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Reporter

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Hand and Brain in China and other essays

Joseph Needham
Joan Robinson
Edgar Snow
Tim Raper



Anglo-Chinese
Educational Institute

Modern China Series

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ANGLO-CHINESE EDUCATIONAL INSTITUTE

THE OBJECTS of the Institute are to encourage and promote the study and dissemination of information about all aspects of China and the Chinese people. This charitable trust is thus bound up with the educational aims and objects of the Society for Anglo-Chinese Understanding.

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Hand and Brain in China and other essays

Contents

Hand and Brain in China, by Joseph Needham	1
1. China's Exploding Technology	1
2. From Seismograph to Dynamo	5
3. Wooden Tankers and One-man Workshops	9
4. The Alchemy of Human Nature	14
Chinese Economic Policy, by Joan Robinson	18
The Open Door, by Edgar Snow	25
China and the Hungry World, by Tim Raper	31

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FAR EAST REPORTER INTRODUCTION

Far East Reporter is happy to make available to its readers these four pertinent essays on various aspects of the People's Republic of China. The essays are rich in facts -

About China's creative talent---from ancient times (when China's technology in many cases preceded or in some cases far exceeded the technical talent of the West) to now, when China's satellite is a companion "man-made earth-guiding star" of the West's satellites;

About local self-reliance - which does not wait for central authorities to do something but puts its own independent views and skills to work;

About national self-reliance -----mainly relying on their own resources and skills while utilizing to the full Western ways - so as to advance as rapidly as possible and avoid "trailing behind others;"

About the mass application of philosophy--that is, dialectical philosophy -- to the problems of production and living, from the simple to the complex, from the personal to the international;

About the new morality --actually practiced: "fight self, repudiate privilege, serve the people;"

About China's demonstration to the peoples of Asia, Africa and Latin America: how a socialist China is rapidly advancing from a peasant economy;

About the fruits of China's thorough-going land reform, contrasted, for example, with India;

About the relation between agriculture and industry with clues to China's economic policy;

About the handling of surpluses - - - "removing the burden from the peasants and putting it where it can be least painfully borne;"

About the dispersion of industry - taking into consideration economic, defense and social aspects and benefits;

About the application of the scientific method - to "problems of production, politics and daily life - experiment, trial and error, and analysis of mistakes; science, not an alien importation" but also "we must learn from other countries;"

About democracy and self-reliance: much enhanced by the Cultural Revolution;

About China's domestic and foreign policies - shown as Edgar Snow and Chou En-lai discuss production figures, the Chinese Communist Party and what happened to criticized Party cadres during the Cultural Revolution, the new emerging political set-up, the simplification of the administrative structure and elimination of duplication, US-China relations, the United Nations, Taiwan, Sino-Soviet boundary negotiations, nuclear arms, etc;

About the astounding results of the mobilization of China's huge labor resources;

About China's impact on and aid to other developing economies - the nature and the aim of this aid.

These four essays
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HAND AND BRAIN IN CHINA AND OTHER ESSAYS

HAND AND BRAIN IN CHINA
by Joseph Needham, F.R.S.

BECAUSE WHAT we know as modern science started only in Europe in the sixteenth and seventeenth centuries, too many people assume that all science and all technology developed in Western culture. This is a fundamental mistake, for in earlier times Asia was often far ahead of Europe in these things. As a historian of science and technology, I cannot claim to be well up in the current developments of science pure and applied in China, but nevertheless I have put something together with the idea that we should look at things that have been done during the past half-dozen years, and link these with background material which often takes us back for centuries. I think it is good to do this, since the idea that China suddenly sprang out of the earth from nowhere to impinge upon the mentality of Western people today, has nothing to do with China — it is only a reflection of the minds of people who previously preferred to ignore that great culture.

1. CHINA'S EXPLODING TECHNOLOGY

IT IS fruitful to look at the whole thing as one continuous line of evolution. Take the satellite, which people are calling "Mao No. 1". The proper name for it is *jen-tiao ti-chhiu wei-hsing*, which means "the man-made earth-guarding star". It is 380 lb in weight, and corresponds to an inter-continental ballistic missile of 5,000 miles range. You may have read the article by Nigel Calder, a very good science journalist, in the *New Statesman* for 1 May (rather appropriately) 1970 in which he talked about evidence of a certain maturity, a once-and-for-all demonstration of talent, and went on to consider the intentions of this achievement. Was it primarily civilian or military in intention?

Quite naturally I was asked the same question by BBC interviewers on the Home Service not long after the satellite went up. Among other things, they asked: would it mean that the Chinese would engage in a long-term space programme as the Americans and the Russians have done, with landing a man on the moon, and so on. My reply to that was that I thought they felt they had better things to do with their resources than trying to land a man on the moon or on Mars before anyone else. They were conscious of the world food problem, for example, and the question of raising the standard of life of the millions in their own country, and therefore they were not so likely to engage in a long-term space programme as some people might think.

As for the civilian application, Nigel Calder pointed out that weather reports were already available from the American and other satellites that were circling anyhow, so he didn't think it would be likely to be that; then he ventured to make some prognostications, rather frightening but leading up to a very good point. He said:

More chilling is the thought that the Chinese are not signatories to the Outer-Space Treaty, and that they might want to put H-bombs in orbit. Plainly there is a lot of terror and awed respect to be engineered with a swarm of such orbital bombs flying in a routine way over Moscow and Washington. However, it doesn't make much sense militarily, chiefly because satellites without elaborate orbit-changing powers are probably easy to destroy with anti-satellite missiles. But the fact that it's no longer incredible makes the final nonsense of Washington's China policy of two decades. The Russians, too, would be well-advised to drop their racialist jokes about the Chinese. And if the Strategic Arms Limitation Talks (SALT) in Vienna have aimed at a thermo-nuclear world order without China, they are most regrettably but logically doomed to fail on that basis. After all, Mao is NOT on a different planet. A great deal of the world's future safety hangs on the SALT talks. In this period when multiple-warhead missiles and ineffectual but seductive anti-ballistic missiles threaten a terrific resurgence of the East-West arms race, the possible effects on the Vienna discussions of this new Chinese complication are not to be shrugged off. But the remedy may have to be the radical one of providing a place for the world's most populous nation, not only in the United Nations, but also in SALT and similar negotiating bodies.

The *Times* leader-writer too pointed out — and a very good thing he did — that when China's first nuclear device was exploded in 1964, it was accompanied by an assurance from Peking that the Chinese would never be the first to use nuclear weapons, and that China was making them solely for her own defence. Since then there has been a critical period in the expanding Vietnam war, and lately some sharp hostility on the Sino-Soviet border; yet nothing has so far invalidated the Chinese assurance.

He went on to say the same thing Nigel Calder said, that the world's great outsider has been China, excluded from the United Nations and from SALT. Sooner or later, this gap must be closed. We would say the sooner the better. Finally, he added that Moscow and Washington have every reason to be aware of the difficulties and frustrations, but the need is overwhelmingly there, and a reminder of it to Moscow and Washington is given every 114 minutes.

Let us now take quite a different point of view about the satellite and the launching mechanism, the rocket. I should like to fill out my side of the story and go on to explain about the origin of gunpowder and rockets. I think that we should link the present, and the new, with the past. The fact is that the oldest mention of any explosive substance known to man occurs in a Chinese Taoist text of the middle +9th century, where Taoist alchemists are strongly advised not to mix saltpetre, sulphur

and a source of carbon, with various other things like arsenic; because those who have done so have sometimes had the cottage explode where they were working, or burn down over their heads, and singe their beards. It was not bringing Taoism into any credit to do this. So don't mix that particular formula.

That was about +850. Then very soon afterwards, by +919, we get the oldest reference in the military books of the time to the "fire-chemical", as it was called, *huo yao*, the name which gunpowder still retains in Chinese, as an igniter for a flame-thrower. It's a kind of slow match which was used for the ignition. Here we go back to an earlier stage, linking up with Greek proto-chemistry because it was in Byzantium in the +7th century that an ingenious proto-chemist, if we may call him so, called Callinicus, produced for the first time the famous "Greek fire". It has been shown by various scholars that this was nothing else but distilled light petroleum fractions. Then in the +10th century we get information about this being presented to China, though no doubt by that time they were distilling their own. So it links up with the Arabs through the Byzantine civilisation.

But the explosive character of the Chinese invention was destined to undergo a very rapid development. By the time of William the Conqueror (when no such thing was thought or heard of in the West), by +1000 or so, rockets were flying through the air, with arrows on the end. They were called *huo chien* or "fire-arrows". At the same time also, this gunpowder, which was probably very low in nitrate, was put in bombs called *huo phao* which were thrown from trebuchets, a kind of catapult. Just a bit later, in +1044, we get the first printed formulae for gunpowder in any civilisation.

The transition to guns and cannon followed quite soon afterwards, for in +1110, when the Chinese were trying to repel the invasion by the Chin Tartars from the North, a new invention appeared in which a rocket was held, not allowed to fly free delivering a warhead, but held on the end of a pole, and used in the other direction as a kind of five-minute flame-thrower. If you had enough of these, and enough men lighting them on the battlements of a city, it undoubtedly was a considerable dissuader for those who were trying to storm the walls. This device was used a lot in the wars with the Chin Tartars and with the Mongols. It was called the *huo chhiang*, or fire-lance. It depended essentially on natural tubing which the West didn't have — bamboo — which, if you are using them for five minutes or so only, in the form of rockets or fire-lances, work very well. All these developments were very important historically, for undoubtedly the fire-lance was the ancestor of all the guns and cannon made in bronze and iron of later times; and likewise the rockets were the prototypes of all those solid- or liquid-fuel rockets that we have today, such as were successfully used to launch China's satellite this year.

When you come to +1280, you come to a very dubious period, a dark patch which we haven't yet got to the bottom of. The crucial time is

+1280 to +1290 or +1300. We have yet to find out where at that time the first metal-barrel guns or cannons were developed. There have been claims for Europe, but I am not inclined to rate them very highly, simply because the natural bamboo tube existed in the East and not in the West. There is also a claim to be made for the Arabs, who were certainly referring to some kind of cannon or gun about +1300, under the name of *madfaa*. We don't know exactly what it was made of; but we're quite certain that the thing was in Europe by +1327, which is the date of the oldest picture in European civilisation (in an Oxford manuscript) showing the earliest European bombard. The seventh or eighth decade of the thirteenth century was almost certainly the time when the thing was starting, but we don't yet know whether it was first in China, in Arabic regions, or in Europe. I myself believe it was probably in the East. The first dated cannons are all Chinese, from the 1360's onwards, which is some half a century earlier than the oldest dated ones in the West, but that doesn't prove the point of actual origin.

There are two further matters of interest in connection with the tremendous achievement of the first explosives technology in China. One: from about +1230 onwards we get what technicians call brisant explosions. In other words, the blowing up of city walls and gates and towers, which was previously impossible with the low nitrate compositions. But by +1230 the nitrate proportion was certainly increased, for in the wars with the Mongols in the time of Genghis Khan and his immediate successors the Chinese were making efficient use of brisant explosives against the Mongol strongholds.

