Report of Lecture-Tour in India

Akito Takahashi[*1, *2]

[*1] Professor Emeritus, Osaka University, Osaka, Japan

[*2] High Scientific Research Laboratory, Tsu, Mie, Japan

Abstract: Report of lecture-tour in India in 4-26 November 2006 is given. Lectures on DDX nuclear data and CMNS/CF were made at NIAS, Mangalore University, IGCAR and BARC. One-day trip to Pune University is added. Features of the lecture tour including sight seeing are reported.

1. Invitation from India

On a day of June 2006, my old Indian friend Dr. S. Ganesan sent me an e-mail informing on the NWND2006 Nuclear Data Workshop celebrating the Golden Jubilee of BARC (Bhabha Atomic Research Centre) to be held on 8-15 November 2006 at Mangalore University, India. With the following e-mail in the same day, he wrote invitation for my talk on fusion nuclear data measurements using Osaka 14 MeV Neutron Source. He waived the registration fee of 500USD.

Dr. S. Ganesan and my family had lived in the same apartment building in a village of Leopoldshafen near Kernforschungszentrum (KfK; Karlsruhe Nuclear Research Center) in West Germany at that time of 1978-1979. His family and my family got acquainted and enjoyed dinner sometimes together. After leaving KfK (the present name is simply Karlsruhe Research Centre), he worked for 5 years at Nuclear Data Section of IAEA Headquarter in Vienna. We two have been working in the field of fusion and fission-related nuclear data. We have had chances to meet at some international conferences, IAEA-CRP workshops and local symposiums in 1980-2002.

He has asked me to come to India several times, but I have been hesitating to go since I have been taught from Japanese friends that India was an awful place.

This time I was also hesitating to accept the invitation, but asked my wife if she might like to see India. My wife immediately responded yes to go. She was pre-activated since she was visiting an Indian wife living in the neighborhood once a week or so for English conversation. She got also pre-knowledge on India from Mrs. Kobayashi, the wife of Keisuke Kobayashi, Professor Emeritus Kyoto University, who visited India in the last January. They said, India was 'fantastic country'. So, I decided to go and sent a response of yes to Ganesan.

And I thought that it might be good chance to have some lecture tour on the recent status on Cold Fusion (now named as Condensed Matter Nuclear Science; CMNS) in some leading laboratories in India. Immediately I sent an e-mail to my CF friend Dr. Mahadeva Srinivasan (Chino, nick-named). Chino was an initiator of CF researches in BARC in 1989-1990s having about 50 researchers. But the Indian CF activity was completely killed after his retirement from BARC. Chino, as well as Ganesan, was so kind of arranging my lecture tour to NIAS (National Institute of Advanced Studies, Bangalore), Mangalore University, IGCAR near Chennai and BARC in Mumbai. From June to November 2006, we three exchanged very frequently e-mails for preparation.

Ganesan is working out of CF. He is expert of Nuclear Data and Fission Reactor Physics, but, he says, is keeping open mind to CF and has kindly arranged my talks in IGCAR and BARC.

In July 2006, my wife and I run to bookstores to buy tourist-books on India, and started to reserve air-tickets and hotels, with great helps by Chino and Ganesan. Of course, we planned to visit some historical places as UNESCO world heritages in India, which locate near to visiting cities. This was our first visit to India, the fantastic and awful country.

2. Bangalore

We chose Thai Airways which flew directly to Bangalore, after transit in Bangkok, by the advice of neighbor-living Indian friends. The Bangkok new International Airport (Swannapoom) looked as a surprisingly huge and modern complex designed to be very well-functioned by a German civil engineer, which was in very contrast with old style airports which we would soon see in Indian big cities.

We arrived in Bangalore Airport in the midnight of 4th November 2006. To get out the exit of Airport, there was immediate opening of the chaos. We hardly found the placard writing Akito Takahashi, my name, and NIAS handed by a Muslim driver of NIAS. To get in the car, several people kindly put our baggage into the rear trunk and we thanked them to start, but several hands required tips. We did not have small bills and I handed one-hundred Rs bill to one, and we could start. Later I did know that income per day for a field worker of farmer was about 40-50 Rs (about 1 USD).

We stayed three nights in the Guest House of IISc (Indian Institute of Science). Inside the fully forested huge and beautiful campus of IISc, NIAS locates. IISc and NIAS were founded by the famous TATA family, the owner of the biggest enterprise in India. IISc is the top-ranked (and 28th ranked in the world, they say) National University in India. NIAS has a very beautiful modern amenity of research and stay. It seems that NIAS was founded to imitate the famous Princeton Institute for Advanced Studies. The Guest House was similar to that we experienced in Tsinghua University China in 1980s. A wide two-bed room with primitive bath room welcomed us to fall in sleep with tiredness of long-day trip from Japan.

In the next morning of 5th November, Dr. M. Srinivasan arrived at the Guest House. He took a night train from Bombay (Mumbai). He immediately started very kind hospitality to us. He handed us a mobile of his wife for our

temporary use in India. This was indeed helpful for information exchange with our hosts during our whole tour in India.

