INSTITUTE OF CURRENT WORLD AFFAIRS

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Visits to Chinese Research Institutes and Scientific Instrument Factories.

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Mr. R.H. Nolte,
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Dear Mr. Nolte,

Only in Nanking was I able to visit research institutes. I attribute this to the few tourists who visit Nanking compared with the many who visit Peking and Shanghai, coupled with a particularly obliging manager of the China International Travel Service. He said, "If we show universities and communes to most tourists they accuse us of ramming propaganda down their throats. They want to see museums and relics of the Old China, I'm glad to arrange for you to see something of the 'New China'".

Two of the institutes were branches of the Chinese Agricultural Academy, and one was an institute of the Academy Sinica. All three were concerned with the improvement of agricultural production. It seemed that the overall objectives of each institute are determined according to a 'united plan' worked out by the State. Their terms of reference are however quite broad. For example, the Kiangsu Branch of the Chinese Academy of Agricultural Science's main task is to 'solve the problems of agricultural production encountered in this Province'. The Mechanization Research Institute had as its objective 'to do research to find the types of machinery most suitable for paddy rice production', and the Academy Sinica's Soil Science Research Institute was to carry out 'basic studies related to improving the fertility of poor soils, especially saline, alkaline and red soils'.

The scientists work out their research projects according to these terms of reference. In the case of the Kiangsu Branch of the Chinese Academy of Agricultural Science the working out of research priorities involves close liaison with their own branch institutes scattered throughout the Province, and the peasant scientists in the communes. The Soil Science laboratory however, does more basic research and the scientists seemed to have considerable say in their research program. In all instances the program has to be sent to Peking for approval.

Chinese Academy of Agricultural Science, Kiangsu Branch

This research institute had eight departments: Food crops; fibre and oil crops; crop protection; soil science; horticulture; animal husbandry and veterinary; plant physiology; agricultural physics. In addition there are two pedagogical research groups: agricultural economics; and agricultural methodology.

There are 300 research workers plus 100 assistant researchers and 4 peasant scientists. Affiliated to this Academy are: 7 agricultural scientific research institutes, one in each of seven districts within the Province; 2 institutes for research in vegetables; one institute for research in poultry; and 17 experimental stations, one in each of 17 counties in the Province. Altogether in these 28 institutes and stations there are more than 1,000 research workers.

A particularly interesting feature in this institute and its 27 affiliated institutions was the use of peasant scientists. These are men who have no scientific training but are veteran peasants who have demonstrated an ability to innovate and who have found empirically "what works" in their home area. At the top level, as in Nanking, there were very few of these men. The work going on was clearly professional scientific work carried out by university graduates. But for the agricultural extension work considerable use was made of the peasant scientists. They act as a go-between and their empirical knowledge is sometimes of use to the professional scientists. For example, last year (1963), 90,000 peasants visited the Institute's experimental field in Soochow to see a demonstration of a new technique for growing rice which was attributed to a peasant scientist. However, his method had first been given a thorough scientific analysis at the Nanking Institute before his ideas were promulgated.

To illustrate the work of the Nanking Institute I was shown the pest control laboratories in the crop protection department. There, research was carried out on the life cycle of various insect pests, and a search made for the most appropriate insecticides. There were 41 research scientists working in this department.

Nanking Agricultural Mechanization Research Institute

This Institute was established in 1957. On the wall of the committee room is a quotation from Mao Tse-tung, "The basic road for our country's agriculture lies in mechanization". There are four laboratories: Electric cable towed plough; plant protection; plant transplanting; and machine repair.

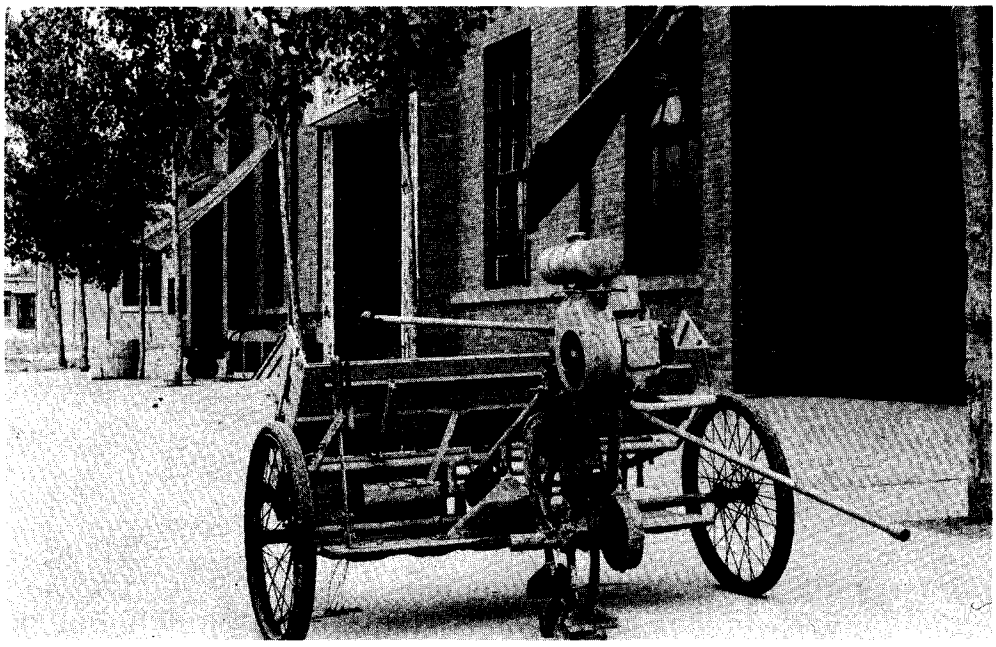
One hundred researchers work in this Institute. They not only design new agricultural machinery but also advise on the application of machinery and select machinery for specific problems. So far the Institute has designed three types of machines which have been thoroughly tested and the blueprints sent to the factory for production. I was shown all three.

