820), represents the age of the rocks–metatonalites and metagranodiorites, in which the zircons had crystallized as typical accessory mineral. These meta-igneous rocks are the only ones, so far discovered, to have survived till today and hence constitute the *Oldest preserved crust*. In the absence of the parent rocks, the 4.2–4.4 b.y. zircons from W. Australia only confirm that crustal development was active within half-billion years of formation of the earth and that a few of these early-formed crusts must have remained stable for some time to be weathered and the zircons deposited elsewhere.

1. Report on the Annual Meeting of Geological Society of America, *Science*, 2000, **290**, 2239–2242.

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NEWS

Nuclear power statistics for 2000*

A total of 438 nuclear power plants were operating around the world at the end of 2000, according to data reported to the Power Reactor Information System at the International Atomic Energy Agency (IAEA). The plants had a total net installed capacity of 351 GW(e). Also during the year 2000, six nuclear power plants representing 3056 MW(e) net electric

Table 1. Nuclear power reactors in operation and under construction during 2000

	Reactors in operation		Reactors under construction		Nuclear electricity Supplied in 1999		Total operating experience	
Country	No. of units	Net capacity MW(e)	No. of units	Net capacity MW(e)	TW(e)-h	% of total	Year	Month
Argentina	2	935	1	692	5.73	7.26	44	7
Armenia	1	376			1.84	33.00	33	3
Belgium	7	5712			45.40	56.75	170	7
Brazil	2	1855			5.55	1.45	19	3
Bulgaria	6	3538			18.18	45.00*	113	2
Canada	14	9998			68.68	11.80	433	2
China	3	2167	8	6420	16.00	1.19	23	5
Czech Rep.	5	2569	1	912	13.59	18.50	58	9
Finland	4	2656			21.06	32.15	87	4
France	59	63073			395.00	76.40	1169	2
Germany	19	21122			159.60	30.57	591	1
Hungary	4	1755			14.72	42.19	62	2
India	14	2503			14.21	3.14	181	5
Iran			2	2111				
Japan	53	43491	3	3190	304.87	33.82	962	8
Korea, Rep. of	16	12990	4	3820	103.50	40.74	169	2
Lithuania	2	2370			8.40	73.68	30	6
Mexico	2	1360			7.92	3.86	17	11
Netherlands	1	449			3.70	4.00	56	0
Pakistan	2	425			1.08	1.65	29	10
Romania	1	650	1	650	5.05	10.86	4	6
Russia	29	19843	3	2825	119.65	14.95	671	6
South Africa	2	1800			12.99	6.58*	32	3
Slovak Rep.	6	2408	2	776	16.49	53.43	85	0
Slovenia	1	676			4.54	37.38	19	3
Spain	9	7512			59.30	27.63	192	2
Sweden	11	9432			54.80	39.00	278	1
Switzerland	5	3192			23.54	38.18*	128	10
UK	35	12968			78.30	21.94	1238	4
Ukraine	13	11207	4	3800	72.40	47.28	240	10
USA	104	97411			753.90*	19.83	2559	8
Total	438	351327	31	27756	2447.53		9819	11

Note: Asterisk is estimate.
The total includes the following data in Taiwan, China: 6 units, 4884 MW(e) in operation; 2 units, 2560 MW(e) under construction; 37 TW(e)-h of nuclear electricity generation, representing 23.64% of the total electricity generated there; 116 years 1 month of total operating experience.
One reactor was shut down, Chernobyl 3, in Ukraine in 2000.

capacity were connected to the grid, one in Brazil, one in the Czech Republic, three in India and one in Pakistan.

Additionally, construction of three new nuclear reactors started in 2000 – one in China and two in Japan, bringing the total number of nuclear reactors reported as being under construction to 31.

Nuclear power provides about 16% of global electricity, with about 83% of nuclear capacity concentrated in industrialized countries. The ten countries with the highest reliance on nuclear power in 2000 were: France, 76.4%; Lithuania, 73.7%; Belgium, 56.8%; Slovak Republic, 53.4%; Ukraine, 47.3%; Bulgaria, 45%; Hungary, 42.2%; Republic of Korea, 40.7%; Sweden, 39%; and Switzerland, 38.2%. In total, 17 countries relied upon nuclear power plants to supply at least a quarter of their total electricity needs.