A. Takahashi and M. Srinivasan in front of NIAS, Bangalore India

My lecture on CMNS/CF was scheduled in the evening of 6th November, putting into the series lectures program of NIAS Training Programmes for national leading people in various fields of researches, October 29 to November 11. So that audiences of my lecture on Progress in Condensed Matter Nuclear Science (modified version of my keynote talk at ICCF12) were widely spread as Geomagnetism, Robotics, Agriculture, Radiation & Isotope Technology, Aerospace Science, Transportation, State Council of Science and Technology, Ministry of Science and Technology, Ministry of Consumer Affairs, Raman Research Institute, Department of Scientific and Industrial Research, National Institute of Science and others.

I tried to choose easy explanations for non-nuclear experts. The chairman of my session, NIAS Professor, admired my talk although Dr. Srinivasan could add clear words for explaining the status of CMNS researches. There were however, non-formal audiences from NIAS and IISc, including Dr. Muelenberg, visiting researcher from Boston USA, nuclear physicists and mathematician who asked me essentially technical questions. NIAS people

and Dr. Srinivasan said that my talk was well received to recognize CMNS as emerging important field. NIAS gave me 5,000Rs honorarium which was

Head Quarter Building of Indian Institute of Science, Bangalore

more than a monthly income of an Institute driver. We were invited to the luxury Indian dinner at NIAS, a full curry course.

On the 5th evening, I and Chino met Prof. K. P. Sinha and Dr. Muelenberg at Guest House. We discussed about theory of CMNS. Sinha and Muelenberg are developing a bosonized electron-state model, which is similar to my EQPET model but more elegant. Prof. Sinha did not attend my lecture at NIAS. Later when I was in Mumbai in 16th to 25th, Dr. M. Melich (Naval Graduate School, USA) visited Chino in Chennai to discuss how India could restart CMNS/CF studies, since IISc and NIAS might have possibility for initiating activity.

Bangalore has several millions of population (nobody knows exact number) now and is rapidly expanding as a leading IT industry town. The IT industry region locates in suburbs, in two hours distance by car. I could not see it due to traffic difficulty to access there. Before coming to India, I imagined a modernized down town as US towns but the reality was quite different. Bangalore is called a garden city. Actually we saw full of big and

nicely-branched street trees and parks; a really green city. However, 2-3 stories-buildings and houses along streets were mostly humble and dirty, and even more chaotic with heavily crowded wandering people, so many auto-tricycles and cars spattering uncontrolled exhaust gases. We went for sight seeing with the Institute car on 5th November. We had to spend most hours in heavy traffic jams in streets and could visit only two places in a day. Later we saw the same situations of heavily jamming traffics in Chennai and Mumbai. This city needs urgent construction of mass-transport systems like subways (metros) and mono-rail sky-trains. I felt that foreigners had difficulty to walk along streets because of no good walking spaces, due to fullness of wandering people and too busily coming cars and tricycles. Urgent construction of city infrastructures is really needed for reducing dusts and garbage disposed everywhere along streets, as well as they need to construct city-water in- and out-lines. Air-pollution and bad sanitary condition are of big problem. Indian government needs great investment to improve these serious situations. The situation in Mumbai is much more serious, as I write later.

3. Mangalore

On 7th November we arrived at a small airport of Mangalore on flat top of mountain area. A team of Mangalore University, led by Prof. G. Nayak of Microtron Center, kindly received us and brought to Taj Manjuran Hotel in the corner of down town area. Taj Manjuran was a nice 5-star hotel. We comfortably stayed there for 5 nights. We were day-by-day getting used to the atmosphere of Indian chaotic towns and totally curry taste of all foods. Traffic here was not so heavy as in Bangalore. We could see a nice view of Arabian Sea from the hotel window.

The NWND-2006 workshop as the All-Indian nuclear data conference and also celebrating the golden jubilee of BARC was started on 8th November at the auditorium of Mangalore University for ceremony session and then we

moved to Faculty of Science Building to have technical sessions. Mangalore University, locating in about 20 km distance from the city center, sites on the hill top and has a huge campus, but the wildest campus in nature which I have ever seen.

My invited talk on 'Experience of DDX Measurements at Osaka 14 MeV Neutron Source' was the first presentation of the first session. I presented about the project of constructing an intense 14 MeV neutron source of Osaka University, named OKTAVIAN, and utilizing it for measuring nuclear data needed for DT fusion reactor application. Due to the 30 min limited time, I focused on DDX (double differential particle emission cross-sections) experiments for neutron and charged particle emission based on TOF (Time-Of-Flight) and pulse shape separation techniques. Nuclear physics analyses applying the combination of direct-inelastic process (DWBA and coupled channel theories), pre-compound process (exciton models) and Feshbach-type compound process for heavier nuclei than Al-27. For lighter nuclei from Li-6 to F-19, I said, we had to enjoy specific faces of particle spectra changing from isotope to isotope, which required individual analyses of complex direct break-up processes of multi-particle emission.
I also talked on the integral blanket neutronics experiments with spherical tritium breeding blanket system of Be-Li-C in three layers; This experiment, implemented as the inter-University work in Japan in 1986-1996, showed first time in the world that DT reactor could breed tritium, namely TBR (Tritium Breeding Ratio) > 1.0. My talk was received with great admiration by participants. Now Indian laboratories, BARC and Pune University for instance, wish to construct similar accelerators and conduct extended works for fusion and basic science applications.