The second point is that when you come to about +1400 you get an extremely interesting phenomenon in Chinese technology: two-stage rockets fantastically similar to the Saturn rockets of our own time. Subsidiary rockets were placed at an angle to the main projectile, and an automatic fuse was arranged so as to let loose a shower of projectiles when the whole thing was reaching its destination. This remarkable thing is found in the *Huo Lung Ching* (Fire Drake Manual), a treatise on artillery from the period around +1400 or a little later.

One final remark I should like to make concerns the idea that the invention of chemical explosives is something tragic and terrible for mankind. Shakespeare's lines about "villainous saltpetre" come to mind. But where would human communications and transport be if it hadn't been for the explosives used to build all the railways and roads in the world, and their cuttings and tunnels, to say nothing of mining, the burrowing for metals in the earth, the use of explosives in destroying obstructions in canals, and every conceivable sort of benefit for human communication? This is the kind of thing you've got to weigh in the balance. In fact, it isn't fair to regard chemical explosives in a purely military light. Ever since the beginning of fire, man has been faced with the problem of how he's going to use the Promethean gifts which the inventors provide, and that is a moral question which is not up to them, but up to every one of us.

2. FROM SEISMOGRAPH TO DYNAMO

I WANT to go on now to talk about power-production. The Chinese at the present time are very proud of the successful completion during the past year of a 125,000 kilowatt steam turbo-generating dynamo set with a double internal water-cooling system. The problem, a very difficult one, has not been solved elsewhere. Although it's quite easy to water-cool the stator (the parts of the dynamo which don't rotate), it's very difficult indeed to cool the rotor. They have used hollow copper tubes for doing it. It runs at about 3,000 revs. per minute and is regarded by engineers in all countries as a considerable achievement. It's only part of a very big move towards power-production; last year 25,000 kilowatt types — very useful in all countries — were ready for export from China. They can be exported to under-developed countries, in the regular trade of China with the rest of the world, along with A/C diesel generating sets in plenty. In Albania the Chinese have in the past two years constructed a complete thermal power station. In 1969 they designed and constructed a hydraulic power station in China consisting of a set of nine 72,500 kilowatt water-driven turbines, with a total output of 652,000 kilowatts, certainly the first time that this has been done completely in the Chinese culture-area.

Now we ought to take a closer look at power-production. Everybody used to be familiar with the eccentric connecting-rod and piston-rod, because steam locomotives all had them. People only had to stand in railway stations and admire the way these things went round. Nowadays they are hidden in Diesels and motor-car engines, yet most boys understand them well enough. But here again it's fair to take a step backwards, just as we did with the question of chemical explosives, and put ourselves in the middle of the +10th century. At that time, a picture called "The Mill at the End of the Canal", dating from about +960, was painted. It still exists, though we're not absolutely sure whether it's the original — it may be a later copy. The design of the machinery visible through the open walls of the mill is very archaic indeed, but it is, we find, the first form of the standard assembly for the inter-conversion of rotary and longitudinal motion. Strictly speaking, it is the first illustration, for if we judge from textual evidence alone, we can find mention of it as far back as +530.

The standard assembly was not used in China in the Middle Ages for steam, but it was absolutely identical in principal. It was the morphological prototype of the steam-engine, acting in reverse. In China in the Middle Ages blast-furnace bellows and bolting-machines were operated by power from water-wheels. They generally used horizontal water-wheels, and above them they had an eccentric or crank working a connecting-rod which pushed the piston-rod back and forth to blow the furnaces. So they started with a rotary motion and converted it to longitudinal reciprocating motion. The steam-engine, as developed from the time of Trevithick and James Watt onwards, does the opposite thing: it applies the power to the piston in the cylinder and it gets the rotary action out. Nevertheless, the morphological

equivalent was there; and it was a very long time between Watt and Trevithick in the +18th century, and the +10th when this started in China.

Thus you might say that the morphology of the steam-engine was ready several centuries, indeed more than a thousand years, before it came to life in physiology. This is another very remarkable achievement of the Chinese in the old days from the point of view of power-production. There is no *direct* connection with turbines and dynamos, except that the horizontal water-wheel is the ancestor of all turbines. This we know through the work of Basson in France in the late +16th century. The tub-wheel is the ancestor of all turbines, and the Chinese had been making those, but all their modern electro-technical work is derived from the foundations of the study of electricity in the +18th century.

The science of electricity is a typical post-Renaissance science characteristic of +18th-century people like Francis Hawksbee, Benjamin Franklin, Michael Faraday. But the study of magnetism on which it depended in the first place was something about which Europeans had done nothing whatever in ancient times. Ptolemaic astronomy and Euclidean geometry were two of the great pillars of modern science as it developed in Galileo's time in the west. There was a third pillar however — the study of magnetism; and absolutely nothing had been done about it in Europe. It was the Chinese who started that in the Han period — from +1st and +2nd centuries onwards they had been pegging away at that. The Chinese were worrying about the declination (why the magnetic needle does not point exactly to the astronomical north) before the Europeans had ever heard of the existence of the north- or south-pointing property at all.

When we come to the instrumental and mechanical things now being made in China — many for export — we can find extraordinary items in the instrument and electronic equipment which the Chinese have been producing. In physics, for example, we find medium plane-gyrating spectrographs and multi-purpose oscilloscopes; in engineering, high-precision engraving machines, photo- and thermo-sensitive devices for automation in factories; quite recently I saw a very good picture of a self-acting gas chromatography control apparatus, which is important for industrial chemical automation. The Chinese are also making transistorised digital computers.

Speaking of the chemical industry, they make all kinds of refrigeration and other chemical compressors, as also moulding presses for thermo-setting plastics. For telecommunications they're making their own telephone exchanges, automatic switching equipment; and one item I found particularly interesting was electronic high-speed telecommunications equipment for coding, decoding and printing out Chinese characters, 1,500 a minute. So even with an ideographic language you can storm some of the heights of modern technology without worrying that you haven't got an alphabet. The Japanese in recent years have practically liquidated illiteracy in Japan, and their language is far worse (i.e. more complex) than Chinese.

Yet I imagine the new Chinese high-speed equipment would be useful for them.

In the field of medicine, many things are now home-made in China. Electro-encephalographs and electro-cardiographs (for cardiac surgery), their own artificial heart-valves and other spare parts for human beings are made there. We heard much in recent years about the restoration of severed limbs and fingers: that's a branch of surgery in which the Chinese have particularly excelled.

Another interesting point is that the indigenous traditional Chinese pharmacopoeia is still contributing drugs of plant and mineral origin which are useful in the healing process after surgical operations. There is a great deal in the traditional Chinese pharmacopoeia which has not yet been elucidated in modern scientific terms; though the Chinese are working hard on this. Of medical equipment the electronic erythrocyte or red blood cell counters — relieving technicians of a dreadful labour — are now made in China.

When one thinks about the achievements that the hands and brains of our Chinese friends have made in times past, it sends one's mind back to the late Han period when the father and mother of all seismographs was made in China. This was the work of Chang Hêng, one of the greatest astronomers of the +2nd century, who was very worried and disturbed in mind about the frightful earthquakes that China was subject to. It was of both social and scientific significance that the capital should know of earthquakes elsewhere. With no telegraphs (certainly no electric coding and decoding tele-communications machines), no telephones, all they could do was use fire and smoke signals (you find groups of five little towers for them all along the Great Wall). There were lots of possibilities of misunderstanding.

About +130 Chang Hêng devised an apparatus believed to have been an inverted pendulum which, on receipt of an earth tremor, was knocked over to one side or another. It was kept in a state of very unstable equilibrium, and would enter a series of slots to operate one or other of a number of balls which would then roll out and drop into the mouths of bronze toads waiting to receive them outside. This gave an idea not only of the strength but also of the direction of the epicentre. The *Hou Han Shu* (History of the Later Han Dynasty) has an actual account of the use of this apparatus in practice. It is said that the courtiers made a lot of fun of Chang Hêng and thought the whole thing amusing until one day it actually worked, and he informed the emperor that there must have been a very severe earthquake in Kansu province in the North-west, and they'd better prepare to send assistance immediately. And then three or four days later despatch-riders appeared at court saying that frightful damage had been done; so afterwards they didn't laugh at Chang Hêng any more.

Chang Hêng was a scholar, with the greatest, the highest education that his age could provide; he was a fine poet, and a literary craftsman, one of those universal geniuses which the Chinese have produced in all centuries.

But we know of others, like Ma Chün in the +3rd century, who were not at all so articulate. Today we find that ordinary working men are themselves producing inventions of great value and they are encouraged to do so, not despised like Ma Chün.

In the reports which have come from China in the past year, we find people like Shih Ko-Chih, who had no great amount of education, but set to work with his friends and studied at night, succeeding in producing something they had wanted for a long time — fully electronically automated skip-hoists and scale-cars for blast-furnaces — thereby sparing an enormous amount of absolute sweat and labour on the part of his mates. This is the kind of thing that can happen in China at the present day. Another group decided that it wasn't necessary to use the best steel for Diesel crank-shafts. They were convinced they could do it with cast iron, and though it took a lot of experimenting the plant did succeed in doing this, and saved a great deal of expensive best steel in consequence.

One of the reasons why the Chinese were able to invent the standard assembly of inter-conversion of rotary and longitudinal motion centuries before anyone else, could well have been that they had good cast iron. Of course other people had steel — the Romans could make steel. All you have to do for that is to take pure iron, heat it in charcoal so that the right amount of carbon gets into the wrought iron, and you have steel. They were doing that early in the Iron Age, but it isn't so easy to make cast iron, for the temperature required is a great deal higher. Yet the Chinese were making cast iron something like fourteen hundred years before anyone else. Nobody got a single pig of cast iron until +1300 or so in Europe, in the Rhineland and in the Low Countries, when the blast-furnaces began to pour it forth. It's one of the foundations of our civilisation, even today, yet in China you can go into museums and handle cast-iron tools from tombs of the —2nd and —3rd century.

Wear is another point. One of the bright things about managing bearings is to use combinations of steel, cast iron, brass and bronze, which can be very effective. Of course the Chinese had brass; and they probably used brass. But it's rather expensive — it's much more likely that they used a combination of steel and cast iron. Engineering friends of mine say that this may have been one of the contributing factors to their ability to solve the problem of the inter-conversion of motion before anyone else could.

3. WOODEN TANKERS AND ONE-MAN WORKSHOPS

HUANG JU-LIN belongs to the South-east, a machine-works in Han-phing in Fukien. Last year he decided that what was needed was a mobile, you might say one-man, workshop. He made a mobile machine-tool which would do turning, grinding, milling, boring, drilling and slotting — a lot of things on the spot. This was Huang Ju-lin's achievement. Not a very highly-trained engineer — he was a foreman, a workshop chap, a practical man — and he produced it. It's done by encouragement; if you don't encourage people like Huang, you won't get these results.

