The East is read

To explore one important facet of the visible tip of the iceberg of Chinese science, S. Dedijer and B. Billgren ask: what was the effect of the Cultural Revolution on *Scientia Sinica*, the principal journal of the Chinese Academy of Sciences? How and to what extent has politics caused it to depart from the international scientific tradition?

AS the chief Academy journal, *Scientia Sinica* occupies a unique position both inside and outside China. Although, as a result of the Cultural Revolution, the journal ceased publication for seven years in 1966, it is in China the standard bearer of science and the most prestigious channel for scientific communication. Abroad it is the official broker of knowledge on the state of China's science and stakes out China's claims amongst world scientific competition. Thus, focusing on this very visible yet little studied face of Chinese science, one learns not only about changes from 1965 to 1974, but gains an insight on the present state of the scientific community in China.

Our basic materials are the four volumes (XIV–XVII: 1965–1974) with 28 issues and 405 articles) of the foreign language edition of *Scient. sin.*, identical to the Chinese edition (we compared two 1973 issues of each). To this material we applied a number of simple qualitative and quantitative indicators for the international scientific tradition and its change by politics.

Tradition: (1) the journal as communication channel; (2) absence of politics in articles; (3) structure of the

journal; (4) structure of articles; (5) science norms; (6) style; (7) priority protection.

Changes by politics in: (1) editorial policy—including “mass science” and “serve the people”; (2) political content of articles; (3) authorship of articles; (4) research programme in journal; (5) language of articles; (6) institutional changes; (7) origin of references; (8) rapidity of publication.

An analysis of the 405 articles shows that all overt political statements in them can be classified under one of the following categories—

- Mao citation: “Chinese medicine is a great treasure which should be investigated and further developed for the welfare of mankind (quoted twice during 1973).

- Political statements: “Since the founding of New China and under the correct leadership of the Chinese Communist Party” in “Cure of Choriocarcinoma and Chorioadenoma Destruens Chemotherapy” (No. 2, 297; 1973).

- Sentences with overt marxist-maoist orientation: “The correct road of dialectical materialism can be only assured by going deeply into the essence of this problem” in “Crustal Structure and Crustal Movement” (No. 4, 520; 1973).

- Policy Statements: “We are still a developing country. Steps have just been taken to study the aforementioned significant theoretical problems of science” (such as pulsars, quasars and background cosmic radiation) in “Heliocentric Theory in China” (No. 3, 376; 1973).

The political content of articles is measured on a 0, 1, 2 scale: 0 for articles without a single overt political sentence, 1 for one or two such sentences, 2 for more than two.

At the beginning of the Cultural Revolution in 1965–66 there were strong hints in the literature that the publication of scientific journals was anti-revolutionary. The most revolutionary impact of the Revolution on *Scient. sin.* was that it ceased publication for almost seven years together with all the other journals, except *Chinese Medicine*, which continued until 1968 in a highly political form. With the renewed publication of the foreign and Chinese editions of *Scient. sin.* (and 19 other journals) in 1973, China returns not only to the 300-year-old international tradition but also to its pre-1949 tradition. For *Scient. sin.* is the new name given in 1955 to the Chinese Academy journal *Acta Scientia Sinica* begun in 1952, which in its turn succeeded *Science Record*, the main Academy journal in 1942–45 under Ch'ang Kai Shek's government. The editor of that, as well as of *Acta scient. sin.* from 1952 was the Chicago

trained physicist Y. H. Woo, vice-president of the Academy from 1949 until after the Cultural Revolution.

Exactly resembling the corresponding Western academy journals and its Chinese predecessors, *Scient. sin.* throughout its history up to issue No. 2 of 1974 consisted exclusively of articles communicating to the Chinese and the world scientific community the latest research results in “pure science, technology, agriculture and medicine with emphasis on basic theoretical research”. Several scanings of the 405 articles show that all those in 1965–66 and 74% of those in 1973–74 follow the Chinese and Western tradition: they contain not a single overt political sentence.

All the 405 scientific articles from 1965 to 1974, even those with political content 2, have like their Chinese predecessors the traditional article structure. The title is followed by the name of the author(s), the institution(s), “date received”, “abstract”, “introduction”, followed by the traditional sections “method”, “experimental results”, depending on the subject. All the articles in *Scient. sin.* close as elsewhere with sections “conclusion” or “discussion”, “acknowledgements” and “references”.