Dr. A. L. Nicholas, head of Nuclear Data Section IAEA, addressed the world nuclear data needs, role of IAEA and other national ND centers (USA, EU, Japan, Russia, China, and others). Dr. G. Audi, France, presented on their ND evaluation works for nuclear masses. Dr. G. Kim from Korea

presented works on Phohang Linac Neutron Facility. Dr. K. L. Peddicord, Texas A & M U., presented about nuclear engineering education and research. Dr. K. Chesson, a student of Texas A & M USA, presented an ND sensitivity study. These were invited foreign speakers.

Production of experimental ND from Indian laboratories is yet not very active, although some presentations were made from BARC (Pelletron), Pune University (14 MeV N. S.) and Mangalore University (Microtron 8 MeV

Fusion Music, Attraction of NWND-2006, at Mangalore University

electron accelerator). Others were on works using research reactors, ND evaluation studies and reactor physics related works. For an evening attraction, they arranged a fusion music show in the Art and Dancing Hall of Campus. Dancing arts are respectful tradition in India. This fusion music as symbiosis of western classic music and domestic Indian music did beat my ears with very impressive harmony of tones and singing voice.

On the last day 11th November, they arranged a round table discussion on need for Indian Nuclear Data Center. Moderator was Dr. P. P. Chandrachoodan, a senior official from the office of the BRNS, DAE. Requested by the moderator, I made comments that India as the 21st Century's coming big power in nuclear industry should hurry up to establish

its own NDC, since their competing BRICs countries as China has had already NDC in 1970s and have been accumulating own data bases and know-hows. It is late for India to start up now, but is not too late. India has many well educated people, especially in IT (Information Technology), but it seriously lacks facilities of hard wares. Especially, to provide funds from Government to Universities and National Institutes for constructing modern experimental tools as accelerator-based intense neutron sources is of key for promoting sound development of ND activities in India.

Dr. S. Ganesan (BARC), the convener of Workshop, is the key member of this proposal. Dr. Nicholas, IAEA, made key suggestions on ND evaluation activities in general and stressed the need to collaborate with international ND evaluation activities in advanced countries and IAEA. India will set up Indian NDC in BARC soon.

Mangalore locates on the sea coast of Arabic Sea, and has rather scattered towns in hill-sides of up- and down-streets. Although town buildings were not beautiful, many tropical trees could mitigate scenery. There were not many tourist-visiting spots, except the French style chapel with beautiful fresco pictures inside the main hall.

We escaped from the Workshop for a couple of days to make excursion by the Hotel car. Beautiful country side was extended with deep forests. In the morning along streets, there were seen so many school pupils wearing colorful uniforms. They were walking for schools making queues. Ladies were also walking with colorful saris which made wonderful contrast with full green trees of forest. In contrast to dirty town areas, Indian country sides were seen very beautiful as far as we saw in this tour escaping from big cities. Especially trees along streets were so big and nice. We visited the 1000 Pillar Basadi, Moodabidri, which was the old Jain temple with so many differently designed and carved stone-pillars. This temple is not so large one as the Jain temple in Ellora which we visited later from Aurangabad, but reserves high-level art. The Sri Gomateshwara statue, Karkala, which

stood on the top of a single rock hill is the very famous Jain statue, Buddha-like statue but with penis strangely. The Sri Krishna Temple in Udupi, in 40 km north of Mangalore, is the very active Hindu temple. We could get inside the temple core to see praying naked (with towel around waist) people. In every active Hindu temple, we had to take our shoes off. This habit was a bit trouble to tourists, since floors were dirty in most places. We saw beautifully decorated festival cars outside the temple. These type festival cars (floats) would be the roots of Japanese floats in festivals of Shintoh shrines.

The Jain statue of Sri Gomateshwara (42 feet high), Karkala near Mangalore

We also visited Sri Kshetra Temple in Dharmastala, in 100 km east of Mangalore. This was very active Hindu temple town with nice museum.

4. Chennai

Dr. J. Kumar and Mr. and Mrs. Srinivasan came to see us at Chennai Airport on the evening of 12th November. Dr. Kumar has been assisting the CMNS/CF community since ICCF10 for type-setting proceedings papers for ICCF10 through ICCF12. He has done wonderful works, and now is going to

assist Jean-Paul Biberian,

Sri Krishna Temple, Udupi north of Mangalore

(Editor-in-Chief), for publishing the E-Journal of CMNS. Kumar sent us by his car to Hotel Quality Inn Sabori in the central Chennai, where we five people took dinner together with in a Chinese restaurant.

On the 13th morning, we 5 people started the hotel to visit Kanchipuram, the Golden City of Thousand Temples, as a major Hindu pilgrim and cultural center. The Ekambarnathar Temple (Mango Temple), dedicated to Lord Siva, is one of the largest temples in the town. There were seen several tall gopuram-towers with so many precisely carved statues of men, women, gods and animals. We saw fantastic view of the big temple buildings from the entrance gate of gopuram. Moreover, the most surprising beauty was in its so many very decorative stone-carved pillars making a long passage and a fantastic gallery surrounding the heart of temple, the place where a big mango tree used to be standing in the backside of Siva statue (set inside a stone room) – now a young mango tree is planted to grow up. This Hindu temple was the most wonderful active temple we saw in India this time.