Li Kuo-tsai was in the oil industry; what they wanted was a 12,000 ton hydraulic, high-pressure pipe-bender. No doubt they imported them. They got them from Germany or somewhere, but it wasn't exactly what they wanted. And there he was in Lanchow, in the great petroleum purification plant. So he, together with his friends, produced this on the spot and it was an excellent achievement.

Another thing which interests me as a railway fan is the new electric locomotives they've been producing in China, using silicon semi-conductor rectification instead of the old type; they're smaller, more powerful, better on gradients, and a distinct improvement on the electric locomotives they had before. This technique is well known here in the West where there's always a lot of know-how, but since the Russians haven't been willing to provide that for some time, and certainly people from Western Europe have not, then it's up to the people there. These men doubtless had to overcome opposition from the official "stuck-in-the-mud" authorities, who always wanted to follow the *yang fa* (foreign ways of doing things), and pretty cautiously at that.

Our volume in "Science and Civilisation in China" about civil engineering has appeared this year. In that book we tell about the epic of civil engineering in China through the ages, particularly with regard to the management of the great rivers and canals. The Chinese were the greatest transport canal builders of the whole Middle Ages; and they compared in irrigation technology with the best experts of other countries, the Egyptians, the Ceylonese, and also the people in South India — but they were the greatest in hydraulic technology.

And they did everything quite differently. They tunnelled, of course. You get irrigation tunnels from early times in China. There's one in Shensi, for example, described in the *Chhien Han Shu* (History of the Early Han Dynasty) back in the —2nd century. Just recently they've done a half-mile tunnel for a road, which is rather an exciting one, again largely done by engineers and foremen not university-trained. It's a highway tunnel in the Thai-hang mountains, and it cuts out a narrow road with eighteen hairpin bends. Shih Pao-ching was actually only a maintenance linesman to start with, but he did night study and was able to take charge of this tunnel, which has been a great success.

Another set of people with rather a makeshift education, along with

some good technicians, built a highway bridge of thirty-nine arches over the Hsin-yi River in Northern Chiangsu, about a mile long, with pre-cast concrete units and arch-topped flanges. Segmental arches did not originate with the Romans. The Romans were very assiduous bridge-builders but they had one of those bees in their bonnet that you must have semi-circular arches — it would fall down if you didn't have the complete half-circle. Everybody thought this, Persians and Indians as well. It was only in China that someone had the nerve to get away from a conviction like that. In +610 Li Chhun in Southern Hopei realised that with really strong abutments he didn't need a semi-circular arch. He could have a flying bridge, with most of the semi-circle gone, just shooting out from each side on its strong supports.

Nowadays there are hundreds of these for railway lines and roads all over Europe and America; steel-and-concrete bridges, flying from side to side of the valley. Most of the modern concrete segmental-arch bridges are empty; you have the main bridge-arch itself, then just emptiness; concrete pillars going up from it lighten the weight, then the deck is on top. Li Chhun did that too. On each side he put two enormous spandrels, perfectly empty, in order to let the flood waters through. When the waters rose, instead of carrying away Li's bridge, they shot through these spandrels. This was a glorious achievement for +610. It is the oldest segmental-arch bridge in any civilisation — there wasn't another until the +14th century when the Italians started to build them. In Florence today the Ponte Vecchio or the Ponte della Trinità exemplify what they were doing in the +14th century. I have a firm conviction that it was people in Marco Polo's time at the end of the +13th century who saw or heard about these flying-arch bridges in China, and said "it can be done!" In Southern Hopei, you can see a number of them, built not only during one, but several later periods. There are about a dozen of them from the old times still in use.

From bridges it is a short step to ships. In 1969 the Chinese made the Hai-Phin 101, a very fine 3½-thousand-ton ice-breaker for the northern ports. The first of its kind, this embodies a number of quite new features, which can't have owed much to the Russians, as they were not there. Another thing they've done on a far bigger scale, is a 15,000-ton oil tanker, the Taching 27, which was launched from the Hung-Chhi shipyard in 1969.

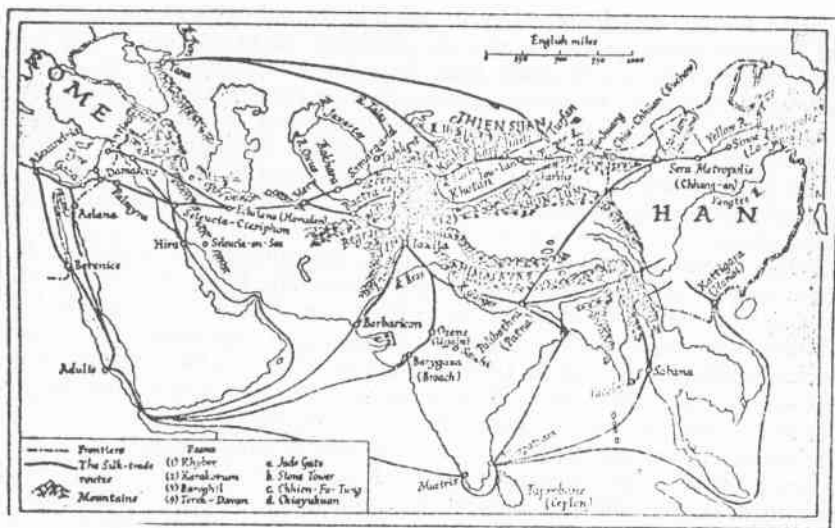
That brings up a rather interesting question; could it be that tankers as such were really a Chinese idea? Most oil engineers would doubt this and say it was absolutely impossible. But one of the historians of shipping, Peter Watson, wrote to me recently raising the question of whether the whole idea of a tanker isn't originally a Chinese one. He pointed out that from the mouth of the Liao River, in the North-east, there was a very great export of soya-bean oil from Ming times onwards. A place called Niu-chuang had a special type of junk, a wooden sailing-ship, which worked its way across the Yellow Sea bringing the oil down to Shanghai. According

to those who lived and worked in Shanghai in the old days, this was nothing less than a wooden tanker. Chinese ship-building has never been the same as Western ship-building. It never used the stem-post, stern-post and keel; it always functioned in terms of transom stem and stern, and bulkhead construction with flat bottom; for all practical purposes, a tanker ready-made, with a series of separate holds. And as the Chinese were quite able, with the aid of layer upon layer of oiled silk, to carry oil about in baskets, it may well be possible that the Niu-chuang oil freighter was the oldest tanker in any civilisation.

While we are thinking about oil, I have something to say about another great success of the Chinese in recent times. By 1963 they had nearly reached internal self-sufficiency in petrol: now they've fully reached it. They'll keep on going as their motor transport increases. The model Taching oilfield was built in 1960 in three months, and has continually increased its production since. The world drilling record was won by the Chinese in the last year or two. The United States record was said to be 90,300 metres per annum with the best apparatus available, and the Soviet Union's 52,000. The Chinese have done 100,000 metres of drilling through rock in a year, which is a subject for congratulation. Now deep drilling itself is a Chinese invention. It goes right back to the Han, that is to the —1st and —2nd centuries. They began drilling because they wanted brine. In Szechuan, which is a couple of thousand miles from the sea; people need salt. They need salt in Tibet, they need salt everywhere, but the sea is a long way away. It happens that underneath Szechuan, about 2,000 feet down in many places, there are colossal fields of natural brine which have been worked for these two thousand years. Not only is brine there, it is accompanied by natural gas, which has been pouring forth from these deep bore-holes for just as long a time. The Chinese began to burn the gas to evaporate the salt solutions, and they have continued to do so right down to the present day. I had the great good fortune to visit Tzu-liu-ching (Self-Flowing Well) in Szechuan during the war. It was a wonderful place, an industrial centre right in the middle of a mainly pre-industrial civilisation.

Similarly, we must grant that the first Artesian wells (so called because the earliest in Europe were drilled in Artois in France) were of Chinese origin. This is not necessarily because any one person brought a specific technique. So often what anthropologists call "stimulus diffusion" takes place. Intelligent and up-and-coming technicians in the other civilisation hear that something has been done and say: "Well, if it really has been done, it can be done, let's see how to do it", and they go ahead and do it, but in a different way.

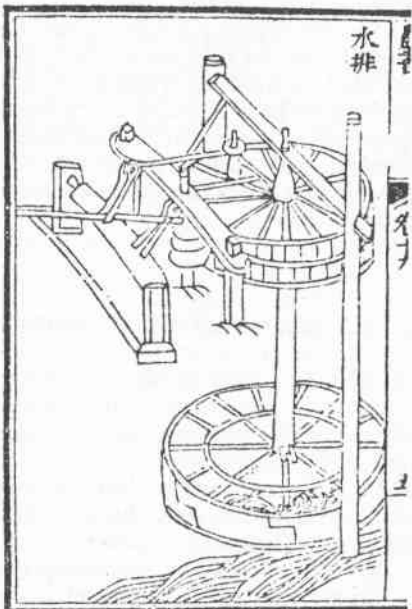
What is more interesting, perhaps, is that the beginnings of the oil industry in the United States were made with Chinese methods. Before the steam-engine was applied to deep drilling in Kentucky or Kansas, the first American bore-holes for oil were made by the Chinese method, which is known as "kicking her down". This involves a team of people jumping on and off a beam to give the percussion, and at the same time a rotary



奔豹橫奔箭



Above: Routes of trade between China and the West from the +1st and +2nd centuries onwards. (From "Clerks and Craftsmen in China and the West", Joseph Needham, CUP). Left: Rocket-arrow and launching box for 75 projectiles (1621). Such devices date from the beginning of the 11th century AD. (From "The Grand Titration", Joseph Needham, Allen & Unwin). Opposite, top: Metallurgical blowing-engine (shui phai) worked by water power; the oldest extant illustration (+1313) from Nung Shu. (From "Science and Civilisation in China, Vol. IV:2", Joseph Needham, CUP). Opposite, bottom: Two pages from the Wu Ching Tsung Yao of AD 1044 showing the earliest formula for gunpowder in any civilisation. (From "The Grand Titration").



右引火毬以紙為毬內實磚石角可重三五斤裝黃烟
 瀝青炭末為泥周塗其物貫以麻繩凡將放火毬只
 先放此毬以準遠近
 裝藥火毬以三枝六首鐵刃以藥藥團之中貫麻繩長
 一丈二尺外以紙并雜藥傳之又施鐵蒺藜八枚各
 有逆鬚放時燒鐵錐路透令焰出 火藥法用硫黃
 一斤四兩焰硝二斤半炭末五兩瀝青二兩半乾
 漆二兩半搗為末竹茹一兩一分麻茹一兩一分剪
 碎用桐油小油各二兩半蠟二兩半鎔汁和之傳用
 紙十二兩半麻一十兩黃丹一兩一分炭末半斤以
 瀝青二兩半黃蠟二兩半鎔汁和合同塗之
 鐵嘴火鷄木身鐵背束秤草為尾入火藥於尾內
 竹火鷄舖竹為球眼籠腹大口狹形微脩長外糊紙數
 重刷令黃色入火藥一斤在內加小卵石使其勢重
 束秤草三五斤為尾二物與毬同若賊來攻城皆以
 砲放之燭賊積聚及驚隊兵

motion is given to the drilling-tool down below, or you may have a wheel with people walking inside it; but the essential point is that "kicking her down" is the old Chinese method, and it was used in the beginnings of the American oil industry. I think it's likely that the Chinese workers who were imported to help to build the transcontinental railroads in the early nineteenth century (also at earlier dates for working in mines) brought the technique with them. Here is a case where we do have positive reason for thinking that the Chinese people themselves went abroad and transmitted the know-how.