The fact that following the international tradition all the 1973–74 articles record the date the article arrived on the editor's desk is related—as are all other components of the standard article structure—to specific socio-cognitive components of the research process. This “date received” usage has at least two functions: it stakes a scientist's claim to priority in his field, and it measures the speed of publication. Encouragement of international competition in science and technology has been a constant policy of the Chinese leadership. Mao, Lin Piao, Liu Shao Chi, and Chou En Lai have continuously stressed that “the country will certainly catch up with and surpass advanced world science levels in the not distant future” (*Scient. sin.*, No. 2, 279; 1973). Of the 235 articles in 1965 only one was published within a month of receipt. This was the most significant Chinese contribution to world science since 1949; synthesis of the insulin molecule by a group of 21 authors (*Scient. sin.*, No. 11, 1965). The three articles on the subject in 1973 and the two in 1974 were also published more rapidly than the average waiting time of six months. The only two articles in 1973–74 published within two months of receipt had definite political overtones; both were results of collaboration between an American (of Chinese descent) and a Chinese scientist.

A detailed study of the style and content of articles in 1973–74, even the

most political, shows a consistent effort to be impersonal and objective in style. The authors express themselves with the usual professional researcher's methodological reservations and scepticism. They relate their ideas and results to those of others and to knowledge already confirmed. There is a continuous professional striving toward a scientific approach, results and conclusions. Hence all the articles—even the most political—follow at least three of Merton's "institutional imperatives" of professional ethics of science. The 300 of 405 1973–74 scientific articles with no political statements can be said to follow the fourth, the "disinterestedness" imperative; they contain no explicit statements on the social significance of the reported research either in "serve the people" language or any other.

Only two out of 93 articles in 1973–74 are directly related to the important goal of the Cultural Revolution—"science by the masses". One in 1973 is by a peasant on "Using Chairman Mao's Philosophical Thinking to Guide Scientific Experiment in Peanut Cultivation". The second in 1974 is by a "worker-instructor" on "A Mathematical Analysis of Involute Gear Periodic Errors". Both articles—one with a political content of 2, and the second with 0, follow closely the traditional article structure.

The political content of articles and of the journal are shown in Fig. 1. As seen, there was no politics in 1965–66 articles. During 1973, 56% (24 out of 43) had no political content compared with 86% (43 out of 50) in 1974. From 1973, issue No. 1, the political content of articles decreased continuously and in 1974 it amounted to one or two points per issue. These "political bits" are to be found with few exceptions in the introduction or conclusion sections, and many are repeated in several articles giving the impression of being insertions by the editors.

With No. 2, 1974, two sorts of purely political articles began to appear. The first, at the beginning of each issue are political editorials criticising Lin Piao, Confucius and "the theory of innate genius". The second, placed at the end of the issue are philosophical "Studies on History of Natural Sciences". Such articles (Fig. 1) take about 10% of the pages of the journal. Thus it seems that the political bias of purely scientific articles is being replaced by a more pronounced political editorial policy with the double goal of guaranteeing the political correctness of the journal and the ideological education of the readers.

Figure 2 shows some significant changes, probably politically induced, in the articles in 1973–74 as against

x No. of articles in given issue of Sc S with pol. points ●

1965–66. From *a* we note a significant decrease of articles by 1, 2 or 3 authors and an increase in collective authorship giving only the name of the institution(s). This may turn to be temporary for it makes difficult the communication among researchers working on the same subject. Figure 2b shows a shift between 1965 and 1973 from the theoretical work in fundamental to non-fundamental sciences. It seems that *c* shows no significant shift in the pattern of institutions performing the work except for the decrease of that in universities. As regards the national origin of references (a total of 3,533 in 1965–66 against 1,242 in 1973–74) we note in a 6.9% decrease of Russian and 5.9% of Western, the latter amounting to 60% of all 1973–74 references. In 1965–66 there were 22 articles in Russian and 9 in French compared with 1 and 2 in 1973–74.

Although our method is relatively simple, it seems to us that a more refined one would not lead to radically different results. We conclude, first, that our results from *Scientia Sinica* do not support such widespread general conclusions by visitors, as for example by A. Peyrefitte, namely, that in the Cultural Revolution "Scientists have been dealt a body blow. The functioning of research has been revolutionised to a degree which is hard to imagine, except, however, for national defence projects".