Kanchipuram is also famous with its silk products. We visited a small private factory weaving saris. After visiting weaving works, the master of

the house showed us samples of saris, which shined with rainbow-like lights

Gate of Hindu Temple Sri Kshetra, Dharmastala, Karnataka

Admiring Sari, at a home-factory of weaving, Kanchipuram

to charm up visitors. My wife bought finally an expensive one for our Indian

friend living in the neighborhood of our home in Osaka.

Dr. Kumar kindly drove us to the Temple Bay Hotel, a five star resort hotel for foreign tourists on the sea coast of Mahabalipuram which is famous for the UNESCO world heritage of coast temples. Animals and Hindu memorial pagodas were carved from a single big stone and making a queue in sand.

On the 14th morning, I and Dr. M. Srinivasan went to IGCAR (Indira Gandhi Centre for Atomic Research) in Kalpakkam near Mahabalipuram. In the same site of IGCAR, Nuclear Power Corporation of India Ltd. - A Public Sector Undertaking spearheading India's nuclear power programme locates to operate two CANDU 220MWe type power reactors. Also in addition, in Kalpakkam, one FBR-500 MWe sodium cooled demo fast reactor is under construction by Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI) which is another wholly owned Enterprise of Government of India under the administrative control of the Department of Atomic Energy (DAE).

After my two lectures, we visited a mini reactor with U-233 fuel which was designed by M. Srinivasn team at that time (construction and test operation completed in 1996) from BARC. This is the world-first Th-232 fuel cycle reactor. India is expecting to put large weight on the Th-U233 fuel cycle for their nuclear energy supply in future, due to abundant resource of Th-232 in India. When this Th-U233 cycle would be established, it would be able to supply more than 1000 years energy need of the world – so far, India would be the leading nation of world if so in future.

I made two lectures at IGCAR. One was the nuclear data (DDX) works as same as my talk in Mangalore. Audiences could admire our works by OKTAVIAN, as was my talk in NWND-2006. The next one hour talk was on the CMNS up-date. I stressed that we have recently got concrete evidences to show existence of new type nuclear processes under the circumstances of deuterium-contained condensed matter, especially PdDx systems; 1) clean excess heat generation with ^{4}He ash, 2) cold (selective) transmutation of host and/or added elements, and 3) proposal of predictable theoretical

models consistent with conventional physics theories. I have got tired in the final part of talk. Dr. Srinivasan helped me to complement additional words of explanation. The confirmation of these new phenomena by many world laboratories would make a very strong impact on basic science and energy application, I stressed. We thought that my CMNS talk was well received among non-CF believers of IGCAR. Most audiences were reactor physicists and nuclear physicists.

On the same day evening, we arrived at the home residence of Chino. Chino and his wife Vasantha were so kind to provide us two nights stay at a bed room of their house. I and my wife enjoyed ethnic tastes of Southern Indian foods which Vasantha and Chino cooked and served. Home-cooked foods were delicious. This home stay in an Indian family was of our another exotic experience in the tour.

The UNESCO world heritage at Mahabaripuram
Shizuko, Guide, Chino, Vasantha

On 15th, Dr. Kumar came again to bring us for Chennai sight seeing. We dropped in a big Theosophical Society Campus near Chino's home, which was founded by a USA colonel and Chino was born there in the Campus as a son

of Theosophist. There were seen collections of imitated monument-buildings of various religions in the world. There we saw also the second largest Banyan Tree forest (single tree forest), after one in Calcutta. Theosophists look having been trying to understand totally the human spiritual acts in linkage of sciences and religions. The second successor of president of the Society was a British lady Annie Besant, who made a strange but surprising predictive works on substructure of atoms. In her “occult chemistry”, she could predict sub-quark level composition of proton (hydrogen) consisted of 18 sub-quark level particles. The structure of this occult view could follow the up- and down-quark structure of present day’s elementary particle physics, so that the occult chemistry gave a shock to Chino and other investigators. Of course, in my view of modern particle physics, Annie’s occult chemistry has many substantial contradictions in fine points and is not complete. However, Chino is keeping the theosophical idea from the beginning of his birth and he is now the President of the Chennai Section of the Society.

Dr. J. Kumar, his son, Chino, Shizuko, Akito; at Dr. Srinivasan’s home

It is very interesting prediction already in 1917. Chino is studying this

occult chemistry being completely independent of CMNS research.

By the way, I think, we CMNS researchers must be careful to keep strict rationalism to sweep out all the contradictions and defects, so as to establish the new field of CMNS. I am not a believer of such occult chemistry. The explanation of CMNS phenomena should not be attributed to occult sciences or alchemy.

Chennai is a big city with its about 6 millions population. Feature of the town was however felt more peaceful than Bangalore, due to less chaotic traffics and finer buildings along streets. There are traces of the former British colony, such as St. George Church, Madras University and High Court House.

In the last night in Chennai, Dr. Kumar and his brilliant son, first year in high school, joined in the farewell party at Chino's home. We talked and talked on various topics, enjoying Tamil Nadu foods and drinks.

5. Mumbai

The chaos of people was peaked here in Mumbai as we saw in arriving car drive from Airport, through crowds of gushing out people, jamming auto-rikishas and cars, to the Hotel Sea Princess in Juhu Beach of Mumbai.