4. THE ALCHEMY OF HUMAN NATURE

FINALLY, I want to say something about the chemical industry. They're very hot on the chemical industry in China at the present time. For example, they've invented new processes for making glycol, a substance important in places where they do electro-plating. The old process used chlorine, which was unhealthy and expensive. They now manage to oxidise ethylene directly through various intermediate compounds to glycol; this is a considerable achievement.

The Chinese also do something which the West won't do: recover waste gas from synthetic ammonia plants and refineries. They're now making a tremendous amount of methane in China, and producing methyl alcohol from it which everybody needs for plastics, pharmaceuticals, synthetic fibres, and insecticides. Whenever I go to France by the Southampton — Le Havre route I pass an enormous refinery at Tancarville. It's a fine sight with all the methane blowing off at the top of these towers at night or in the twilight, but it irritates me that all this methane should be burnt. Under-developed countries are crying out for methyl alcohol and they're not getting it. The Chinese are recovering it, and that's a very fine development.

One of the things that particularly amused and interested me was that the Kai-hsien paint factory up in Liaoning was in a fix because they wanted gold and silver paint and they didn't know how to make it. Eventually they found the right way — using low-zinc brass. So now they've got plenty of gold and silver paint for books (among them the works of Chairman Mao), and whatever else they want it for.

That struck a chord; because quite recently Lu Gwei-djen and I have been very much enjoying writing up the early development of alchemy and chemistry in China. One interesting thing to find out is what the old alchemists in China from the Han period onwards — from the — 2nd century — were doing when they made their artificial gold and silver. It wasn't gold and silver in the modern chemical sense, but it looked very like them. Among these were undoubtedly the low-zinc brasses, quite successful imitations of gold. The Chinese were very good at making brass from a time as early as anyone around the Mediterranean had it; but the Chinese did something which nobody in the West did, and that was to isolate zinc

metal. They got pure zinc by distillation in the early +10th century; calling it "poor lead" (*wo chhien*), and nobody else could do that till the +18th century.

One of the earliest achievements was to make "mosaic gold". In the Middle Ages *aurum mosaicum* was used by the monks who illuminated manuscripts. It was nothing less than sulphide of tin. It comes in flakes of a beautiful glittering gold colour and it's quite a stable salt. In Ko Hung's time, that great alchemist about +300, the Chinese were making lots of stannic sulphide — admittedly with a poor yield. We have no doubt that it was one of the forms of potable gold which they consumed as the elixir of life, and it would certainly have been much safer than some of the other things they took. In the West the making of stannic sulphide commercially was given up in the end because low-zinc brass is cheaper and easier to make.

Another material on which the Chinese went to town, from the Han period onwards, was the making of cupro-nickel. They called it *pai thung*, "white copper" or "white bronze", and it was exported to Europe on a large scale in the +18th century. The Honourable East India Company's ships used to bring back a lot of it, sometimes as pigs (ingots) of "paktong" from which the people in Europe made very nice candle-sticks and fire-grates. Finally nickel was isolated by von Engeström in Sweden from this alloy.

Nowadays decentralisation, provincial self-reliance, the work of the country people themselves, in factories scattered about all over the length and breadth of the land, is very important. In the 33 small factories in Wa-an in Hopei Province, employing 5,000 people, no less than 4,000 of these are *nung jen*, that is, farmers, peasants, agriculturists. Since you can't do farming work every day of the year they operate machines in their spare time and become modern people; they're not stuck in the mud as their ancestors were for so many centuries.

They've got all sorts of chances today: for example, they can build narrow-gauge railways. There are now a lot of these all over China. Supposing you make creosote from coconut refuse, which hasn't been done before, and you want to convey it say ten miles to the nearest navigable river or canal: you don't wait indefinitely for the central government to do it for you — you lay on a narrow-gauge railway, you put a little Diesel on wheels, and you've got it. All over the country this sort of thing is happening.

Such local patriotism interests me very much. There was a mine producing good bituminous coal at a place called Ta-cha-yuan. Then in some centre or in one of the ministries they said: "It's no good, got to be closed down". The local people didn't feel that. They were absolutely convinced, from having actually worked at the coal-face, they knew their rocks, their earth, and their local situation — they knew there was lots of stuff still there. But the central people said: "No, the thing must be closed down". The Cultural Revolution however came to their help, and insisted on having the matter looked into again. Eventually it was found that what the local people said was perfectly right: there were many hundreds of thousands of tons of excellent coal which they could go on working away at, and the whole thing was put on a *yu pan fa* ("there is a way") basis again.

Dogma used to say that there wasn't any worth-while coal south of the Yangtse at all, but it's now been proved to be totally wrong. Other mines which had been written off, because of too easy exploitation earlier have now been revitalised, and are under use.

We have so much of this "they" and "us" in our civilisation that it's highly refreshing to find at least one civilisation where "they" are not as powerful as all that, and "we", when we think that such-and-such a thing is the case, can in fact win an argument.

All this links up with what is called the "slavish comprador philosophy". "Comprador" is a Portuguese word for a person of some non-European country who plays ball with the exploiting colonialists, acts as their interpreter, and ultimately runs their local company or their local bank. The Chinese have a great hatred for the comprador philosophy. Following Western ways and not doing things independently is what they call a "slavish comprador philosophy"

Another nice phrase is the "doctrine of trailing behind at a snail's pace", which some of the leaders wanted to do. Chairman Mao himself always said that they ought to maintain their independence, rely on their own efforts, and aim high; it was very important to put some courage into people after the Russian catastrophe of a decade ago, when they withdrew all their technicians.

I must explain three Chinese phrases, *yang fa*, *thu fa* and *hsin fa*. *Yang fa* simply means "foreign ways of doing things", the "foreigners are always right". They are the inheritors of modern science which began in the West, so Westerners must be right; everything has to be done in that way, or not at all. *Thu fa*, on the other hand, literally means "earth methods". Since dialect is called *thu fa*, speaking the local "earth-speech", down-to-earth speech, as it were, you might say that *thu fa* were down-to-earth, certainly local, methods. Many of these have in fact been revitalised, excellent old Chinese methods put to good use in modern times. I have myself seen this in the high-quality steel industry.

Then there is *hsin fa*, "entirely new methods". Chairman Mao said that we can't take the beaten track traversed by other countries in technological development; we must break away from convention and adopt as many advanced techniques as possible. To put it into practice they have their so-called "three-in-one groups" of revolutionary workers, progressive administrators and sympathetic scientific and technical personnel.

Finally, I'd like to strike a different note; in having local inventors, these sons of the soil — intelligent people without much formal education — spend part of their time learning how to operate modern machinery in local factories, they do need some guidance in how to think. Therefore, in the past couple of years, philosophy classes have been started in all kinds of factories and communes. This is applying dialectical philosophy in Chairman Mao's own writings to helping people to think about the contradictions in Nature: water can be beneficial but also a grave danger; certain kinds of soil suit certain kinds of irrigation; all kinds of problems and paradoxes exist in agricultural work, in ways of planting, genetics, and fertilisers, or in mechanical or electrical engineering. Every situation is full of paradoxes, problems and difficulties, but with some guidance in how to think, the problems can be solved. The Chinese people are now being tremendously encouraged to do this.

Another thing which is very striking indeed is the moral education — I would even call it moral theology. The Chinese Communist Party is entirely committed to the denial of the existence of any transcendent creator God; they are, as all communist parties are, officially tied to an atheist orthodoxy. Nevertheless, this whole system of "fight self, repudiate privilege" is a new form of high morality. And it is said that these struggles among the people, these contradictions among the people will not be overcome for centuries.

This is a very extraordinary development of Marxist doctrine, and I am inclined to doubt whether the Russians ever really got that far. Chinese Marxism has undoubtedly risen on to a plane of what, roughly speaking, with my own background, I can only think of as moral theology. To fight self, and repudiate privilege, and to go on doing it; to deny your own self-interest time after time, year after year; to attack other examples of self-interest, and to feel that these are going to arise for a very long time to come, is something new in Marxism; it's very like what people used to talk about when I was young as "the old Adam" in mankind, which has got to be fought against perpetually.

When I studied the Marxist classics, I used to get rather cross with various theological friends who maintained that nothing is any good unless you "change the human heart", unless you get people to undergo a "conversion". No, I said, what matters is the blueprint for a new society, the objective construction of a new society, new laws, new social customs, new ways of doing things — the socialisation of society. One had a feeling in those springtime days that when the nationalisation of the means of production had been achieved, everything would be solved. I don't know about young people today, but when I was young, we felt that the new Jerusalem was just round the corner. We repudiated people who said there must be a conversion of the heart, which has to go on generation after generation. But this is what is happening in China now, and what is preached in China now

Jen Li-hsin, in a recent important article, said that one must have a dialectical approach towards *oneself*: one must regard the target of revolution to be not only other people, but also oneself. One must realise that it's the evil things in oneself that one must also fight against. Not only that, contradictions are universal and eternal, and this is the philosophy of one always splitting into two, rather than the unity of the two.

So there we have it — Maoism in China today, in spite of whatever negative sides there may be to a highly moral way of life, is something terrifically vital and terrifically creative. It is unquestionably connected with the upsurge of creative ability in all these fields of science and technology which we have been talking about.

CHINESE ECONOMIC POLICY

by Joan Robinson

THERE IS a great deal of talk nowadays about the problems of development, of hunger in the world and the growing gap between the rich industrial nations and the miserable continents of Asia, Africa and Latin America. In this connection it is rather rare to hear any mention of the one region where development is taking place.

The other day, Professor Galbraith, who was at one time the United States Ambassador to India, discussing the rivalry between the super powers, argued that the motive for so-called aid to the so-called developing countries, was mainly competition for support in the cold war. The urgency has gone out of it, he maintains:

Now, alas, we know that it does not matter. We know that the development will be so slow that the question of what ultimately emerges is academic. In the interim a jungle, whether capitalist or communist, is still a jungle, and the difference cannot be told by anyone walking through. And a poor peasant society, whatever it calls itself, is subject to the same cruel parameters of over-population, insufficient land, insufficient capital, insufficient education, and a technology that is limited by all these. One cannot but imagine that the Soviets agree. Circumstance, if sufficiently obdurate and compelling, leaves little opening for ideological preference.¹

This attitude is easy enough to understand. The prophets of modern capitalism do not want to admit, even to themselves, that this dismal scene is not inevitable, that there is a demonstration going on in the world that a poor peasant society can develop its land, get itself educated, master technology and begin to catch up upon the western world. Still less do they want the populations of their client states to get any such idea into their heads.