The first was a rice seedling transplanting machine which can be adjusted to plant from three to eleven seedlings in each 20 cm. square. It has a 2 H.P. motor and with it, five people can plant one hectare in a day (it takes 30 people to plant one hectare of rice without a machine). I was told that the machine is exported.

The second item was an insect spray. Basically it consisted of a pump which drew water from an irrigation canal, mixed an appropriate amount of insecticide into it and the mixture was then sprayed over crops.

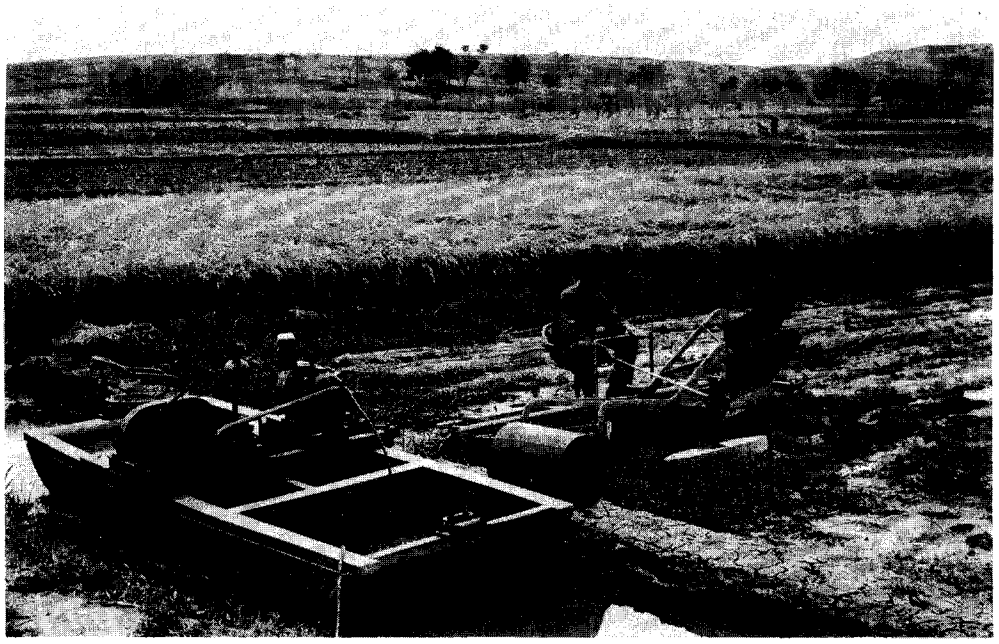
The third machine, and by far the most interesting, was the cable-drawn plough. This was for operation in swampy ground preferably covered with 10 to 15 cms. of water. I watched it demonstrated in a field outside the Institute. At either end of the field was a punt-like boat on which was mounted a winch (powered by either an electric or diesel engine). The plough was attached by cable to both winches and was simply pulled back and forth across the field. The boats were anchored and by means of another winch could be moved a furrow's width perpendicular to the furrows after each traverse. Theplough moved quickly at 2 metres per second, and I was told that up to six mou of land (15 mou = 1 hectare) per hour could be ploughed.

The Director of the Institute, Ko Jie, was one of the very few scientists I met in China who was willing to speak to me in English. He said I was the first Englishman ever to have visited his institute. He personally demonstrated the cable plough, which he claimed is now in mass production.



Rice seedling transplanting machine designed at the Agricultural Mechanization Research Institute, Nanking.

The cable towed plough in action. It is pulled by a winch powered by a diesel engine. This field was insufficiently flooded for optimum operation.