The hotel, as Ganesan recommended us with BARC's discount rate, was comfortable to stay with usual conditions as in Japanese standard hotels. We found it in India that we had to pay more money than what we needed in living with similar conditions in Japan, European and American Countries. If we could pay so, safe tours were guaranteed in India. The Sea Princess Hotel locates in the beautiful Juhu Beach with fine-grain sand and shallow sea water. In every early morning and evening, so many people came here for walking and jogging. The hotel site was so peaceful, because it was isolated and guarded by hotel staffs from outside hustle and bustle. We stayed totally for 8 nights in this hotel.

On 17th November, we visited the BARC Guest House Complex in the colony – residential village of BARC employees which looked similar to those of Chinese Universities as Peking and Tsinghua; many apartment-buildings, schools, bank and shopping center were packed inside the colony surrounded by fence. The BARC research site was adjacent to the village.

Dr. A. V. R. Reddy invited me to have a talk in the CFNAA 2006 meeting at Seminar Hall of the Guest House Complex. This was the Indian conference on neutron activation analysis (NAA). I made the same talk with NWND-2006 in Mangalore, but stressing more on 14 MeV neutron irradiation experiments. I was the only one foreign speaker in the conference. Ganesan told me that my talk was very good. A BARC scientist was asking me about the detail of OKTAVIAN facility, for BARC was willing to construct a similar one. My paper entitled "Experience of DDX Measurements with Osaka 14 MeV Neutron Source" was published in Proceedings of DAE-BRNS Discussion Meet on Current Trends and Future Perspectives of Neutron Activation Analysis, November 16-17, 2006, Board of Research in Nuclear Sciences, Department of Atomic Energy, India

In the weekend (18-19th), we tried excursions of sight seeing in down town and outer-skirt of Mumbai. BARC arranged a cheaper (1,500Rs for a day tour) car with driver and guide for us. We visited and looked Museum, VT (Victoria Terminal; rail way station), Gate of India, Taj Mahal Hotel and Mumbai University, most of which are famous heritages of the UK colonization governing center and were making European atmosphere in the south end down-town area, although buildings were dirty with dusts piled on surfaces. To get there and back to the Sea Princess at Juhu Beach, we had to waste most hours of day in queues of chaotic jams of auto-tricycles, taxis, cars and buses. Every vehicle had to take small gaps among jamming vehicles, ignoring lanes of road, to go forward. When car was stopping, there came beggars and hard-sellers to hit windows of car. We should never

respond to these.

Gate of India, Mumbai (Bombay)

On the 19th morning, we started to go into outer-skirt of Mumbai aiming at visiting the Kanheri caves in National Park. We eventually found that the driver and escort did not know the place, and we went far away to get out the expanding frontier of Mumbai city. We got lost and wasted time. However, we could accidentally see the feature of expanding Mumbai, with new apartment areas and huge slums. Mumbai has about 20 millions of population now and still increasing by 0.8 million people getting into the city area every year, to reach population of 32 millions in 2015 (by the prediction of National Geographic). The city area extends 80 km x 50 km wide. Mumbai has no down-town centers as Tokyo, Osaka, New-York and Boston with many tall intelligent buildings. Most tall buildings were of pile-ups with concrete plus thin reinforced steel-sticks. If there would come an earthquake, we would have to see catastrophe. They are trying to construct urban high way net-work, but the tempo looked so slow to complete. I think, they better give up motorization, because the air-pollution in Mumbai is already over the limit of perseverance. I and my

wife were coughing after one day drive through the town. My wife took a day rest in room of the hotel, during my lecture in BARC, and the coughing was over. The Tokyo metropolitan area has about 25 millions of population, and has 14 metro-lines and urban- and suburban-networks of JR and private railway companies of electric trains. In contrast, Mumbai has no metro lines, nor net-worked suburban trains. Among big Indian cities, only Delhi and Calcutta have one metro line, respectively. Mumbai, like other big Indian cities, has to hurry up to construct net-work of electric mass-transport systems like subways (metros) and sky-monorail trains. The green-house effect by polluted exhaust gases from uncontrolled auto-vehicles has made the city to be hot spot; very high temperature (around 34 degree C in day time, during our stay in Winter) under always foggy smog of SOx and NOx, which recalled me 50 years ago in Osaka; – Japan had made great effort to decrease exhausted SOx and NOx from vehicles and industrial factories in 1960-1980 to have developed technologies for eco-tools, and has now realized rather clean airs in large cities. China and India should follow the same route.

At Kanheri caves, north of Mumbai

On 20th November, I made a lecture on CMNS/CF in Nuclear Physics Section of BARC, where every scientist was non-believer and serious critic of Cold Fusion. I could have about two hours for lecture, so that I mentioned some details of convincing experiments like Israeli-Italia-American work on excess heat with helium generation and MHI work on cold selective transmutation, and theoretical explanations by, for example, my deuteron cluster fusion model (EQPET/TSC). I stressed that the transient condensation of deuteron cluster under Platonic tetrahedral symmetry with bosonization of associated electrons was of key for new-type of nuclear reactions to appear in condensed matter. Many questions came up during the talk from nuclear physicists, but none of which was denying what I was talking. I think, they got good impressions that CMNS studies were not in contradiction to existing conventional physics and worthwhile to study more. They gave me 2,500 Rs honorarium, which was great help for me to pay cost for two days tour on 18-19 November for sight-seeing.

