positive people in these two states were estimated to be about 25,000 and 19,000 respectively, in 2006 according to the NACO report. According to the HIV sentinel surveillance report in 2006, one-fifth of IDUs was HIV-positive in Manipur.

Apart from HIV, HBV and HCV infections, which share similar routes of transmission with HIV, are also a cause of concern among IDUs. HBV and HCV are important public-health diseases due to clinical consequences like acute hepatitis, chronic hepatitis, liver cirrhosis and hepato-cellular-carcinoma (HCC). HIV is a dreaded disease with 100% mortality within a short span of time. But, after the introduction of the highly active antiretroviral therapy (HAART) against HIV, the relevance of other blood-borne diseases is increasing[1]. Morbidity and mortality associated with hepatits viruses are becoming important among HIV-infected persons, as their survival has dramatically improved due to HAART[1].

The major concern is particularly due to higher burden of HCV among IDUs. There is an effective vaccine available against HBV, but no such vaccine is currently available against HCV. On the other hand, more people infected with HCV develop chronicity (75–85%) compared to HBV infection[2,3]. In a recent study, compared to 22–33% prevalence of HIV among IDUs in different districts of Manipur, 55–80% prevalence of HCV has been reported[4]. Similarly, studies conducted in Nagaland and Mizoram have also noted almost fivefold higher prevalence of HCV among IDUs compared to HIV[4]. As both the hepatitis viruses and HIV are transmitted through similar routes, HIV/hepatitis viruses co-infection is also commonly observed. This is known to cause rapid liver destruction. HCV also poses greater risk of HCC among Asians.

The HIV rates among IDUs have significantly declined in Manipur due to continued harm reduction effort, but HCV rate tended to remain elevated[5,6]. A similar situation has also been reported elsewhere. There are several explanations for such discrepancy. First, prevalence of HCV among IDUs is higher than HIV, indicating a bigger pool of HCV reservoir among IDUs. Thus mathematically, if IDUs share syringes/needles with others the chances of HCV infection are considerably high[5,6]. Secondly, the tenfold greater transmission efficiency of HCV compared to HIV through parenteral route is another explanation of greater prevalence of HCV. In the Northeast, despite continued efforts to promote safe injecting practices, multi-person sharing of needles/syringes (direct sharing) continues to be high[4]. Thirdly, sharing of injecting accessories like common container of drug preparation, filter cotton, rinse water, and front and backloading of drugs is more frequently associated with transmission of HCV than HIV[5,6]. Among IDUs in the Northeast, prevalence of indirect sharing is high, with 50–70% IDUs reporting sharing of various injecting accessories[4]. Sexual transmission of HCV also occurs, but less efficiently than HIV; hence discrepancy cannot be explained by sexual transmission[5]. High rate of unprotected sexual behaviour, including report of anal intercourse among IDUs in this region, warrants programme of condom promotion among them.

It is clear that due to greater parenteral transmission efficiency of HCV than HIV, more stringent strategies are required. There is need to scale up the existing needle/syringe exchange programme to contain HCV and other blood-borne viral infections among the IDUs in northeast. It is important to encourage single use and discard syringes among IDUs. Additionally, strategies to prevent indirect sharing practices should be incorporated, as it is believed that this is responsible for a large proportion of transmission of HCV among IDUs. The difficult hilly terrain poses a major challenge for the programme. Apart from providing prevention equipments, the programme should also offer screening service for HCV and HBV patients, and better counselling to IDUs. Intensive drug de-addiction treatment and rehabilitation measures will be a viable measure for changing the drug-use behaviour. Above all, prevention of drug use among adolescents and youth through greater community involvement will be the most effective way to fight these dreaded diseases.

1. Soriano, V., Barreiro, P. and Nuñez, N., *J. Antimicrob. Chemother.*, 2006, **57**, 815–818.
2. Calvin, Q. P. and Jin, X. Z., *Int. J. Med. Sci.*, 2005, **2**, 36–40.
3. Chen, S. L. and Morgan, T. R., *Int. J. Med. Sci.*, 2006, **3**, 47–52.
4. National Interim Summary Report, Integrated Behavioural and Biological Assessment (IBBA), Round 1 (2005–07), Indian Council of Medical Research and Family Health International, 2007, pp. 57–64.
5. Coutinho, R. A., *Br. Med. J.*, 1998, **317**, 424–425.
6. Zwahlen, M. and Vlahov, D., *Int. J. Epidemiol.*, 2003, **32**, 715–716.

G. K. MEDHI
J. MAHANTA*

Regional Medical Research Centre,
NE Region,
Indian Council of Medical Research,
Post Box 105,
Dibrugarh 786 001, India
**e-mail: jmahanta@hotmail.com*

The largest genetic paradise of India lacks biotechnological implementation

Northeast India, which occupies only 8% of the total geographical area of the subcontinent, contains about 50% (±8500 spp.) of the floristic wealth and the richest phytodiversity of the country[1]. This region comprising the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura, is the largest centre of genetic diversity of plants of economic importance. However, this region is still unexplored and information available about these plants is rudimentary and scanty due to lack of proper biotechnological implementation.

