tion to certain neurodegenerative diseases such as Parkinson's disease.

S. Sriramachari, Institute of Pathology, Safdarjung Hospital, New Delhi, when asked to comment on the utilization of the brain bank, felt that researchers should exploit the facilities available; however, care should be exercised regarding research topics. He suggested that research areas in both clinical diseases and metabolic diseases must be pursued using this facility, as well as the search for the anatomical basis of schizophrenia. He wished to see greater synergy between research teams comprising various disciplines of neurosciences in the pursuit of a larger goal. At present, teamwork to achieve a targeted goal is missing. He called for a more region-specific understanding of certain diseases using adequate sample sizes and age-distribution correlations. He felt that more work needs to be done in the area of atherosclerosis and mucoid vasculopathy. Other areas that need targeted projects are those of blood tissue research, tissue histochemistry and tissue immunology.

P. N. Tandon, National Brain Research Centre Society, New Delhi whose brainchild this facility is, remained quite optimistic about the future of the brain bank in India and hoped that such facilities would be opened in other parts of the country also.

For a facility of this nature used for storing human brain tissue, a few key pointers to the validity of such a facility or its expansion in the future cannot be overlooked. For reasons that are obvious, human ethical issues would always crop up in the running and usage of a facility that takes tissues from cadavers. From a social perspective, it has to be ensured that such a facility does justice to the very reason for its formation in the first place – better understanding of the diseases that afflict the human brain. The usage frequency of the facility and the type of projects have to be monitored from time to time. It must be ascertained whether projects that require usage of the brain tissue yield tangible benefits to neuroscience research and to humankind.

Could any of the projects carried out with the use of material from the brain bank just as well have been performed using animal models? Are the results from such projects commensurate with the dignity of the individual who gifted his/her brain for the advancement of science? Is there sufficient usage of already stored brains? Here it must be mentioned that there are not enough users at this point in time. Could non-usage and passage of time need stored tissues to be discarded at some stage? Are the projects of significance to the general community of medical and molecular biological researchers? Is there a concerted effort to solve identified problems peculiar to our country? If any of the answers do not live up to the original mandate for which such a facility is made, then a rethink may be necessary.

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MEETING REPORT

World conference of bryology*

Bryophytes (liverworts, hornworts and mosses) are the simplest, green land plants that ventured first on barren land. Gametophyte is a thalloid or has leafy axis, and arises from the protonema. Sporophyte is a partially-dependent capsule. Nearly 200 bryologists attended the 'World Conference of Bryology' at the National Botanical Research Institute (NBRI), Lucknow. In the inaugural session, H. Y. Mohan Ram elaborated that bryophytes made possible the colonization of land by animals and evolved as unparallel in diversity of size, structure, chemistry and function. He specified features of bryophytes that serve as study organisms in macroevolution, population genetics and ecology. He emphasized on the study of mineral relationship, response to pollutants and the stress-tolerant factor. According to P. Pushpangadan (Lucknow), bryophytes contain most species-rich lineages of land plants and present a challenge for understanding the evolutionary diversification. S. R. Gradstein (Germany) explained that bryophytes are complicated in ontogeny but are simple in their morphology and genetics, and serve as model system and a key to understanding the relationship among embryophytes.

T. Hallingback (Sweden) suggested a study of taxonomy, distribution and inventorization of threatened bryophytes to analyse the impact of disturbance for conservation. V. Virtanen (Finland) described a case of homicide in which fingerprinting of bryophytes of the site was used to produce evidence against the suspect. Gradstein pronounced Plagiochilaceae as the indicator taxon and discussed its role in the hydrology in tropical forests and elaborated the biosystematic analysis. D. S. Rycroft (Scotland) discussed the chemosystematics of *Plagiochila*. D. G. Long (UK) discussed molecular phylogeny of *Asterella* and suggested that the genus is paraphyletic and other members of the family are derived from within *Asterella*. S. C. Srivastava (Lucknow) spoke on the Indian hepatics (850 species) and marked 20% species as endemic, rare and highly vulnerable. V. Nath (Lucknow) presented distribution, morphological plasticity and molecular aspects of *Frullania*. He listed bryophytes in folk medicines. He reported *Lejeunea cocoes* and *Anacolia menziesii* which are new to India. D. Kumar (Lucknow) presented taxonomy and dis-