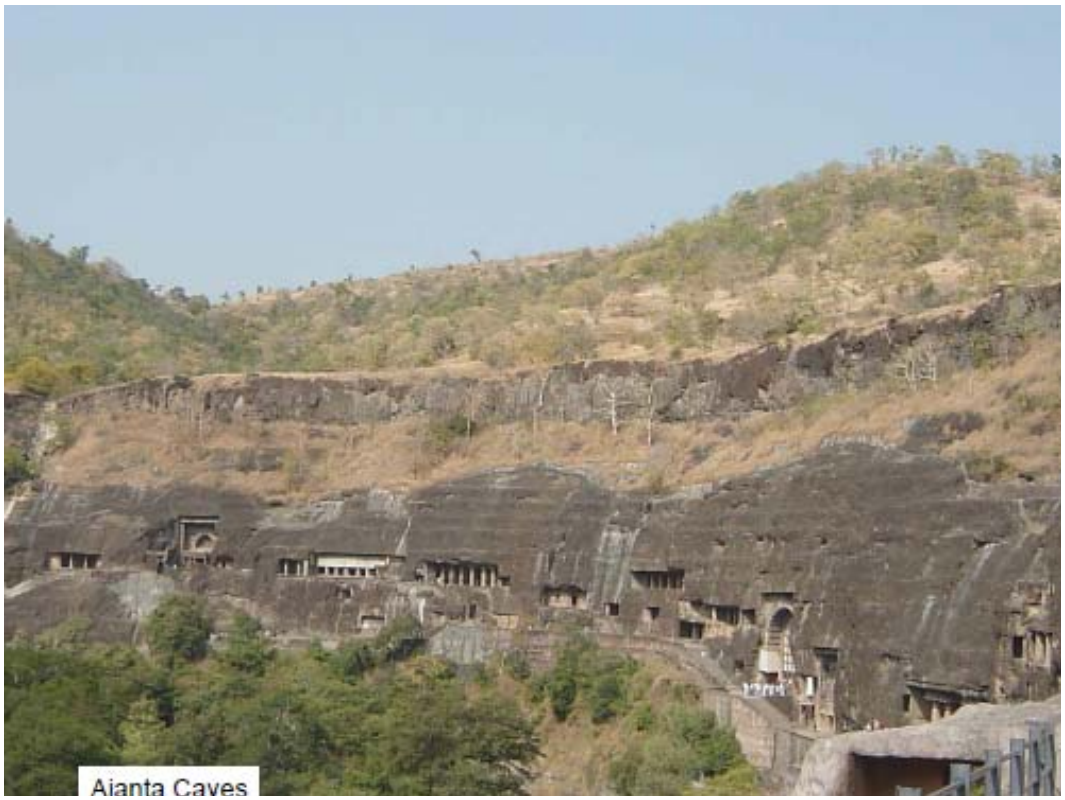
We thought to have finished lecture-tasks and were relaxed to go for sight-seeing tour of world heritages near Aurangabad.

6. Aurangabad

Aurangabad is a medium size city on Deccan Plateau. It has 52 gates of city-walled old town. Usually in China (as Peking and Xian) and Thailand (as Chiang Mai), as well as Europe, we saw only 4-6 gates of one walled old city. Inside the town was full continuation of low-stories-concrete buildings with dirty construction, people-and-people and auto-rikishas. We were used to such chaos, already. The city has however a small Taj Mahal, like miniature set of Taj Mahal in Agra, and a Mogul Empire Fort on top of steep rock-mountain with 7 layers of defense walls, which we saw on the way to Ellora. Rama International Hotel where we stayed in for two nights was a westernized modern resort hotel. We were very relaxed to stay there.

Aim of tourists coming to Aurangabad must be of course to visit famous UNESCO world heritages as Ajanta and Ellora locating in 105 km and 45 km distances from the central Aurangabad, respectively.

We needed one day trip to see Ajanta Buddhism caves. The toll road to Ajanta, constructed by the loan of Japanese Government, was nicely smooth to reach the visiting center amenity in 2 hours. On the way we could enjoy so beautiful country-sides with agricultural fields, meadows and trees. We saw many people going to field works in cotton-fields and sugar-cane-fields or to road-construction works, and many pupils in colorful uniforms going to schools. The Deccan Plateau was seen really flat with somewhere standing table-mountains. The land looked arable widely. This must be the richness of the Indo-subcontinent. Indian people can have enough foods to survive in warm climate, and therefore population will increase more and more as modernization comes into. However, we saw, ladies were carrying heavy pots of water on their heads. The driver of Hotel car said that they had to carry water every day from rather distant wells or streams, and it (water) was a big problem allover India. Ladies should work hard from morning to evening, compared to milder or idling works of men: a gender problem. A field worker can earn about 40 Rs a day, which was comparable to tips I handed to a hotel bell boy. The land in country-side was so beautiful, because of non-polluted


Ajanta Caves

environment by not-yet-modernization, but people were poor for much less income although they might feel their lives happy. To where India goes from now-on! Almost every body has a mobile, a cell phone. In contrast, infrastructures are far from modernized ones. Many Indian people look well educated and keeping clear brains, and can speak fluent English mostly. However, India lacks modern hard-ware systems in daily lives and industries. They have to overcome with this primitive mismatching in some day.