India, endowed with an estimated 47,000 species of plants, includes around 15,000 medicinal plants, among which 7000 are used in Ayurveda, 700 in Unani, 600 in Siddha, 450 in Homoeopathy and 30 in modern medicine[2]. Northeast India has been prospering for many centuries due to its own tradition of healthcare system. The Himalayan region including Northeast India is a rich repository of medicinal plants with a total of 1748 species[3]. Plants like *Digitalis purpurea* (digitoxin), *Taxus wallichiana* (taxol), *Raulfia serpentina* (resperine), *Panax assamica* (ginsenosides), *Nardostachys jatamansi* (jatamansin), etc. would be of special interest to the pharmaceutical industry. The northeastern region with its diversified plant species has tremendous potential and a natural advantage in this emerging area. Ancient people utilized thousands of different plant products, and now the importance of traditional system of medicine has been recognized all over the world. Plant biotechnology has gained considerable importance for production of phytochemicals with biological activities. It helps in exploiting plant species for improving their importance in human welfare. It also solves the problem of threatened and endangered species leading to restoration of the phytodiversity by plant tissue culture or *in vitro* culture. Genetic resources are renewable, provided they are well managed. *In vitro* conservation of germplasm can be used for conservation of rare, endemic, threatened and endangered species of this region having greater ecological as well as economic importance.

The northeastern region has not been evaluated or explored for medicinal plants, except for information available from folklore or from local medicinemen. Biotechnological implementation in this region should be done as soon as possible along with proper action plans. By this, plant metabolites which are the major resources of pharmaceuticals, food additives, fragrances, pesticides, enzymes, etc. can be evaluated properly. Screening of all plant species of this region should be done to develop novel biologically active compounds, leading to effective treatment of cancer, AIDS, ageing, hypercholestromia, diabetes, etc. In the agriculture and medicinal sector, we need more extensive research work to convert this biological wealth of the country to economic wealth on a sustainable basis.

Northeast India should receive the highest priority for development in plant genetic resource conservation. Proper implementation of biotechnology needs to be directed for commercialization of products and processes utilizing the existing rich natural resources of the country. In the coming decades an appropriate coordination and implementation of policies is necessary by the various ministries, research and development sectors, NGOs and individuals in the private sectors to systematize these efforts towards development of the country.

1. Mao, A. A., In Proceedings of the National Seminar on Biodiversity and Future Concern (eds Handique, P. J. and Kalita, M. C.), Guwahati, 2006, pp. 1–7.
2. Anon., Cultivation of Selected Medicinal Plants, National Medicinal Plant Board, Department of Ayush, Ministry of Health and Family Welfare, Government of India, New Delhi, 2004.
3. Airy, S., Rawl, R. S., Dhar, U. and Purohit, A. N., *Curr. Sci.*, 2000, **79**, 1467–1471.

J. S. DAS

Plant Tissue Culture Laboratory,
Botanical Survey of India, Eastern Circle,
Lower New Colony, Laithumkhra,
Shillong 793 003, India
e-mail: biotechjay@yahoo.co.in

Secondary emissions from spectrofluorimeters

The reason given for secondary emissions from spectrofluorimeters by De *et al.*[1] is wrong. The observed undertones and overtones described in that correspondence are due to Bragg's law ($n\lambda = 2d \sin \theta$) that governs the grating-based monochromator function. In a flourimeter, two monochromators are used to disperse polychromatic light, one for the lamp and the other for sample emission. Besides undertones and overtones (λ/n, $n\lambda$, where n is an integer), one may also detect 'apparent emission' at $2\lambda/3$, $4\lambda/5$, $3\lambda/2$, etc., all of which are explained by Bragg's law. The above statement can be verified by doing a simple experiment with a scatter solution. When a scattering solution is excited at 900 nm and emission monochromator is scanned from 250 to 750 nm, three peaks are observed at 300 ($\lambda/3$), 450 ($\lambda/2$) and 600 nm ($2\lambda/3$) (Figure 1). The reason for this is as follows: when the excitation monochomator is set at 900 nm, it allows the 450 (second order) and 300 nm (third order) from the light source. When scattered light of 300 and 450 nm passes through the emission monochromator, it is detected at 300, 450 and 600 nm (second order of 300 nm). Doing the same experiment with a

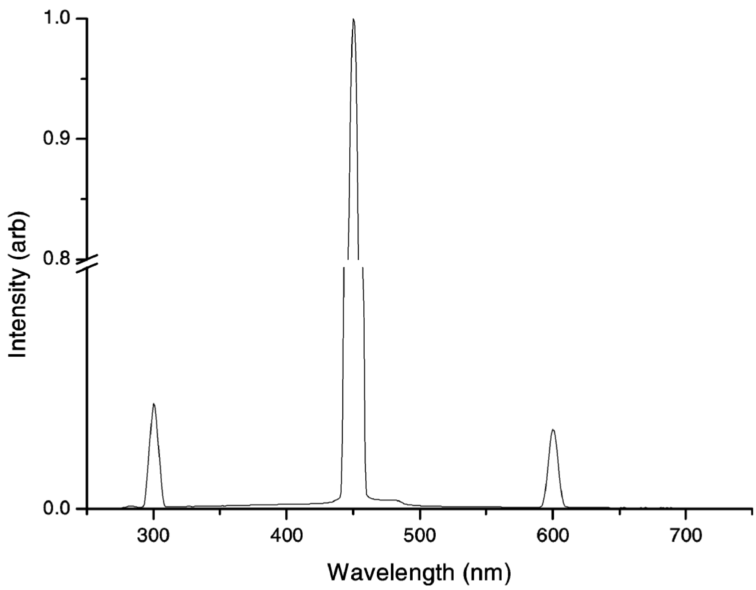

Figure 1. Emission spectrum of a scatter solution (MgO in water) excited at 900 nm (slit width 7.5/7.5 nm) recorded using a fluorimeter (Spex Fluorolog).