*A report on the 'World Conference of Bryology' held in the National Botanical Research Institute, Lucknow during 23–30 January 2002.

tribution of rare hepatics *Haplomitrium* and *Calobryum*. He described a new species, *Herbertus mehrae*.

According to R. E. Longton (UK), annual shuttle mosses appear in autumn and wither in spring after producing spores. He showed that the spores situated adjacent to the inner capsule wall are non-viable. He revised Entodontaceae taking into account the ornamentation patterns of peristome. H. S. Korpelainen (Finland) discussed the crucial role of gemmae in the dispersal and maintenance of populations in different climates. M. Pohjamo (Finland) concluded that the genetic variations in different populations of *Trichocolea* originate from somatic mutation or from recombination due to occasional sexuality.

L. Soderstrom (Norway) showed the more opportunistic behaviour of *Pogonatum* in temporal, lowland disturbed habitat than those in the stable alpine habitat. T. Cao (China) discussed cytotaxonomy of Lophoziaceae and relevance of ultrastructure of spore in systematics. He showed 12 geographical elements of *Ptycomitrium* in the world and interpreted its origin in Pangana, Laurasia and Gondwanaland. P. L. Uniyal (Delhi) exhibited the cytological data for the circumscription of taxa of various ranks and elucidation of phylectic trends in mosses. He said that the variation in chromosome numbers is associated with morphological complexities and habitat distribution, and high grade of polyploidy confers some selective advantage for the plants to colonize in adverse conditions.

P. Joshi (Nainital) discussed uptake of nutrients in epiphytic bryophytes and their role in the conservation of nutrients. A. K. Srivastava (Lucknow) deliberated on the taxonomic relationship among fossil bryophytes. B. L. Chaudhary (Udaipur) proved the allelopathic potential of *Lantana* against regeneration of bryophytes and mentioned the indicator value of bryophytes against allelochemicals. D. K. Saxena (Bareilly) found a trend of increasing level of lead in urban mosses and marked *Hylocomium* as highly tolerant to metallic polluters that show hyper-accumulation potential with minimum change in physiochemical parameters. Anima Langer (Jammu) reported that variability enables taxa to adapt and evolve in changing environment, and elaborated the intraspecific variability in *Reboulia hemispherica*. Geeta Asthana (Lucknow) discussed distinct characters for taxonomy of Lejeuneaceae. Sarla (Delhi) showed the inhibitory effect of IAA and NAA on the growth of protonema of *Bryum* and production of gemmae on the protonema in response to kinetin. A. K. Asthana (Lucknow) exhibited distinct characters for recognition of the taxa of Anthcerotaceae. D. K. Singh (Dehradun) focused on the threatened liverworts and formulated an action plan for conservation through awareness, capacity building, surveys, and monitoring. B. S. Dixit (Lucknow) spoke about the medicinal value of biologically active substances of liverworts.

