

# nature genetics

---

volume 5 no. 4 december 1993

---

## Mission in Mongolia

**Ulan Bator.** Seven hundred years ago, the Mongolian Empire of Kublai Khan (grandson of Ghenghis) stretched from Korea to Hungary. Alas, today, Mongolia is so beset with its own economic problems that its current research plight would not rank high on most people's agenda. For 70 years, starting in 1921, the country enjoyed a harmonious relationship with the former Soviet Union — it was in fact the world's second communist country. But with the dramatic collapse of the Soviet empire in 1991, aid from Moscow dwindled and Mongolia found itself in desperate need of hard currency to pay for imports — money that it simply does not have. The country is pleading for foreign investment, for it has a vast mineral wealth including gold, zinc and molybdenum, but it lacks the infrastructure to exploit it. And with a population of just over 2 million (there are more Mongols outside Mongolia than within its borders), rising unemployment and continuing food shortages, the prospects for rapid economic recovery look grim.

On a splendid day in mid-October, Indian

summer has arrived in the capital, Ulan Bator\*, as the temperature slowly crawls above freezing point. But the conditions inside the scientific institutes and hospitals where the Mongolians practice research and medicine leave a great deal to be desired. The National Centre for Anthropology, in the centre of Ulan Bator, is probably typical. Established two years ago under the auspices of the Medical University, the laboratories are hopelessly underequipped. In the genetics department, there is a solitary bench-top centrifuge, a cabinet sparsely filled with chemicals (mostly from Bulgaria), a couple of old word-processors, but no radioactive isotopes or PCR (polymerase chain reaction) machine, and no library to speak of. The institute receives no scientific journals and, says director general Dr Jamyanghiin Batsuuri, his staff are "information hungry". Batsuuri says he has not seen a genetics journal for four years.

---

\* 'People to People' Citizen Ambassador Program delegation to Mongolia (leader Dr Walter Nance), October 20–23, 1993.

K. Davies

IMAGE  
UNAVAILABLE  
FOR COPYRIGHT  
REASONS

It comes as a pleasant surprise, then, when Batsuuri describes the first-rate research on population genetics carried out by his group, notably under Dr Sambuughin Njamkhishig (in collaboration with colleagues in Russia, Japan, and the United States). For the past several years, Batsuuri's team has been studying a selection of protein polymorphisms among thousands of subjects to shed light on the history, biological make-up and migration of the Mongolian population. They conclude that the genetic origin was in the centre of Mongolia (coincident with cultural expansion), radiating south to China, north-east and probably westward as well. Indeed, a variant of transferrin that had been thought to be most common among Chinese turns out to be even more frequent among Mongols. More recently, analysis of restriction fragment length polymorphism and mitochondrial DNA variants has begun to confirm the serological data, as well as providing evidence in support of the notion that the American-Indians and Mongolians are related to a common ancestor who migrated across the Bering Strait some 30,000 years ago.

Attention is now turning towards the comparison of the 20 or 21 ethnic groups within Mongolia that are geographically, linguistically and culturally distinct. Preliminary studies by Njamkhishig of mitochondrial DNA suggest that there may be two maternally derived lineages — in other words, two 'Eves' giving rise to the population. Related research is being pursued by Dashtsevelyn Tumen at the Academy of Science's Institute of General and Experimental Biology, where her collection of excavated skulls, dating back as far as 10,000 years (and with perfect sets of teeth), sits wrapped in newspaper and ready for use in DNA analysis.

The Mongolian population has increased fourfold in the past 70 years, but the majority still live in isolated, semi-nomadic groups in rural

K. Davies

IMAGE  
UNAVAILABLE  
FOR COPYRIGHT  
REASONS

J. Batsuuri — a high ranking geneticist.

areas. While the population structure may lend itself to genetic studies, there are fears that the frequency of hereditary disorders is on the rise, according to Dr Janchiv Radnaabazar, head of medical genetics at the Maternity and Child Health Research Centre. The feeling is that consanguinity is contributing to an increase in congenital malformations, together with the tendency for women to continue

child-bearing well into their forties, thereby increasing the incidence of Down's syndrome. Other disorders on the rise include Turner's syndrome, hermaphroditism and prelingual deafness, not solely attributable to the promiscuous use of streptomycin. The infant mortality rate currently stands at 66 per 1,000 births but is starting to improve.

