CHINA: A PICTORIAL CLOSE-UP

by

John Sutton

Photographs by William W. Hutchison

*At the invitation of the Geological Society of China, a delegation of ten international scientists representing IUGS and its related organizations visited China last fall to discuss possible multinational co-operation under the aegis of IUGS. To add a new dimension to the report which has already appeared on the visit (see *Geological Newsletter*, 1977, 4, pages 323-326), Professor John Sutton colours his personal impressions of the one-month visit to China with the photographs taken by the Secretary General of IUGS, William Hutchison.*

Figure 1: Inside the Academy of Geological Sciences, State Bureau of Geology.

Figure 2: Leaving the Academia Sinica.

There are two academies in China concentrating on research and study in the earth sciences. The Academy of Geological Sciences, which is part of the State Bureau of Geology, operates a number of research institutes. It maintains laboratories in Peking and elsewhere. Any discipline which might prove useful to the development of geology is studied: the range is wide and includes pure science. We saw work on stratigraphy and structural geology which indicated foresight in both short-term and long-range planning.

Geological research institutes and laboratories are also maintained by the Academia Sinica, or the National Academy of Sciences. I had visited some of these laboratories on an earlier trip to China in 1973. In many instances, the subjects being studied were much the same indicating relatively little progress over four years, possibly reflecting some of the difficulties under which scientific research was carried out in the mid-nineteen seventies.

Laboratories are, however, well-staffed and contain equipment which is in excellent condition and in active use. Libraries are well-stocked with foreign literature and leading foreign journals are rapidly distributed. Science is still basically hampered by the breakdown in scientific publication resulting from the Cultural Revolution. There are few modern geological text books written in Chinese although the publication of scientific journals has now resumed. In one laboratory I saw a group of scientists using out-of-date sources in compiling certain maps calling for geological information from outside China. This, I felt, was a waste of human resources since China has a great capacity for colour printing and has produced first-class maps of regions outside China, as, for instance, in a recently published geological map of Asia.

In addition to what we learned during the visits to institutions and laboratories, we were presented with a number of papers providing accounts of recent geological work in China. These pamphlets, written in English by members of research groups (sometimes named but more often left anonymous) bear only the words "Peking, China" and the date as

an indication of origin; they are not numbered and do not form part of a series or journal, but in at least one instance a Chinese original of an article had been published. The publications first appeared in 1976 - at the time China was admitted to IUGS and participated in the International Geological Congress held in Sydney. Collectively, they reflect Chinese geological activity in recent years and should be included in every major library if exchange of publications were made possible and if catalogues of papers were made available. Together with the 1:4,000,000 geological and tectonic maps of China they provide a tantalizing glimpse of what has been accomplished.

Figure 3.

Figure 3: Changchun College.

Originally built as a palace for the Japanese puppet Emperor, this Geological College is situated in a building that boasts 140,000 m² of useable space. The 2,400 students attending the College are taught by an academic staff totalling approximately 750, thus leaving the student-academic staff ratio at an enviable 4 to 1. Established in 1952, Changchun College (one of four Geological Colleges maintained by the State Bureau of Geology in conjunction with the ministry of Education) has graduated more than 12,000 students.

The geological work underway at the College was impressive. Classes studying mineral prospecting were learning geophysical and geochemical techniques not only in the laboratory but also in the field, where practical exercises were carried out to examine anomalies discovered in routine reconnaissance surveys. The field work involved detailed geological, geochemical and geophysical studies which, if warranted, included trenching and drilling. The wide range of techniques spanned isotope analyses and radiometric age determinations. The emphasis during the three year course (now to become a four year course) is more on prospecting science than on conventional geology as in the West. Training is basically tailored to the needs of the State Bureau of Geology and graduates normally go on to work with a Provincial or State Bureau. Colleges provide for workers to return to take "refresher" courses, or one or more years of further education.

Figure 4: A pumping well at Taching.

Figure 5: Taching Refinery.

On the 26th of September, 1959, oil was discovered at Taching in northeast China, in the third exploration hole. Further exploration and development of this major oil field took three years. An impressive achievement, it involved coping with such problems as moving 50,000 to 60,000 people into a desolate area, finding and maintaining sources of water, developing agriculture, and moving heavy drill equipment long distances. Eleven test areas were set aside to study

alternate means of production. It was finally decided to use carefully controlled water flooding to force out the highly viscous crude oil.

The delegation was astonished at the apparent lacustrine origin of the oil in this large non-marine basin filled mainly with Cretaceous sediments. Equally puzzling was the relatively shallow depth at which the oil had matured.

We enjoyed an excellent discussion on all aspects of field geology and came away impressed with the attention the Chinese paid to most of the critical geological relationships. What is needed now is an opportunity for foreign geologists to learn more about Chinese geology and to work alongside Chinese colleagues; they in turn would benefit greatly by travel abroad and the chance to see the geological phenomena which they at present only read about. The extent to which their isolation may be hampering their economic development also became apparent in the discussion. We were shown the carefully preserved drill cores from this field (which is one of considerable complexity with production from a number of sedimentary horizons). We concluded that an understanding of the conditions under which the sediments had accumulated is critical to the future development of the field. To the best of our knowledge, those in authority at the Taching oil field had not had the opportunity to study sedimentary rocks outside China, and, in consequence, found it difficult to interpret the evidence presented by the abundant drill cores which we were shown.