B. C. Tan (Singapore) showed various floristic provinces of the Indian subcontinent based on the distribution and richness of species. He focused on the molecular systematics using cpDNA sequences and morphological data. M. Higuchi (Japan) specified the mosses of Pakistan as Holarctic with prevalence of Eurasian and Himalayan elements. He estimated 334 species with Pottiaceae as the dominant family. B. O'Shea (UK) mentioned the species richness and endemism in Sri Lankan mosses. S. N. Joshi (Nepal) listed 115 species from the tropical region of Nepal. J. N. Vohra (Karnal), J. Lal (Allahabad), B. D. Vashishtha (Kurukshetra) and S. D. Tewari (Pithoragarh) highlighted the mosses of Eastern and Western Himalaya and northern plains of India, and emphasized the need for conservation of habitats. They featured phytogeographical aspects and mentioned 30% species as endemic and 60% as rare and endangered. D. Sharma (Lucknow), M. N. Vijayan (Margao), S. D. Phatak (Madgaon), A. E. D. Daniels (Nagercoil), G. T. Dabhade (Kalyan), T. P. Sharma (Udaipur), G. V. Kumar (Tiruchirapalli) and M. C. Nair (Calicut) spoke about the mosses of central India, Eastern and Western Ghats and Gujarat. Beata Papp (Hungary) presented the threatened status of bryophytes. H. Deguchi (Japan) described monoplastidic sporocytes that established through several successive mitosis of sporogenous tissue and produce high ratio of elaters and spores. R. T. Corlett (China) listed 353 species and identified 16 hot spots in Hong Kong. He studied the effect of environmental variables on brycommunities and viewed that non-tropical species are more likely to be rare/threatened than tropical ones, and these taxa are denser in higher altitudes. H. Mohamed (Malaysia) spoke about diversity and biomass, and its importance in hydrology in the forest ecosystem. He correlated polymorphism in mosses with light intensity factor.

X. L. He (Finland) clarified the generic boundaries and phylogenetic relationship within Geocalycaceae. S. Huttunen (Finland) proved monophyletic origin of Brachytheciaceae and Lembophyllaceae on the basis of cpDNA and nrDNA sequence data. She suggested the rearrangement of traditionally included taxa of Meteoriaceae and Trachypodaceae. She revealed that the pendent life-form has evolved independently and is regarded to be a derived character. H. Tsubota (Japan) presented phylogenetic inference and recognized the Hypnaceae as polyphyletic and Sematophyllaceae as monophyletic groups based on the rbCl sequences. H. S. Negi (Palampur) mentioned that geographically restricted and taxonomically unique species are valuable for conservation. He ranked coniferous forests as highest in conservation priority as they contained habitat-specific and geographically restricted taxa. M. R. Suseela (Lucknow) dealt with nitrogen fixation and maintenance of soil fertility by bryophyte–algae associations. N. Bhowmik (Allahabad) reported the damage of gametophores by endophytic fungi *Gloeosporium*. S. N. Srivastava (Allahabad) recorded that oak trees provide luxuriant growth of bryophytes and marked *Lacnora* (crustos lichen) as pioneer vegetation followed by leafy liverworts and then mosses.

P. Chaturvedi (Dehradun) demonstrated the inhibitory effect of IAA on protonemal growth, and promotion of protonemal growth and buds by 2,4-D and cytokinins. N. Pandey (Nainital) testified the inhibitory effect of bryophyte extract on some pathogens. Asha Gupta (Lucknow) reported highly resistant sporopollenin in the bryophyte spores preserved in fossils. M. Tanwir (Jammu) mentioned that the diverse climate and habitat favour speciation and endemism. A. Kumar (Rai-Bareilly) observed a trend of decreasing chlorophyll content in bryophytes from polluted areas. D. K. Upreti showed that mosses are major substrates for lichens in alpine regions. G. S. Deora (Udaipur) revealed the formation of secondary gemmae on protonema that easily colonize in adverse conditions.

Pushpangadan spoke on the protection and promotion of the rights of the com-

munity, farmers and indigenous people on biodiversity and advocated the equivalent share of benefits to them, arising from the commercial use. S. Sopory (New Delhi) elucidated that the plants sense abiotic stresses via various signal transduction pathways. In salinity the calcium sensor activates the kinase (Ca-binding protein) and sodium is thrown out of the cell.