The cable towed plough. Demonstrated outside the Agricultural Mechanization Research Institute, Nanking. The winch on this boat is powered by an electric engine.

Soil Science Research Institute

The Academy Sinica's Soil Science Laboratory which I visited in Nanking was the best equipped scientific research laboratory that I saw in China, and compared favourably with anything I have seen elsewhere in Asia. I was given the usual political introduction into which Mr. Chan, the Director of the Office, crowded a great many slogans - "Under the three banners... Rely on our own efforts ... Let 100 flowers bloom and 100 schools contend ..." etc.. But from amongst this political verbiage I learned that there were more than 300 university graduates working in the Institute which was divided into six divisions: Soil geography; soil agro-chemistry; soil physical chemistry; soil biochemistry; soil biology; and soil physics.

I was shown around many different laboratories. In each laboratory the project leader explained the work in progress. I noted that although the majority of scientists could read English, most were very reluctant to speak it. We visited the library which I was told contained 60,000 volumes. There was a separate room for current journals and I estimated there were about 300 journals on the racks, from all over the world. I noted British, American, Russian, French and German journals, all appeared to be originals rather than photo copies, and one American journal which I picked up at random was the July 1964 issue (it was October 1964 when I was there). There were many Russian and English language books in the library. Also I noted as we went around the laboratories that on each scientist's desk there was nearly always a few of the latest English and American books on his speciality. In addition about half the scientists also had a copy of one of Mao Tse-tung's political books.

The equipment in this Institute came from all over the world. I saw a Tinsley Polarograph bought in 1957, Czechoslovakian and Russian spectroscopes, a British centrifuge super speed MSE, equipment made in their own factory for measuring the electrical conductivity of soils. I was shown equipment for differential thermal analysis, a German Zeiss microscope, a superbly equipped X-ray room with Japanese, Dutch, and East German equipment, and a special laboratory for using radioactive isotopes. The factory attached to the Institute had 24 workers and was mainly used for instrument repair. Although I was unable to assess the scientific merits of the research work there was a sense of purpose and enthusiasm which marked it as a first rate institution.

Scientific Instrument Factories

I visited two scientific instrument factories. The first was the scientific instrument teaching apparatus factory in Nanking. The factory produces 102 different kinds of optical and electrical apparatus. Another teaching apparatus factory in Wuhan produces zoology and botanical equipment, and a third in Shenyang makes heat and mechanics equipment. The Nanking factory has 1,400 workers and staff members, 400 machine tools and occupies a floor space of 50,000 square meters.

Ammeter Assembly room, Nanking Scientific Instrument Teaching Apparatus factory.

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The manager of the factory, Jang You-shyr, stressed on several occasions that the work had been done without aid, "If there had been aid the work would have been done more quickly". He said that in 1958 the management decided to make electron microscopes, and asked some visiting Czechoslovakian experts for help. The Czechs looked at the machine tools in the factory and said it was impossible. In their factory in Czechoslovakia there were many modern machine tools and experts, but they had only produced three electron microscopes in seven years. The Chinese determined to prove they could make such microscopes and within a year made their first model. They have now constructed 20 and I saw another 5 in different stages of construction. The microscopes have a magnification of 20,000 and sell in China for ¥60,000 (U.S. $25,000).

The factory also makes biological microscopes, metal structure microscopes; stereoscopic microscopes; geological microscopes; slide rules; stero pantometers; astronomical telescopes; electrostatic generators; moon and earth motion machines; induction coils; hand driven AC and DC generators; and a variety of ammeters and voltmeters. Optical glass used to be imported from Germany, but is now produced in their own factory.

In addition to the electron microscopes I saw the ammeter assembly room. The meters were simple but looked robust. During the month in China I visited 6 middle schools (3 were in communes and 3 in cities) and each had equipment made in this factory.

The other instrument factory was the Medical Instruments Factory in Soochow which made 391 different kinds of surgical instruments especially for gynaecology, obstetrics, and eye, nose and throat surgery. The main feature of note about this factory was the way in which it had pulled itself up by its own bootstraps. Many of the machines and processes had been built and designed by the workers themselves. For example, a steel tempering process which would have cost ¥80,000 to buy was made themselves for ¥40,000. Another interesting feature was that the cadres (officials) are required to spend one day a week in manual labor in the factory, and the department heads and the factory manager must all spend half of every day working in the factory.

To my inexperienced eye the factory was crude and working conditions much below the standard of the Nanking factory. However, the finished products, whilst below Western standards, met international specifications, and were exported to countries in Asia, Africa and Latin America. The factory had won many awards for self-reliance and standards, and while freely admitting they still had a long way to go to catch up with Western technology the factory management was obviously pleased with the achievements.

Yours sincerely,

C.H.G. Oldham

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