The excuse usually advanced for ignoring China is that it is difficult to get information about what is going on there. In fact, anyone who wants to can find out a great deal. The difficulty is not in knowing what is going on, but in believing it.

Yet there is nothing incredible in the achievements of Chinese socialism. The problem of underdevelopment, as Galbraith says, is the problem of a large population with insufficient capital and education. That is to say, there is manpower and little else. When people can be organised to work and study and when they can be inspired with faith that they are working and studying for the benefit of themselves and of their nation, manpower can begin to equip itself with capital and with technology and to find natural resources formerly undiscovered.

In the so-called *free world* there are great impediments to this process. Professor Mahalanobis, who played an important part in framing the policy for development in India, discussed the difficulties and dilemmas that

planning runs into in a market economy in a review of Gunnar Myrdal's *Asian Drama, An Inquiry into the Poverty of Nations*.² The basic problem of poverty is, quite simply, to have something to eat. The first problem is to increase agricultural output.

Myrdal agrees that a radical redistribution of land to agricultural labour would be a great advance in equality and institutional reform. However, "as neither political will nor the administrative resources for . . . any fairly effective land reform are present", he advocates, almost in despair, promotion of capitalist farming by supplying, preferentially, to the larger and more successful cultivators, such facilities as credit, improved seeds, fertilisers, pesticides, electricity, tractors and other machinery (p.1380). A preferential supply of inputs in a package form was started some time ago in a Ford Foundation project which has been quite successful in some parts of the country. The top 10 per cent of households in the rural areas have become richer during the last 10 or 12 years. The poorer households may not have become poorer in absolute terms, but disparities have increased within the village. Apart from social and psychological problems arising from increase of inequality, there are disadvantages in encouraging a selective growth of capitalist agriculture. Rich cultivators, in a country which is not self-sufficient in foodgrains, would, first of all, tend to hoard their grain in years of good crop outturn, and secondly, would try to restrict the production of foodgrains to maintain and increase prices by reducing the areas sown. If higher and higher prices for foodgrains have to be offered as incentives, there may be a spiral of inflation; in consequence, the agricultural surplus may be reduced in years of good outturn, or may vanish in years of shortfalls, as has been the experience in India. How to increase agricultural production without increasing the price of foodgrains, is perhaps the most difficult problem of Indian planning.

In China, a thorough-going land reform was followed by collectivisation, in gradual stages, which, first of all, removes inequality within each village, provides a better standard of life to the ex-poor peasants than they have ever known and provides to all security against famine and against the tyranny of landlords. The utilisation of land and labour power is rationalised, freed from the arbitrary boundaries of family ownership or tenancy. The idleness of the slack season is turned to use in schemes of investment in irrigation, drainage and so forth so that, in effect, land as well as capital can be created by labour. Education is brought into the villages; not only formal schooling, but learning by doing, improving techniques by a continuous process of experiment and analysis.

The transformation of agriculture, which is the first requisite of development, owes a great deal in China to the political wisdom and economic common sense of the Communist Party led by Mao Tse-tung, and it owes even more to the native talents and the hard work of the Chinese people. But it is evident (as the sad experience of India shows) that a necessary precondition for success was freedom from private property in the means of production, which is just what the *free world* will not allow.

In a speech delivered in April 1956 Mao Tse-tung analysed the basic economic problems of development in terms of "Ten Great Relationships":

First the relationship between industry and agriculture and between heavy and light industries

Heavy industries are the centre of gravity and their development should be given the first priority. We all agree with this. In dealing with the relationship between heavy and light industries and between industry and agriculture, we have not committed any fundamental mistake. We have not repeated the mistakes of some socialist countries which attached excessive importance to heavy industries at the expense of light industries and agriculture. The results [of their mistakes] were an insufficient supply of goods for the market, a shortage of means of living, and an instability of the currency. We have given comparatively greater importance to light industries and agriculture. Unlike the market situations in some countries, immediately after a revolution, goods in our markets have been more plentiful. We cannot say that our daily necessities are abundant, but they are not in short supply. Furthermore, their prices, and the value of the *jen-min-pi* [the Chinese legal tender] are stable. This is not to say that no problems remain. There are problems — e.g. greater attention to light industries and agriculture than before, and adequate readjustment of the rates of investment in heavy and light industries and in industry and agriculture to give a comparatively greater weight to the investment in light industries and agriculture.

Does this mean that heavy industries are no longer important? They are still important. Is this to shift our focus of attention from them? Let me put it this way: most of our investment will continue to go to heavy industries.

What will be needed is more investment in light industries and agriculture. Let its proportion rise. Will this change shift the centre of gravity? It will not be shifted; it will remain on heavy industries. The only difference is that both light industries and agriculture will receive a greater weight.

What will be the result of this? The result will be a more extensive and better development of heavy industries, of the production of means of production.

To develop heavy industries requires an accumulation of capital. Where does capital come from? Heavy industries can accumulate capital; so can light industries and agriculture. However, light industries and agriculture can accumulate more capital and faster.

Here a problem arises. Do you or do you not want to develop heavy industries? Do you want [them] badly or not very badly? If you do not want them, you would be doing damage to light industries and agriculture; if you want them but not very badly, you could invest less in light industries and agriculture; if you want them badly, then you ought to pay close attention to the development of light industries and agriculture. [Because] the more the output of daily necessities, the more the accumulation [of capital]. After a few years, there will be more capital available for heavy industries. Therefore this is a question of whether you sincerely want or just pretend to want [heavy industries].

Of course we all want heavy industries; it is quite out of place to say that we only pretend to want them. The only question is how badly we want them. If you really want heavy industries badly, you should invest more in light industries. Otherwise, you are not a hundred percent, only 90 percent sincere. In that case, you actually do not want them badly; you pay only some attention to them. If you take full notice of them, you ought to develop light industries carefully. Because, firstly, they can meet the needs of the people's livelihood and, secondly, they can accumulate more capital and faster.

As to agriculture, the experience of some socialist countries has proved that bad management could fail to raise production even after collectivization. Some other countries have failed to raise agricultural output because their agrarian policies were doubtful. They put too heavy a tax burden on their peasants and they lowered agricultural prices in terms of industrial prices. When we develop industries, especially heavy ones, we must give a proper place to agriculture and adopt a correct agricultural tax and price policy.³

This passage provides a number of clues to Chinese economic policy. First, consider the reference to the "mistakes of some socialist countries". Stalin's treatment of the Russian peasantry was both tyrannous and unsuccessful. Coercion failed to produce an adequate agricultural surplus. The resulting drag on the standard of life of the urban population had serious consequences, both politically and economically, for the development of industry.

In China a prime object of policy was to keep the goodwill of the peasantry and to create conditions in which all except a very small minority of ex-wealthy families would find their standard of life improved.

It is true that in the years of natural disasters that followed the Great Leap of 1958, there was a period of shortages and hardship, but even then contrasts with old days was very striking; in former times millions would have died in famines at such a time, and millions more would have been uprooted and dispersed over the country in a desperate search for means to live. It is generally admitted that there were mistakes made during the Great Leap and that the communes, which were formed at that time by amalgamating co-operative farms into larger units, were set up in a great rush, and, in some cases, with exaggerated ideas of how fast the peasants could be pushed into changing their way of life. All the same, the communes were invaluable in nursing the country through the bad years. Indeed, it may be said that to avoid breakdown, maintain distribution of rations and prevent inflation for three years of serious harvest failures was a more striking achievement than all the heroic activity of the Great Leap itself.

Stalin's collectivisation was not aimed primarily at improving agricultural technology and in fact the brutal manner in which it was carried out reduced output. The aim was to compel deliveries to feed the cities. In a later passage in the speech quoted above, Mao refers to a period (1954) when the Chinese authorities also extracted too much from the peasants, but a year later the mistake was corrected and it is to be avoided in the future.

The collective must accumulate its capital. [On this] we must take notice not to demand too much from the peasants, not to make things too hard for them. Unless under severe conditions of natural disasters, we must as far as agricultural production allows see to it that the peasant's income is higher than that of the previous year.⁴

Since the recovery from the bad years began in 1962 there has been a continuous run of satisfactory harvests. Perhaps it is too soon to say that the cycle of famine has been finally broken, but every year the area of land that is protected from natural disasters is growing, as control of water spreads and erosion is checked.

The manner in which the surplus is collected has removed the burden from the poorest villages and put it where it can be least painfully borne. There are no compulsory deliveries. Each group, in charge of a particular area of land, agrees on an annual plan of production and of sales to the procurement agencies. In principle, each is intended to keep as much of their crops as will feed their own families. Thus poor regions part with very little (and many are actually subsidised when they get into difficulties); where output per head is high, there is a large surplus to be sold. All purchases are at fixed prices; industry is instructed to produce consumer goods that the peasants want to buy—bicycles and wireless sets are favourite items—so that the individual is glad to earn money, while the organisers of the communes are keen to acquire funds to buy fertilisers, electric power and machinery and so forth, to improve production and to invest in setting up small-scale industries in the villages.

The second important clue in the Ten Great Relationships is the emphasis on the interaction of agriculture and industry. Mao in 1956 is looking back on a period of planning in the Soviet style with priority for heavy industry. He is not saying that there should be less investment in heavy industry—he is saying that there will be even more if light industry is not neglected. Advance in agriculture is not possible without the support of industrial investment and advance in industry requires the support of the agricultural surplus to feed its workers and provide its raw materials.

In a further passage, discussing the relation between the coast and the interior, he lays great emphasis upon the need for a dispersion of industry throughout the country. It is an important element in Chinese policy to prevent the drift into cities which is creating so much filth and misery in all the so-called developing countries. In the first phase industry had to be built up in the old centres and the families of workers from the country were brought in as employment and housing became available, but at the same time industry was being developed in inland cities and small towns, to bring employment to the workers on the spot; now villages also, within the commune organisation, are getting more and more factories to produce commodities for which the economies of large scale are not overwhelmingly important. There are clearly economic advantages in such a policy. It is also influenced by strategic considerations. China is making it clear that she could not be destroyed even by atomic attack.

The third major theme in the Ten Great Relationships is the emphasis on individual and local initiative and the morale of the workers.

Mahalanobis sees a cruel conflict between economic development and improvement in conditions of work.

It seems to me that in certain respects, welfare measures tend to be implemented in India ahead of economic growth. For example our labour laws are probably the most highly protective of labour interests—in the narrowest sense—in the whole world. There is practically no link between output and remuneration, and hiring and firing are highly restricted. It is extremely difficult to maintain an economic level of productivity, or to improve productivity. In the early stages of development in all countries, there has been a real conflict between welfare measures and economic growth.