The deliberations and discussion resolved (i) to collate the pertinent information on the endangered taxa for public attention and scientific record, (ii) to encourage floristic and taxonomic study, especially in the hot spots and identification of sensitive and tolerant species through molecular markers, (iii) capacity building, and (iv) utilization of biomass, exploitation of indicator species, pollution monitoring, analysis of the potential chemicals and study of bryophyte-associated animals and microorganisms.

During a field excursion to Nainital, the delegates caught glimpses of bryovegetation of various habitats, mineral-enriched substrates, indicator value and role of mosses in building of mineral rocks. They marked various growth forms in relation to the habitat and microclimatic condition. The conference was immensely successful and well organized.

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MEETING REPORT

Learning to change*

The crucial and varied needs for, as well as some possible processes of change in agricultural R&D, were analysed by experts and policy makers in a workshop on 'Agricultural Policy: Redesigning R&D to Achieve the Objectives'. The workshop brought together several actors and agencies concerned about the future of agricultural knowledge systems in India.

A crucial expectation from the workshop was to gain insights into the relationship between agricultural science and policy in the Indian context. While the recent National Agricultural Policy document of Government of India provided an immediate focus, the larger question was concerned with the capacity of R&D to identify and respond to the critical and durable elements of agricultural policy.

The opening session on 'The context for change', proclaimed that change in R&D was imminent. The session began with a clear statement of the workshop objective, viz. 'To deliberate and arrive at some crucial suggestions and an agenda for action to guide this change'.

As the main sponsor and organizer, the National Academy of Agricultural Sciences (NAAS) made an explicit demand for shifting from perceptional guidance in R&D to well-debated and analysed measures for change. The Academy (President V. L. Chopra) desired that these debates and suggestions be: (a) scientific and analytical, (b) honest and uninhibited. Presenting the ICAR perspective, the DG, ICAR, demanded that the workshop should provide a picture of how to go about changing R&D organizations. The keynote address by A. Vaidyanathan (MIDS, Chennai) made a candid assessment of the changing context of agriculture, and urged that innovation in the public sector agricultural R&D be conversant with these dynamics. The past decade has witnessed significant changes in growth rates and trends in agricultural production/productivity, resource use – in irrigated and rainfed agriculture, and has given us evidences of ecological degradation. Agricultural R&D continues to appease itself with claims of success (limited often to varietal release), while there is evidence of declining productivity of disciplinary commodity-based knowledge in the face of these agro-ecological problems. Other changes in context include increasing presence of private sector and profit motives in agricultural R&D, an erosion of public sector commitment to basic and poverty-oriented knowledge, and the potential of emerging biotechnology and information technology regimes. The demands of 'sustainability' and poverty reduction, the need for introspection and the role of evaluation in R&D, and the dialectical relationship between data generation and utilization in R&D (as one of the most important inputs for reflection and changes in the direction of research), were also presented as critical changes in context. The four papers presented in this session, the discussant's response and inputs from the floor, highlighted the important milestones of success in green revolution technology achieved thus far. This success, however, must not perpetuate a 'business as usual' approach to the generation and utilization of knowledge and technologies in the agriculture sector. The innovation system must now look for ways forward to the next stages of excellence in science and success, agro-ecological and socio-economic goals.

The session on 'Organization and management of research for sustainable agriculture' highlighted the need for an analytical framework that can guide the transition of research organizations from their productivity goals to sustainability goals. The papers and interventions questioned the capability of the existing research system to engage effectively with the institutional landscapes and dialectical processes of agricultural innovation. In the session on 'Technology development, diffusion and linkages', these organizational issues were analysed further. It was argued that the linear model of technology generation, diffusion and adoption in spatially and functionally dif-

*A report on the workshop on 'Agricultural Policy: Redesigning R&D to Achieve the Objectives' held at the Indian National Science Academy premises, New Delhi between 10 and 11 April 2002, sponsored by the National Academy of Agricultural Sciences, and organized jointly by the Centre for Advancement of Sustainable Agriculture, National Institute of Science, Technology and Development Studies and National Centre for Agricultural Economics and Policy Research.