To visit Ajanta caves, tourists have to take 'eco-bus' from the amenity center. To be our surprise, eco-bus was actually a noisy old bus without exhaust gas control. We imagined an electric car from tourist books. What a miss-speculation it was! However, this can be a system to collect money routinely from tourists. Entry fee for foreigners was almost 20 times (5-10 USD = 250 – 500 Rs) of one (10-20 Rs) for Indian domestic people. They reasoned; when Indian people visited Japanese temples they had to pay so much fee as 5-10 USD (600- 1200 JPY), that why not we charge same money

to foreigners. Well, we do not however discount to be 1/20 of entrance fee of Japanese tourist spots for visiting foreigners as Indian!

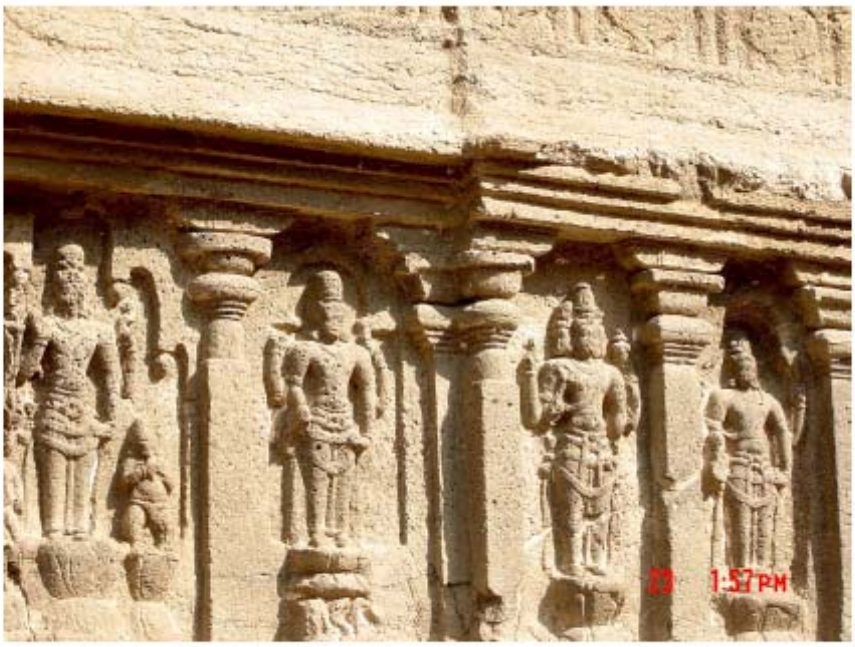
The Ajanta caves were however fantastic Buddhism heritage, surprising carved temples in a single rock cliff of 500 m long along a small river valley. We saw ruins of so precise fresco paintings on walls of carved temples. It was great pity to see that most paintings were damaged naturally in long years and artificially by invaders. The Ajanta caves were looked just comparable in size and art-level to the famous Dunghuang caves in West China, which I visited in 1984. The Dunghuan caves still reserve original colors of paintings and statues. I saw the fresco paintings in Ajanta were reflecting in very high level of precise painting-art of Indian people at that time. Among many carved temples, the 26th cave was felt the best.

On the next day (23rd November), we visited the Ellora caves, 45 km from the Aurangabad city center. On the way, we were so happy to see big street trees of Banyan. Banyan trees hanged so many 'air-roots' which would reach to earth soil to grow new stems of tree-system to be finally a big single tree forest. The road with big Banyan street trees was the most beautiful road which I have ever seen.

Surprises of visitors to see the Ellora carved temples were written in many places, so that I need not to repeat it. For us, the 12th cave of Buddhism temple with three story architecture with so many statues looked the greatest. By seeing the 32nd cave of Jain temple, I understood that the composition of three-statues set, as Yakushi-Nyorai (central Buddha statue) sandwiched (guarded) with Nikkou-Bosatsu (sun-light statue) and Gakkou-Basatsu (moon-light statue) in Yakushiji-Temple in Nara Japan has far roots here in Jain temples. Sandwiching the central Gomateshuwara-statue, male- and female-statues were positioned in right- and left- sides, respectively. In Buddhist temples, as seen in the 12th cave, a set of three statues keeps the same positions, but gender is neutralized. All Buddha statues are not men nor women, but neutral symbols of

Buddhism-spirits. This must be the evolution of human belief to Buddhism, probably from Jaina.

We returned to the Sea Princess Hotel in Mumbai with quite satisfied souls,



At Ellora Caves

Banyan trees along street for Allora

and was talking each other to have a long rest on 24th in hotel. Then I

phoned to Dr. Ganesan to report our return. I heard, he said some in hurrying voice; “Prof. Bhoraskar of Pune University is asking you to visit his laboratory tomorrow!” What!

7. Pune

On the 24th morning, we were on the way to Pune. A young colleague of Ganesan, Dr. Devesh Raj came together to guide us. To pass through traffic jams in Mumbai and New Mumbai areas, we could run smoothly on nice high way, comparable to German autobahn, reaching to Pune a big city of 2.5 million population which locates on the west end zone of Deccan Plateau. They say, this is the only one nice high way in India. (Actually, we saw nice 4 lane highway from Chennai suburbs to Kanchipuram, then going for Bangalore.) Pune locates at 175 km away from Mumbai. The distance is too short to introduce airplane business. Instead they might have hurried up to construct a modern 4-6 lane highway. We did not see slum in Pune.