This dilemma is overcome when the workers have the feeling that their industry is their own and when welfare is not doled out by a reluctant employer but is managed by themselves.

Galbraith, in the article already quoted maintains industrial society is much the same whether in the United States or the Soviet Union.

Additionally, in both societies the guiding and directing force is not the individual but the organisation. In consequence a prime source of social tension in both is the seeming helplessness of the individual in his relation to the resulting industrial and public bureaucracy.

The development of Chinese socialism has been a continuous struggle to prevent this hardening of the system and to keep open the channels between the masses and the leadership. Here also an apparent sacrifice of efficiency turns out to be a gain, for enthusiasm and high morale are both cheaper and more effective than a stereotyped hierarchy of command.

Finally, in the Ten Great Relationships, Mao emphasises the importance of education and the infusion of a scientific spirit into the whole population.

Mahalanobis (in his review of Myrdal quoted above) lays great stress upon the contribution of the scientific revolution in the West to economic development.

The scientific revolution, the social revolution, and the industrial revolution are three aspects of the process of modernisation in every society; these three aspects may be distinguished but cannot be separated. The rate of economic growth in every country is determined both directly and indirectly by the rate of progress of science and technology: directly through the utilisation of the results of research and development, and indirectly through institutional changes brought about by the increasing influence of the scientific outlook and tradition.

He comments sadly upon the situation in his own country:

In the absence of the scientific tradition, science teaching and research tends to become highly imitative of what is being done in the advanced countries. There is lack of ability on the part of administrators and of scientists in senior positions to recognise and encourage pioneering work. Any new line of research for which a precedent cannot be found in the advanced countries would be necessarily suspect in a society which is still dominated by the principle of authority. There would be an irresistible tendency to discourage and suppress original work and innovations,

and the scientific tradition would continue to remain weak; this is the main reason for the "brain drain" from India and other underdeveloped countries.

There is an important element in the Thought of Mao Tse-tung which is the application of scientific method to problems of production, politics, and daily life — experiment, trial and error, the analysis of mistakes so that they can be corrected. Science is brought to the Chinese people as something Chinese, not an alien importation. At the same time, Mao says, we must learn from other countries and take all that is good and progressive from them.

These themes have been developed or reasserted in the Cultural Revolution. The policy of encouraging the agricultural sector to carry out its own accumulation is strongly encouraged. The commune system originated in 1958 from the need to co-ordinate plans for irrigation and flood-control over a large area. Such schemes were being carried out in many parts of the country all along. Since the Cultural Revolution this movement has gathered momentum, along with the mechanisation as the communes gradually equip themselves, out of their own savings, with electric installations and agricultural machinery. More and more small factories are set up to make use of the labour force released from agriculture as productivity rises. This is carrying forward the objectives laid out in 1956 both by improving the livelihood of the peasants (now commune members) and by drawing industry into the countryside, making it possible to check the spreading growth of the coastal cities. At the same time the agricultural surplus grows larger and more assured to permit industry to expand.

The principles which Mao enunciated in 1956 are proving to be excellent economic common sense; the contrast with the situation in "some socialist countries" today is very striking.

The spirit of democracy and self-reliance in industry, which was present from the first, has been much enhanced by the Cultural Revolution. Where the Soviet style of hierarchical management persisted it was swept away by the Revolutionary Committees; workers now have a say in management, overall and in every detail. There is no sign that they use this power to give themselves an easy time. On the contrary, it seems, the new methods increase productivity and reduce the overhead of managerial staff. Incentive wages, bonuses and piece rates are rejected. The slogans of the Cultural Revolution: Combat egoism and eschew privilege, which sound to our cynical ears like Sunday school maxims, turn out in practice to be a great deal more effective than the science of "man management" taught in Western industry.

The Cultural Revolution brought a return to simplicity in dress and manners which had begun to slip a little, but there is no suggestion of asceticism for its own sake. The object of production is to raise the consumption all round, from the bottom, till everyone has a modest standard of comfort. Meanwhile sophisticated consumer goods such as transistor radios are coming into the village shops as well as into the great department stores in the cities.

Mahalanobis' reflections on the need for mass education in scientific conceptions are being justified. An important theme in the Cultural Revolution was the emphasis on practice in education and the need to lay a basis rapidly in the whole population on which scientific habits of mind as well as technical knowledge can be built up.

The watchword now is "Class war, production and scientific experiment". The revolution must be carried through by the mass of the people not by an elite, production requires hard work which will be rewarded by rising standards, scientific experiment in every sphere of life is to prevent the relapse into dogmatism and obscurantism.

This is the prescription for development. No one seems to have found another way.

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THE OPEN DOOR

by Edgar Snow

IN TWO long dialogues Premier Chou En-lai discussed with me some of China's foreign and domestic policies and achievements, and released for publication the most detailed interview he has given for some years. One session brought forth the first concrete figures on China's industrial and agricultural output made available in Peking for nearly a decade.

We sat in a spacious, vaulted, noiseless reception chamber in the Great Hall of the People. The premier was, as usual, urbane, relaxed and alert. A stranger would hardly guess that he is 72 and in his twenty-first year as premier of the Republic, the last five years of which saw him at the center of stability, holding an administration together during the second or cultural revolution.

Behind China's current achievements in broadening international diplomatic and trade ties there is a recovered rhythm of agricultural and industrial production following her emergence from a valley of discord. Considering the depth of that radical upheaval and the still uncompleted reconstitution of a new state superstructure, it was striking to learn from the premier that the basic economy suffered relatively mild damage. "As a result of some struggles in factories, disruption of traffic, and lost labor hours, industrial production in 1967 and 1968 did decline somewhat," he frankly conceded. Without minimizing past difficulties he asserted: "We can still say that what we gained" — in purification of the leadership and revolutionary growth — "was far, far more than we lost."

The premier said that despite the 1967-68 decline the goals set for the 1966-70 five-year plan had been basically attained and some had even been greatly exceeded. I asked for an estimate of total value of industrial production in 1970. "Approximately ninety billion U.S. dollars," he answered. "That only includes industry and transportation and does not include commerce and the service trades."

As for agriculture, the premier said that "as a result of Liu Shao-ch'i's interference" mistakes were made in the late fifties and other mistakes were made in measures of correction during the "hardship years" of 1960-62. "Now for nine years our agriculture has had a steady growth." He continued:

"China's total grain output in 1970 was more than 240 million tons. In addition China has now accumulated state grain reserves of about 40 million tons." Grain tonnage is taken by Western economists as an index of Chinese agricultural conditions. Until recently many of them have continued to regard 1957 as the peak year, when output was officially given as 180 million tons. After that, "buoyant exaggeration" in 1958 greatly distorted China's statistical credibility. Since then few responsible estimates were ventured. The premier's statement may therefore be regarded as highly significant.

"If you now have surpluses, why does China continue to import wheat from abroad?"

Although China's grain imports in 1970 dropped to less than one percent of her total production, the premier explained why a limited amount of wheat intake from abroad was necessary. Imported wheat is cheaper in China than rice. China keeps the cheaper wheat for home consumption or reserves and exports rice, in balance, to Cuba and Ceylon in exchange for sugar and rubber, for example, and uses it in African trade. China also sends millions of tons of rice to help Vietnam and other countries.

Premier Chou gave the present production figure for chemical fertilizer as approximately 14 million tons, now considerably above Japanese output. Agriculture here needs 30 to 35 million tons and that is China's goal for 1975, the last year of the new five year plan. "Thirty million tons of chemical fertilizer may be more or less sufficient but we need more because not only grain crops but cash crops need fertilizer. We still don't have enough phosphates and urea; our chemical fertilizer plants are mainly ammonium sulphate. Small chemical fertilizer plants have been highly effective. We have made big strides on the road to self-sufficiency by building such small plants."

The premier noted that China had attained the world's largest output of cotton, cotton yarn and cotton cloth. In 1970 China produced 8.5 billion meters of cotton cloth.

Steel output was also affected by revolutionary struggles in 1967 and 1968, he said. The average production was 10 to 18 million tons during the past five years. Capacity is now being expanded and modernized and may show a rapid increase in 1971.

Oil output reached more than 20 million tons last year — self-sufficiency in terms of China's present demands. Many new fields have been discovered. Railway mileage and double-tracking have been greatly extended. In southwest China a new and difficult system has been completed, which now connects the frontiers of Vietnam with Sinkiang in Central Asia.

The premier put agricultural product value for 1970 at about 25 percent of total combined output value of industry, transportation and agriculture. Calculated on that basis, China's industrial-transportation-agricultural output value in 1970 was around 120 billion American dollars. There is, however, no reliable index for converting "output value" in China in terms of gross national product systems used in the West. "Output value" omits or minimizes important "service values" such as rents, privately owned rural homes — now rising by the millions, built with mutual labor — as well as major and small water conservancy projects constructed by army and volunteer labor. Or consider China's nationwide urban and rural air-raid shelter system, built largely by unpaid neighborhood mutual

labor teams. It would elsewhere cost billions of dollars. Finally, how is one to fit into the GNP formula the value of some 30 million acres of marginal land added during the past ten years to the cultivable area by peasant labor — with unbelievable toil — at a cost of little more than peasant food consumption?

China's output figures are based on a constant-value yuan, fixed at a rate of 2.40 to the US dollar since 1953. Until now China has avoided inflation, internal prices have remained stable and on many items have been reduced, while low wages have risen more in purchasing power than in cash. China has no internal or external debt, the premier proudly pointed out. There is no personal income tax and basic consumer necessities are generally cheaper, amazingly so in food, now available in variety and abundance, as any visitor to China may see for himself.

Taking various imponderables into account one is tempted to suggest a hypothetical GNP for China much nearer to that of the larger West European countries than is generally supposed. The hard fact remains that in per capita income China still ranks among the poorer countries, with its population, despite mass birth control measures, approaching 800 million.

Switching to internal politics, the premier discussed some features which he felt were misrepresented abroad. Although at one time it was widely reported that the entire Communist Party was dissolved during the cultural revolution, membership was in fact only suspended and the premier now asserted that less than one percent was expelled. In echelons of higher leadership changes were of course much greater. At the Ninth Party Congress held in 1969, for example, a large majority of the former membership of the Central Committee and the former Politburo was replaced by cadres who had emerged from the cultural revolution. Yet the majority of those not re-elected have not been expelled from the Party but have gone down to the countryside to "temper themselves," according to Chou.

Under Mao Tse-tung's leadership the Party and the state superstructure are now being rebuilt throughout the country. Councils or congresses of peasants, workers, mass organizations and the People's Liberation Army are preparing to send delegates to a new National People's Congress. Its purpose will be to adopt a new constitution to affirm the character of the new state, and the form of future central and local government, as well as the people's fundamental rights and duties.

One of Mao Tse-tung's aims has been to "simplify the administrative structure" and "eliminate duplication." "In the past there were 90 departments directly under the central government," said the premier. "Now there will be only 26. They are all run at present by revolutionary committees, and in each committee the Party nucleus is the core of the leadership. Formerly there were more than 60,000 administrative personnel in the central government. Now it is about 10,000."