In North America, where 118 reactors supply about 20% of electricity in the United States and 12% in Canada, the number of operating reactors has declined slightly. In Western Europe, with 150 reactors, the overall capacity is likely to remain at or near existing levels in the coming years. In Central/Eastern Europe and the Newly Independent States, with 68 reactors, a few partially built plants are likely to be completed, while aging units are being shut down. Only in the Middle East, Far East and South Asia, with a total of 94 reactors at present, are there clear plans for expanding nuclear power, particularly in China, India, the Republic of Korea and Japan.

Worldwide in 2000, total nuclear generated electricity increased to 2447.53 terawatt-hours. Cumulative worldwide operating experience from civil nuclear power reactors at the end of 2000 exceeded 9800 reactor-years.

Table 1 shows the electricity supplied by nuclear power reactors in 2000 and the respective percentage of electricity produced by nuclear energy.

*IAEA public release material dated 3 May 2001 communicated by S. Ganesan, Theoretical Physics Division, Bhabha Atomic Research Centre, Mumbai 400 085, India (e-mail: s.ganesan@vsnl.com).

MEETING REPORT

Chickpea regeneration and transformation*

Among grain legumes, chickpea is an important crop of the Indian subcontinent as far as production and area under cultivation are concerned. It is a rich source of vegetable protein. However chickpea is losing its image as a poor man's meat due to high market prices, causing protein calorie malnutrition and under nutrition. The reasons for stagnation in its production are: susceptibility to insect pests, pod borer, fungal pathogens, and low tolerance to drought and low temperature stresses. Various insecticides and fungicides have been used to control insects and pathogens. Improvement in resistance by conventional breeding is limited due to the lack of sufficient and satisfactory levels of genetic variability within cultivated chickpea germplasm. Many wild annual *Cicer* species which possess a wealth of agronomically desirable genes are sexually incompatible to cultivated varieties[1,2]. An effective and alternative approach is to transfer genes from sources which are otherwise difficult to introduce through conventional breeding. The success of gene transfer depends on the availability of an efficient and reliable *in vitro* regeneration protocol. Chickpea, like other large-seeded legumes, is recalcitrant for *in vitro* regeneration and genetic transformation.

In view of lack of reliable protocols for regeneration and transformation of chickpea, the National Centre for Plant Genome Research (NCPGR) had organized a one-day workshop. The programme consisted of two main sessions followed by a round-table discussion. In the first session, K. K. Sharma (ICRISAT) presented an overview of the economic importance of chickpea, highlighting serious diseases and abiotic stresses that are major constraints in chickpea production. He also highlighted ongoing research at ICRISAT with the aim to introduce resistance against insect pod borer and fungal pathogens. Although regeneration could be achieved via direct multiple shoot organogenesis or somatic embryogenesis, the attempts for establishment of plantlets in soil had not been successful. Putative transformants of chickpea could be raised by biolistics and *Agrobacterium*-mediated transformation. However, the lack of efficient *in vitro* regeneration has limited the efforts for improvement of chickpea. V. K. Chowdhury (CCS HAU, Hisar) commented on the lack of reproducibility of regeneration protocols and highly problematic rooting and subsequent transplantation of the *in vitro* regenerated shoots, which was also a major limiting factor for obtaining complete transgenic plants and their progeny. He mentioned that his group had been successful in regenerating the transformed shoots using *Agrobacterium*-mediated and biolistics procedures. P. K. Jaiwal (MDU, Rohtak) reported direct and indirect *in vitro* regeneration of chickpea via organogenesis and somatic embryogenesis from diverse explants. A comparison of various selective agents along with the assessment of the compatibility of regeneration systems with *Agrobacterium*-mediated transformation was presented. The shoots recovered on selection medium from *Agro*-infected explants were found to be GUS-positive and could be rooted.

In the second session, K. V. Krishnamurthy presented the work carried out by his group on shoot organogenesis, somatic embryogenesis and protoplast culture of chickpea at NCL, Pune. He also discussed *Agrobacterium*-mediated transformation of chickpea using *gus* and

*A report on the one-day workshop on Regeneration and Transformation of Chickpea (*Cicer arietinum* L.) organized by the National Centre for Plant Genome Research, JNU Campus, New Delhi and held on 30 November 2000.