At the Children's Hospital, 2,500 surgical operations are performed annually, of which 500 are for birth defects, but diagnostic capabilities are slim. The technology in the cytogenetics laboratory is 30 years behind the West: chromosomes are sorted on the basis of size and morphology alone — there is no facility for producing banded karyotypes. But although there is no shortage of physicians and medical trainees, a more deep-rooted problem is their inadequate education. According to Batsuuri, there is a desperate need for educational change and increased funding to assist the long-term improvement of health care and medical genetics research. This may be possible if and when the economy recovers, says Batsuuri (who is also a member of parliament), but no-one is willing to predict when that will happen. Mongolia spends about 1 per cent of its annual budget on science, but that amounts to only a paltry \$1.5 million.

**Western values.** Although most Mongolian scientists seem to be operating in an environment bereft of money, journals and the most basic of resources and supplies, some have been able to reach out to the West with considerable success. On the edge of Ulan Bator lies the Institute of Biotechnology, founded five years ago by the Mongolian Academy of Sciences and employing close to one hundred people. Dr Bumbein Dashnyam, a resourceful man — a bit of an 'operator' in Western terms — has been able to furnish the molecular biology department lavishly, to the envy of his colleagues. With the help of a

IMAGE  
UNAVAILABLE  
FOR COPYRIGHT  
REASONS

K. Davies

Maternity and  
Child Hospital  
Research Centre,  
Ulan Bator.

IMAGE  
UNAVAILABLE  
FOR COPYRIGHT  
REASONS

The Great  
People's Hural  
(parliament  
building, Ulan  
Bator).

five-year, \$600,000 grant from the United Nations Development Program and support from the World Health Organization, the department can proudly list a sequencing apparatus, ultracentrifuge, thermal cycler and state-of-the-art tissue culture facility on its inventory.

The Institute's main research effort focuses on hepatitis B and C, whose incidence is very high in Asia, including projects on vaccine development, diagnostics and genome research. Dashnyam's successes have led to an invitation to visit Merck, Sharp & Dome in the United States later this month, and he has also asked the United States National Academy of Sciences for assistance, either financial or otherwise, to aid the viral research programme. Dashnyam believes in international collaboration too: he has forged an alliance with biochemists at the University of Oxford to study the structure of the Y chromosome, and enjoys good relations with Japanese investigators, including a recent collaboration on the prevalence of HTLV-1 in Mongolia (J. Batsuuri *et al.*, *Scand. J. Infect. Dis.* 25, 298–299; 1993).

But problems persist: because the institute cannot buy journals, Dashnyam has to rely on photocopies of the tables of contents from colleagues in Europe to keep in touch. Sending a fax is prohibitively expensive — about half a month's salary. And with wages for his staff averaging around US\$15 per month, Dashnyam is finding it difficult to hold on to his best researchers, especially as one or two private biotechnology companies are attempting to get off the ground in Mongolia.

“The brain drain in our country is very large”, Dashnyam sighs. (It is ironic to watch local sidewalk artists, seemingly tracking western tourists around the city, earn far more money in 15 minutes than a department head in

Mongolia makes in a month.)

But perhaps the most frustrating problem Dashnyam and others must encounter lies not within the Institute but behind it. There, two impressive multi-storey structures, constructed by the Russians as a modern research institute and accommodation facility for joint Mongolian-Russian programmes, lie vacant and incomplete. There are no plans for construction to resume, even though Dashnyam estimates it would only take another \$1 million to finish the task.

**Communication breakdown.** With Russia consumed by internal problems and unable to provide assistance, and relations with China poor to say the least, Mongolia is more than ever reaching out to the West for aid. Although only a massive infusion of cash will have a radical impact on Mongolian science, more modest assistance would also be welcome. One copy of *Science* in the public library and one personal subscription to *Nature* in all of Ulan Bator are hardly enough. *Nature* has a sponsorship programme whereby Western readers can take out a personal subscription on behalf of a colleague in Central or Eastern Europe at a reduced rate. In the hope of helping a little, *Nature Genetics* will next year offer its readers a similar opportunity. *Nature Genetics* will also do its best to provide constructive criticism to authors from Mongolia (and countries in a similar plight) who take the trouble to submit papers, even if they may not always be considered of sufficient general interest to warrant publication.

International collaboration is also of the utmost importance; Mongolian biomedical research depends to a large extent on the expert training of staff in foreign countries, and exchange programmes and short-term travel fellowships provide invaluable experience, but few have been able to take advantage of them. With no local funds, members of the Mongolian research community are almost entirely dependent on invitations and sponsorship from foreign institutions to provide them with the opportunity to present data at foreign meetings and to be made to feel a welcome part of the international scientific community. Language might be considered an insurmountable barrier to such visits, but the use of English, especially among young students, is rapidly gaining popularity. There is much more that the West can do but even Mongolians, it turns out, love their MTV. □

IMAGE  
UNAVAILABLE  
FOR COPYRIGHT  
REASONS

YAC sighting.