Where have the displaced cadres gone? He said that about 80 percent of them were sent to rural centers known as May 7th schools, a term deriving from a Mao Tse-tung directive of that date. In such schools re-education in socialism and Mao Tse-tung Thought is combined with self-supporting labor on commune farms, often operating newly opened land. As for others, the premier said, many are past 60 and ready for retirement on pension. Some will choose to live on with their families in the communes. Some will go into factory work. "The ablest cadres will go or have already gone to strengthen leadership in various localities, and

to help run industries and institutes formerly under central government ministries but now being turned over to local management.”

Such decentralization policies also reflect intensified regional and local self-sufficiency aims not only for food but also in industrialization, based partly on growing rural electric power. Organized migrations continue, on a massive scale, of educated urban youths and city people ready for new employment into the interior cities and communes. In Shanghai alone the exodus since 1965 approaches one million.

That the rural communes continued to sow and reap better harvests, that industry recovered and advanced in new technologies, and that the government and party did not disintegrate into anarchy during the cultural revolution: all that was attributable, said the premier, to the people's unity and faith in the teachings and leadership of Mao Tse-tung. That fact would now be explicitly recognized in the new constitution. It would state that “the People's Republic of China is led by Mao Tse-tung, and the Thought of Mao Tse-tung is the guiding principle of all our work.” It would also “openly declare” the proletarian state to be irrevocably under the leadership of the Communist Party.

Likewise in the constitution, said Chou, would be guarantees of new forms created by the people during the cultural revolution for carrying out the socialist revolution: the right “freely to air their views; to arouse the masses; to engage in great debates; and to write *tatsupao*.” (The latter are large posters or papers, once circulated by the billions by the Red Guards.) The constitution would also guarantee the right to strike, Premier Chou added.

One point the premier wished to be clearly understood. The foreign press had greatly misinterpreted the role of the army by presenting it as dominating both the party and the government. That had not and would never be the case, he said; in the future it would become even further evident to those who wished to analyze the party leadership.

Between interviews with Mr Chou and other officials, my wife Lois Wheeler and I traveled about the country above and below the Great Wall, retracing some of my old paths and exploring new ones. We met people at work in farming communes and on local industries — in urban communes and their revived neighbourhood workshops — in large modern industries cooperating with schools and in universities experimenting with innovations in teaching and in student selections. We visited hospitals where modern surgery is combined with *acupuncture* and training of village medicine men, called barefoot doctors, who are also bearers of China's effective birth control pill now in widespread use even in rural areas. We visited a commune where whole families, down to age 6, engage in target practice. We met teachers and actors and high officials laboring in rice paddies and saying they like it and we saw electricians demonstrating how to repair overhead wires, alive with 220,000 volts, before spectators who included the director of China's largest steel plant and the chairman of a governing revolutionary committee in a city of a million men.

We found Premier Chou interested in our impressions of the cultural revolution and eager for fresh news of the United States. That I was the first American writer to return to China to gather material for Western publications perhaps in itself gave significance to those interviews. The major obstacles to re-opening long-closed lines of communication between the Chinese and American peoples remained, as for nearly two decades,

the United States' armed protectorate over Taiwan and Chiang Kai-shek's defeated Nationalist regime there.

The premier reviewed the new condition in China's world relationships, featured by her expanding trade and diplomatic ties with foreign states, notably increased since Canadian and Italian recognition. Not surprisingly it is believed here that continuing diplomatic breakthroughs, including the changing vote to seat China in the United Nations, increasingly isolate the Taiwan regime and isolate the US and Japan over the Taiwan question in the world community. The “revolt” is now becoming general, the premier observed, reaching to all continents. Even in Western Europe few countries are left which will still have relations with Chiang Kai-shek. Canadian and Italian recognition ended illusions about the viability of a “two-China” compromise, or a “one China, one Taiwan” arrangement.

“What will be China's response whenever the United Nations votes in favor of recognizing the People's Republic as entitled to China's seat in the Security Council?” Premier Chou replied: “And with Chiang's clique out of the United Nations altogether? Then, of course we would consider that. The future of the United Nations is hard to predict. There are two possibilities. One possibility is that [organizational] change will take place. The other is that it may suffer the same fate as the League of Nations. It becomes evident from the 25th session of the General Assembly that an increasing number of medium and small countries and even certain big countries are opposing the superpowers' manipulation of the United Nations, or, more often, bypassing the United Nations to play power politics, divide spheres of influence, and even scramble for high seas and space.”

In this part of the world China is still threatened with war by the superpowers, Chou asserted: with some one million land, air and naval forces as well as rocket troops to the north and west; and with the United States in alliance with a remilitarizing Japan on the east, and through Taiwan even deeper into Southeast Asia.

Since Taiwan is Chinese territory, United States encroachment there is regarded as the crux of Sino-American difference which led to the Indochina war, where China has now extended an umbrella of protection and support to the alliance of the three Indochinese peoples against the United States. The premier recalled that in 1960 and in 1965 he spelled out for me the conditions under which the Taiwan problem could be solved so as to establish Sino-American relations. He said that there had been and would be no change. China required that 1) the United States must recognize Taiwan as an inalienable part of the People's Republic of China and must withdraw all its armed forces from Taiwan and the Taiwan Straits; 2) despite their different social systems, China and the United States should practice peaceful coexistence on the basis of the Five Principles.

“Taiwan is China's internal affair and the Chinese people alone have the right to liberate it. United States armed aggression there is another question, an international question, and we are ready to negotiate that,” Premier Chou said. “The door is open but it depends on whether the United States is serious in dealing with the Taiwan question.” He expressed friendly feelings for the American people. He indicated a readiness to consider applications from “friends of China, in concrete cases, and in a concrete way,” to visit here. [The United States recently lifted all restrictions on travel to China. A spokesman said the State Department hoped the move “would result in greater travel to the mainland.” *The Editors*]

Chou En-lai explained the Chinese side of the present deadlock in Sino-Soviet boundary negotiations, which has persisted for a year or more. On September 11, 1969, the Chinese and Soviet premiers reached an understanding that Sino-Soviet boundary negotiations should be held free from any threat and that the two sides would reach an agreement on provisional measures to maintain the status quo of the border, avert armed conflicts and disengage the armed forces of both sides in disputed areas. "Disputed areas," according to Premier Chou, are places where the two sides differ in their boundary delineations on the maps, according to the Sino-Russian boundary treaties of the 19th century: "That is to say, they are places which they say belong to them and we say belong to us. This question can be solved only when an agreement on the provisional measures has been reached and adjustment is to be made in accordance with the principles of mutual understanding, mutual accommodation and consultations on an equal footing. And it really shouldn't be difficult to settle."

In practice, it seems, the Russians have simply refused to agree to disengage in the disputed areas, where the two lines remain as intertwined as the prongs of two forks pushed together.

I asked the premier whether he would today repeat China's call, made in the early 1960s, for a summit conference to prohibit the use of nuclear weapons, to abolish their manufacture, and to secure their total destruction.

"Let me make our position on this question clear," he replied. "In the first place, our nuclear tests are still in the experimental stage, and every test carried out is limited and made only when necessary. The aim of our nuclear tests is to break the nuclear monopoly and nuclear blackmail and prevent a nuclear war. Therefore, each time when we conduct a test, we declare that at no time and in no circumstances shall China be the first to use nuclear weapons. And we reiterate the proposal that a summit conference of all countries of the world, big or small, be convened to conclude an agreement on the complete prohibition and thorough destruction of nuclear weapons and, as the first step, to reach an agreement to prohibit the use of nuclear weapons. After our recent test (October 14, 1970) the Japanese Socialist Party expressed their support for this stand and proposal of ours."

As for "so-called nuclear arms limitation" talks between the superpowers, he said, these were aimed to maintain their monopoly over all others, and nothing else. Each power concentrated only on how to "limit" the other so as to maintain its own superiority. The United States and the Soviet Union indeed wished to "limit" the costs of supporting their monopoly of terror, but the costs nevertheless continued to rise astronomically even as they talked. As to how their contradictions were ever to be resolved, "We are not their chiefs of staff!" He said, "Don't cherish any illusion in that kind of 'disarmament'. For 25 years, they have all along been engaged in arms expansion, and not at all disarmament."

Speaking of China's "world outlook," Premier Chou quoted Chairman Mao's words: "The people of all countries, the masses comprising more than 90 percent of the entire population, sooner or later want revolution. . . ." According to Chairman Mao, he said, the danger of a world war still exists, and the people of all countries must be prepared. But "revolution is the main trend in the world today."

The Premier said that Chairman Mao's statement of May 20, 1970, foresees prospects for an American revolution. Indeed no one can speak seriously to responsible leaders here without noticing their intense interest in the signs they detect of disintegration of American capitalist society. Clearly Chairman Mao is not expecting an early American revolution, however, nor seeking to build China's foreign policy on that speculation. The policy for which China seeks adherence is more limited. It calls not only for American troops to be withdrawn from Asia and Taiwan, but also for all foreign troops "to be withdrawn from all territories they are occupying, and go home, so that people of all countries may enjoy the right to solve their problems on their own without any menace or interference from the outside."

My own impression after nearly six months here is that the recovery of political stability and economic growth are now a first priority, while abroad China seeks the renewal and expansion of state-to-state ties on the basis of the old Bandung principles of peaceful coexistence. China does not aspire to become a nuclear superpower but aims at credible deterrent power while seeking to end superpower domination in world affairs with the cooperation of the medium and small powers. Relying on her own means however, China has never been so well prepared for war, and to frustrate American military and political purposes in Asia by fulfilling her obligations to support Hanoi and the Indochinese peoples allied with Hanoi.

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CHINA AND THE HUNGRY WORLD

by Tim Raper

TO SAY that China is no stranger to famine would be an understatement. Immense catastrophes such as the famine of 1849 in which nearly 14 million died, that of 1877-79 in which up to 13 million are estimated to have perished, and that of 1928-30 when 5 million lost their lives are merely the peaks — abysses would perhaps be a better word — in a landscape where hunger has been a permanent feature, and annual death-rolls of hundreds of thousands not uncommon. As the economist R. H. Tawney (writing in 1932) put it: "There are districts in which the position of the rural population is that of a man standing permanently up to the neck in water, so that even a ripple is sufficient to drown him."¹

Traditionally, drought and flood — the primary causes of famine — were held at bay by systems of canals, reservoirs, embankments and irrigation works which made possible the growth of dense populations in regions that would otherwise have remained derelict. But sometimes — and particularly during the last century — these were allowed to fall into decay. Similarly, in periods when the power of the Empire and its officials was exercised benevolently, grain surpluses could be transferred to deficit areas, but more often they were hoarded while neighbouring provinces starved.

