. It says that mass moulds space-time in such a way that geodesics are shaped like the observed paths of the moving planets - or moving bodies

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This scheme of identification, nurturing and training was so successful that over the last 56 years of its existence the school has produced more than 6000 scientists and engineers who are manning the various divisions of the Atomic Energy Establishment in different parts of the country. It is indeed remarkable that some of the older alumni of this school have achieved such distinctions as becoming Chairmen of Atomic Energy and Space Commissions, Advisers to the Ministry of Defence, Directors of several leading Laboratories, Secretaries to Science Departments of Government of India, Senior Professors at institutions like TIFR and some have moved to industry and some have settled abroad in good positions. Looked at retrospectively, it shows that these pioneering steps taken by Dr Bhabha and Dr Ramanna in the years following independence resulted in the creation of just the kind of technical man-power that India needed

for scientific and technological advancement in some areas atleast. It would have made a big difference if this very successful model had been adopted in many other fields of scientific activity too.

Years rolled on Dr Ramanna got involved himself in many other activities of the Atomic Energy Establishment, played a key role in modernizing the technical aspects of our Defence forces and also became a Member of Parliament. Yet the crowning glory of his achievements was the role he played as the first Director of the National Institute of Advanced Studies.

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topic of the course was "Integrated Approach to Knowledge" and covered a wide variety of topics in history, economics, philosophy, sociology, psychology, caste, religion, panchayat raj, informatics, security problems of India, education, science and technology, mathematics, all tailored to suit the personnel that attended the course. It may be interesting to mention that lectures were given by personalities like Professors Romila Thapar, K Subramanyan, Barlingay, Freddic Mehta, N Mukunda, Sreekantan, Ravindra and so on. The subsequent three courses were held in Bangalore, Nagar Bhavi and Jamshedpur on similar lines. The permanent buildings of NIAS at the IISc Campus became available for holding the courses only in 1992 and all the courses after 1992 have been held in Bangalore. Over a period of time both the nature and the duration of the courses have changed and similar but suitably tailored courses have been extended to many other sectors – the IAS officers, the university professors and readers, the Indian Foreign Service recruits, the ISRO Officers and so on.

The towering figure of Dr Raja Ramanna was chiefly responsible for attracting to NIAS many distinguished persons as short term^y and long term visiting professors and also as lectures^r at the various courses. The eminent anthropologist Prof. M N Srinivas and the outstanding metallurgist and retired Director of the Indira Gandhi Centre for Atomic Research Prof. C V Sundram joined NIAS in 1992 as soon as the new buildings at the IISc Campus were ready. I also joined this team in the same year. Around the five of us, namely Dr Raja Ramanna, Prof. R L Kapur, Prof. M N Srinivas, Prof. C V Sundram and myself gradually younger scientists, philosophers, psychologists, social scientists, gathered and research activities in various multidisciplinary areas got started, adding a new dimension to the scope and activities of NIAS. A new and novel feature that Dr Raja Ramanna introduced to enhance the academic flavour of NIAS was the induction of several leading personalities from different walks of life as Associates of NIAS which gave them the opportunity to attend all the special lectures, panel discussions, and

selectively even national and international conference organized by NIAS and held in its premises. Over the years, with the coming up of the elegantly designed J R D Tata Auditorium and the tastefully developed gardens around (thanks to the untiring efforts of controller Maj Gen. Paul) NIAS became one of the most attractive retreats with a characteristically different intellectual and natural ambiance of its own in the garden city. Though Ramanna retired as Director in 1997 he continued his association with NIAS and was present in NIAS on every working day excepting when he was out of Bangalore. The NIAS faculty had fondly hoped that his benevolent presence and guidance would be available for many more years to come. Alas this was not to be.

As Longfellow says:

Lives of great men all remind us

We can make our lives sublime

And departing, leave behind us

Footprints on the sand of time.