Figure 6: Lunch Break on Sinian and Phosphorites.

A long morning was devoted to walking up a complete section of tilted but undeformed Sinian (latest Proterozoic) into lowermost Cambrian at Wang Jia Wen south of Kunming, Yunnan. Near the top of the section buff-weathering laminated cherty and dolomitic phosphorites are well exposed overlying cherty, stromatolitic dolomite. The quality of the outcrops and the amount of detail in each of the four Sinian formations so intrigued the party, that lunch was delayed until mid-afternoon!

Phosphate deposits formed in very late Precambrian or early Cambrian are so extensively distributed elsewhere in China, that they provide for both an expanded agriculture within China and for the development of useful fertilizer exports.

Figure 6.

Figure 7: Huang Ho River.

On either side of the Red River (Huang Ho), which enters the sea at Hanoi, we were shown the results of the

geological mapping of complex terrain which included Palaeozoic, Mesozoic and younger strata involved in long-lived major dislocations. Before visiting the exposures, the regional geology of Yunnan was explained to us by a member

of the Yunnan Bureau of Geology. Listening to his careful and detailed account, we realized that this area would, in all probability, become one of the world's classic terrains.

The area has been subjected to repeated dislocations which probably began before Ordovician time and which, more recently, involved extensive transcurrent displacements produced by India as it moved northwards relative to southern China. The geological history described to us had been

mapped in a rugged-to-mountainous terrain by an organization which could call on several thousand scientists and engineers. As is common in China, the overall aim was to produce geological, geophysical and geochemical maps at a scale of 1:200,000. Though training of individual geologists may appear somewhat specialized, the effective grouping of scientists in properly led teams has produced first-class results judging by what we were shown in the field.

Figure 8: Classic Karst south of Kweilin.

A one day cruise down the Likiang will remain indelibly imprinted in our memories. It provided a relaxing change in pace near the end of our visit. The boat slipped quietly past a fairyland scene of steep, cone-shaped clusters of mountains carved out of Devonian limestones.

Figure 9: The IUGS Delegation.

IUGS delegation and hosts cruised through the karst on the Likiang, south of Kweilin. Back row, left to right: Hsu Hsien-chung, Sun Tien-ching (a Vice-President of the Academy of Geological Sciences of China

and Director of the Institute of Geomechanics), Liu Yuan-chen, Frances Delany, Norman Fisher, John Sutton, Rudolph Trümpy, So Chi-ying, Chiang Min-hsi, Wang Ta-lsiung, Chang Hsue-shou. Front row, (kneeling), left to right: Wu Chin-sian, William Hutchison, Ken Hsu, Charles Drake, Anders Martinsson, Tsai Wen-yen, Digby McLaren, Yuan Tao-sian and Cheng Wen-tsun.

Figure 10: Farewell to Peking.

Sharing a quiet moment at Peking airport prior to departure are, left to right, Rudolph Trümpy (President of IUGS) and Hsu Chieh (Acting President, Geological Society of China and a Deputy Director General of the State Bureau of Geology), Yeh Feng (another Deputy Director General of the State Bureau of Geology) and Ken Hsü (Switzerland).

The issue that was probably uppermost in their minds was the future of geological co-operation and the links that should be established between the Chinese geologists and their colleagues outside of China. Having found our own visit to be a stimulating educational experience, we felt strongly that a regular exchange of staff and information could go a long way toward benefitting geological research both in China and abroad. In particular, problems in stratigraphy and in the understanding of large scale continental structures could profit from future collaborative work within the framework of the IUGS.

Figure 10.

John Sutton

EDITOR'S NOTE: At the final meeting in Kwangchow (Canton), the Chinese expressed interest in participating in the work of the following groups of the IUGS Commission on Stratigraphy: the Subcommissions on Ordovician, Silurian, Devonian, Carboniferous, Cretaceous and Quaternary Stratigraphy and the Working Group on the Precambrian-Cambrian Boundary.

Insofar as the IGCP program is concerned, interest was expressed in:

1. Project 1: Accuracy in time.
2. Project 24: Quaternary Glaciations in the Northern Hemisphere.
3. Project 29: Precambrian - Cambrian Boundary.
4. Project 118: Correlation of Upper Precambrian.
5. Project 143: Remote Sensing and Exploration.

ABOUT THE AUTHOR: Professor John Sutton is with the Department of Geology of the Royal School of Mines, Imperial College of Science and Technology, London, England. Former Head of the Department, he is well known for his work on the Precambrian and his studies of the metamorphic rocks of Scotland. His international activities include service on the Bureau of the Inter-Union Commission on Geodynamics (ICG) and as Chairman of Committee Two of IGCP. He has just been appointed Chairman of the IUGS Committee on Geology Teaching. Professor Sutton is currently Vice-President of The Royal Society.