A basic cause of famine was the concentration of land and wealth in the hands of a small number of landlords and land-owning usurers. The broad picture is summarised by Adler: "On a very rough basis landlords and rich peasants (i.e. farmers regularly employing hired labour), constituting with their dependents about 10 per cent of the rural population, owned 70 per cent of the cultivated land; middle peasants, forming about 20 per cent of the population, owned roughly the same proportion of the land; and poor peasants — many of them landless labourers — formed 70 per cent of the village population but owned only 10 per cent of the land."²

In Edgar Snow's words: "Enormous taxes, the corrupt share-crop method, and the whole historical system of social, political and economic relationships described by Dr. Karl August Wittfogel as the 'Asiatic mode of production' continued to leave the landless peasantry constantly heavily in debt, without reserves, and wholly unable to meet such crises as drought, famine and floods."³

Snow has painted a terrible picture of conditions during the great North-west famine of 1928-30 — of men whose flesh hung from them in naked folds; children with misshapen bodies, twig-like arms and protruding stomachs, women with protruding buttocks and breasts hanging like collapsed sacks. He has also described how in the towns there were still rich men with hoards of grain to sell at inflated prices; while in Peking and Tientsin lay thousands of tons of wheat and millet which could not be shipped to the starving because the militarists who controlled the rolling-stock were afraid to let it be used in case their rivals should seize it.⁴

During this famine thousands of acres of land were bought by speculators for a few coppers; 400,000 women and children also changed hands by sale. Snow describes how some people even sold their clothes and wandered around naked. Bark, roots, straw, leaves and earth were eaten to relieve hunger-pangs.

After a century of such privations is it to be wondered at that the Chinese peasants welcomed the Red Army as their saviours and Mao Tse-tung as a Messiah?

After the Communists gained power in 1949 the American press — which had no difficulty in reconciling its earlier reports of devastating famines and appalling massacres with its new-found enthusiasm for Chiang Kai-shek and the Nationalists — began attacking their successors on the grounds that under Communist rule China was starving. Felix Greene has exposed these reports as fabrications or, at the best, exaggerations.⁵

During the years 1959-62 China experienced one of the worst droughts in her history, and severe rationing had to be introduced. But, as Professor C. P. Fitzgerald has stated, "... not even the best-informed critics of the regime could point to evidence of deaths from starvation. Under comparable conditions in the era before land-reform, such deaths would have been reckoned in millions. . . . The Communists have shown great skill, common-sense and organizing ability in handling the distribution of the rice and grain-crops. Instead of the old system of local supply and hoarding by landlords and corn factors the regime has tackled the question on a countrywide scale."⁶

Professor Keith Buchanan has pointed out that for the first time in her history the development of the communes has made possible the mobilization of China's huge labour resources. Water control and soil conservation projects have been undertaken on a massive scale all over the country —

most striking is the Yellow River project, with its staircase of dams linked with the rehabilitation of great areas of eroded land in the Yellow River catchment area. Large-scale afforestation is also being carried out. An all-out attack has been made on pests which attack crops; and on diseases such as malaria and hookworm which have in the past immobilized the peasant at critical points of the year, thus reducing agricultural yields. Technical developments, such as the use of better tools, chemical fertilisers and improved varieties of seeds, have also helped to increase output.⁷

COMMUNISM OR POVERTY?

THIS IS not the place for a detailed technical exposition of the methods by which the Chinese people have succeeded in eradicating hunger and building up a better life for themselves. The point is that, from all the evidence available, they have succeeded, and are continuing to succeed, in this task. This is a fact which has been recognized with some dismay by those who are hostile to Communism, and would like nothing better than for it to fail. As K. S. Karol has stated: "Pharisaical editorial writers like Joseph Alsop and others periodically announce with contemptible pleasure Chinese famines which exist, fortunately, only in their imaginations; but their editorials are often read in countries with pro-American governments where famine actually rages. Sooner or later the truth will out, and it is then doubly unfavourable to the Americans, first because it is disgusting to see the world's most overfed country rejoicing that others — even if they are Communist — are suffering from hunger, and secondly because one discovers that it is not in China but in their own camp — in Central or South America, for example — that people are dying of malnutrition . . . today a Kwangtung peasant eats much better than a peasant in Kerala in India — and this is known in Asia."⁸

Commenting on this, the American scholar Noam Chomsky writes: "The fact that this is known in Asia is apparently what frightens American planners like Walt Rostow, who points out that a primary threat posed by China is the possibility that the Chinese Communists can prove to Asians by progress in China that Communist methods are better and faster than democratic methods."⁹

Gunnar Myrdal has described how China's success in mastering her problems by comprehensive state planning has forced other countries, notably India, to adopt similar methods. He quotes an Indian writer as saying that "unless radical changes were brought about in the economic conditions prevailing in these [new Nationalist] States [of Asia], and the living standards of the masses were greatly improved, it would be difficult to avoid the danger of the Communist ideas spreading among the people."¹⁰

This seems implicitly to admit that people, given the choice, prefer Communism to poverty.

FORMS OF AID

CHINA'S ACHIEVEMENT in abolishing hunger is of particular importance at a time when 30-40 million people in the Third World starve to death annually,¹¹ and experts like Gunnar Myrdal have said that urgent steps are necessary to prevent global famine. Western aid to the underdeveloped countries — mainly loans at interest rates of up to 6% or more — declined by 28% between 1961-65, and the situation is still deteriorating. The foreign aid budget presented to Congress by President Nixon in May

1969 was the lowest proposed by any president since the American aid programme began more than 20 years ago. Here in Britain, the level of net official aid has fallen by £3 millions since 1960, a period during which our Gross National Product has risen by 60%, or £15,000 millions.¹²

Such aid as the underdeveloped countries do receive is more than offset by the fall in world market prices of the raw materials they produce, the rise in prices of the goods they need to import, the outflow in profits and investments, and other factors. As a recent Christian Aid pamphlet states,

the world's wealth and the world's markets are controlled by the rich, white nations of North America, Europe and Australasia: the international economic system operates to their advantage and discriminates against the poor.

As a result, the economic gap between the richer and the poorer nations is widening rather than decreasing.¹³

The fact is that the wealthy nations simply are not prepared to reduce their own domestic expenditure in order to give the poorer countries the aid they need. The amount spent by them on arms alone exceeds the national income of all the underdeveloped countries. As Bertrand Russell has pointed out, the cost of a single experimental missile is greater than the sum needed to make drinking water available to everyone in Egypt. Moreover, a large proportion of the aid is in the form of armaments, which are used by military oligarchies to keep themselves in power; while much of it is also dissipated in large-scale corruption.¹⁴

China's aid has differed from that given by the Western countries in almost every respect. Because her own economy is still developing, it has so far been on a small scale financially, compared with that of the richer nations. However, the proportion of China's national income devoted to aid is comparable to that of the United States.¹⁵ What is more, the aid given by China has, in many cases, consisted of actual gifts or grants. Between 1950 and 1966, China gave away over £600 million.¹⁶ Where loans have been made, they have in most cases been interest-free.

At least twenty-five countries have benefited from Chinese aid. One of the earliest to do so was India which, during the famine of 1951, received 100,000 tons of rice.¹⁷ The others include Afghanistan, Burma, Cambodia, Ceylon, Indonesia, Nepal, North Vietnam, North Korea, Mongolia, Albania, Hungary, Egypt, the Yemen, Algeria, Tanzania, Zambia, Somali, Ghana, Guinea, Mali, Mauritania, the Congo (Brazzaville), Zanzibar and Cuba. Goods supplied by China in the form of aid have included locomotives, freight and passenger cars, communications equipment, machinery, agricultural implements, metal products, electric motors, textile machinery, chemical raw materials, building materials, cement, coal, steel, cotton fabrics, paper, miscellaneous consumer goods, and grain. She has also financed the construction of roads, bridges, factories, power-plants, coal-mines, irrigation projects, papermills, petroleum installations, railway lines, conservation works, and meteorological stations; as well as universities, hospitals, youth and sports centres, and housing.¹⁸

The most famous of China's roadbuilding projects was the 500 mile highway from Kathmandu to Lhasa. The section from Kathmandu to the Tibet border, which was constructed with Chinese machines and materials, and with the aid of Chinese experts and technicians, was financed by a Chinese grant of £3½ million sterling.

TANZANIAN RAILWAY

CHINA'S LATEST and biggest aid project is the construction of a 1,000 mile railway line linking Zambia's Copperbelt with the Tanzanian port of Dar es Salaam. This will enable landlocked Zambia to export its 800,000 tons a year of copper, and to receive imports, while avoiding the "White African" routes through Rhodesia, Angola and Mozambique.

The line will cost £150 million, and will be financed by an interest-free loan, repayable over 25 years. Chinese engineers, who have completed four years of survey work through wild East African bush and mountain country, have said they hope to finish the job in five years, which would be a very impressive construction feat.

A striking feature of Chinese aid has been the spirit in which it has been given. The wording of China's aid agreements lays stress on "equality", "mutual benefit" and "proletarian internationalist duty". In other words, the recipient is treated as a partner, not as an object of charity, as is so often the case with Western aid.

China also insists on her technicians living at a standard not higher than their local counterparts. The Indian writer Dev Kumer describes how

reporters visiting the Chinese road construction project in Nepal . . . were astonished to find the "Cheeni sahibs" cooking their own meals, dispensing with servants, and working with their hands like other labourers.¹⁹

Not unnaturally, China's aid has been confined to countries with left-wing or neutralist regimes. This ensures that the aid is used for the good of the people in these countries, and for the strengthening of international socialism. Military aid has also been given in the form of arms and training to national liberation movements.

SELF-RELIANCE

THE AIM of Chinese aid is to help the recipient countries to become self-reliant. But this can only be achieved if the peoples in these countries are prepared to make the effort necessary to win independence. It is here that China's own example is all-important. As one writer has put it:

Here is a huge and initially very poor Asian country successfully pulling itself up by its own bootstraps, having cut itself quite free of the encraving mesh of domestic feudalism and international capitalism. As the living standards of the Chinese people gradually rise, and as the gap between these standards and the standards of neighbouring Asian countries gradually widens, China's example is bound to make an increasingly powerful impact on the minds of intellectuals and peasants' and workers' leaders in "free" Asia, and, through them, on the mass of the people.²⁰

This is especially true of those countries, both in and outside Asia where outworn social and economic structures and traditions inhibit change; or where repressive and reactionary regimes, bolstered by Western aid, keep the people in a state of subjection and misery. Here, revolutionary mass movements alone can bring about an improvement in living standards.

But time is running short. Unless these movements, aided by China, succeed within the next few years in overthrowing the present unjust economic system which "causes and perpetuates poverty,"²¹ "we face a dark

age of human misery, famine, under-education and unrest which would generate a growing panic, exploding in wars fought to appropriate the dwindling means of survival."²²

The moral is clear. China, whose example shines like a red beacon in the darkness — an inspiration to the freedom-fighters in their struggle against tyranny — deserves the support of all who care about the suffering of the needy, and are determined to prevent the catastrophe of mass-starvation from overtaking this already-hungry world.

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