We arrived at Physics Department of Pune University at about noon time. Pune University, founded in 1952 and ranked within top 5 universities in India, has a huge campus with forested trees which they had converted from the former British Governor’s house after the 1947 Liberation and Independence. We made laboratory tour to see their accelerators, a 14 MeV neutron source with 200 keV energy acceleration and an electron Microtron with 8 MeV acceleration energy, both of which were home-made in the University by Prof. Bhoraskar and his colleagues. They wanted to improve the 14 MeV source to be pulsed with few ns width and to increase neutron yield. We discussed about problems to solve. In my view, the home-made system was looking too old and primitive, like old accelerators when I was student in 1960s in Japan or much older than small accelerators in Chinese leading universities. So, I recommended; they better start from the beginning to design, get budget and construct new facility, because of no enough space available in their old department building. They will need a

new building facility to improve radiation shielding capability and security check, also.

We met in Pune University three former visiting professors in Nagoya University Japan, Prof. Bhoraskar and Prof. Mrs. Bhoraskar and Dr. Sanjay Dhole. Dr. Sanjay-san and Prof. Bhoraskar stayed in Kenji Morita's laboratory in Nuclear Engineering of Nagoya University. Prof. Emeritus Kenji Morita was my elder brother student in the same laboratory of Osaka University in 1962-65. We enjoyed playing tennis in those old days.

It was indeed by chance to know that Dr. J. Kumar who kindly hosted us in Chennai and has been assisting the CMNS community was studied in Pune University under Prof. Bhoraskar in Physics. Our world is not so large!

On the way back, we dropped in the flat of Ganesan family near BARC. We were hosted by Indian chai (milk-tea). We invited Mr. and Mrs. Ganesan for dinner at Oriental Restaurant in the Sea Princess. We started from their flat at 19:00 expecting to reach at 20:00, but we could arrive in there at about 21:00 due to so heavy traffic jams everywhere on roads. It took 2 hours for 16 km drive! Terrible! We could however enjoy laughing conversations with good meals, and said finally bye-bye at the lobby.

Akito, Devesh, Raji (Mrs. Ganesan), Ganesan

8. Impression of India

India on the subcontinent is a huge country. We could see only a portion of India this time. Even so, we found the features of towns were almost same in most cities and country sides. Big cities were groaning under the pollution and noisy traffics with too many people and expanding slum. Country sides were so beautiful with forests, arable fields, and wonderful street trees. The land looked so rich for supplying enough foods for increasing population. Many people carry modern IT tools, namely mobiles. Many people are highly educated. However, something mismatching exists. One is the lack of modern hard-ware systems and infrastructures in homes, colleges, industries and urban-suburban transport systems for people, water, commerce and industry. India has a lot of culturally high level heritages, like Mahabalipuram, Ajanta and Ellora. However a systematic tourism does not exist in India. Even tourist maps were not available. Wandering beggars and hard-sellers in, for example, Ellora and Ajanta should be swept out, for tourists to feel like to drop in shops in amenities. Now tourists are hurried up to pass through shops-zones to avoid trouble with beggars and hard-sellers.

Vegetarian foods are typical in India with full curry tastes. The best three I tasted were; 1) just-baked 'nan' from Rama International Hotel Aurangabad, which was really good beer-mate, 2) fish-curry at Taj Manjuran Hotel Mangalore, and 3) soya mutter curry at a restaurant in Pune. Papaya fruits in India were wonderfully good, much better than those in Chiang Mai Thailand. Vegetarians are taking necessary energy by Veg-foods. My wife speculates that they have to grind grains and vegetables to make powder, to condense by cooking to higher calorie rate, and put in curry in every food for sanitary reason. They can not eat noodle-like things, because hands can not be put into hot soup. By introducing the knife-and-fork (spoon or chopsticks) habit, they can surely extend the variety of foods and escape from the curry-only style. Foreigners are then

easy to access.

The status of Indian nuclear science and technology has some advantages in the development of Th-U233 cycle fission reactor energy production systems. However, supporting pyramid of basic sciences has keeping weakness of primitive hard-wares for producing creative experimental data. The present level seems in 20 years behind those in Chinese Institutes and Universities. As I could see this time only a small part of experimental facilities in India, there might be world-advanced facilities elsewhere. The Government should however invest appropriate funds to open Inter-university facilities like accelerator-based intense neutron sources. The opening and growing-up of Indian Nuclear Data Centre is one of key factors for India to develop its own systematic nuclear industries. I hope, they also find interests on new fields like CMNS to develop basic sciences.

Indian young people are looking well educated in IT technologies and business, through CAT (Central Admission Test) and others to compete and train people. But, experiences treating and producing hard-wares are lacking. Unless they change the situation to take balance of knowledge, India would not be a leading country in the 22nd century.

Acknowledgement: I cordially appreciate Drs. M. Srinivasan and S. Ganesan for their kind hospitality to our lecture tour in India. Without their helps, we could not have so smooth and happy experiences.