We find quite the contrary situation. Except for a very significant quantitative decline (312 articles and notes in 18 issues in 18 months of 1965–66 against 93 articles in 8 issues of 24 months of 1973–74) our results indicate that the goals of the Cultural Revolution are not reflected to any significant degree in the 1973–74 *Scientia Sinica*. All our evidence shows that the science China is most proud to show the world is still done entirely by professional scientists, who for their ideas and research problems still turn, as in the rest of the world to national and international science itself and not to the masses. This points to the existence of a scientific community in China which functions by the same traditions, norms and usages as in USSR, USA and Europe. We also note that in the period studied, the Chinese have not made any new innovations in this tradition which are visible in *Scientia Sinica* except for the radical increase of "collective authorship" of dubious value. Consequently we conclude that—with the exceptions noted—the *Scientia Sinica*, has followed in 1973–1974, as throughout its history, the international tradition of science, according to chairman Mao's directive "Make the past serve the present and foreign things serve China".

Barefoot in the field

Though a thorough study of the barefoot doctor system has yet to be carried out, there is no doubt that it represents the first successful, large-scale attempt at the delivery of total health care in a developing country cut off from Western civilisation. Alexander Dorozynski discusses the system by which, in the space of a few years, China has managed single-handedly both to overcome chronic malnutrition and to bring under control most of the epidemic diseases which have plagued it in the past.

THE really significant developments in health care delivery in China have taken place during the past 10 years, since 1965, when Chairman Mao issued the "great call": "in medical and health work, put the stress on the rural areas." The results, although now taken for granted, have been amazing and unequaled anywhere else.

Child mortality has been reduced in a spectacular fashion, and something that seems to be a nationwide family planning programme has been set up. In a truly revolutionary process, the Western 'medical monopoly' has been overturned, yet its achievements have been incorporated into a truly national medical system that has drawn both from the experience of countless generations of traditional practitioners, and from modern science.

The term "barefoot doctor" is now known the world over. It seems that it was first used in the Chiangchen People's Commune on the outskirts of Shanghai in 1965, where a medical team started teaching young farmers to perform some medical tasks. These farmers continued to work in the fields, but also cared for their fellow farmers, who affectionately called them "barefoot doctors". A Chinese delegate at the 27th World Health Assembly has said that since then, about 1 million barefoot doctors, of different levels adapted

to the needs of their community, have been trained in China.

In developing countries, medical doctors tend to congregate in the cities, largely leaving rural areas unattended, with the exception of occasional visits or vaccination campaigns. In China, many mobile medical teams tour the countryside, transporting with them especially designed equipment that allows even major surgery to be performed 'in the field'. They attend to the most serious cases, teach, and give refresher courses to barefoot doctors.

An important aspect of this programme was pointed out at the World Health Assembly by Dr Wang Kueichen, a 37-year-old barefoot doctor—"There is no barrier between the doctor and the patient"—white coats, impersonal offices, gleaming instruments and the medical language, all of which often contribute to isolate the patient in the West, play no part in this patient-doctor relationship. Barefoot doctors, she pointed out, are called 'doctors', not paramedics or auxiliaries; but the relationship is close enough, she said, for her usually to be called "little sister" or "little daughter".

The major concern is with preventive medicine, and this may well be the principal reason of the system's success. Basic preventive medicine, immunisation, health education, well-baby clinics, and surveillance of communicable diseases are enough to cut down radically the incidence of the most common illnesses in rural areas. Labour-intensive techniques have been used effectively against epidemics. For example, millions of schistosomiasis-bearing snails have been picked by hand and destroyed, and there have been similar campaigns against bedbugs, mosquitoes, rats, and flies. As one medical professor has put it: "Each of us, regardless of whether he was a janitor or university president, had to carry around a big fly swatter and a vengeful lust for dead flies. Everyone had his or her quota to fulfil by the end of the week."

This did not exclude curative medicine. The recognition and treatment of diseases such as respiratory infections and diarrhoea, which are among the most widespread causes of infant mortality, is in most cases a simple task, which requires neither a medical degree nor eight years of medical training. In such instances barefoot doctors practise what is referred to as "the New Chinese medicine", an integration of western and traditional procedures including acupuncture, herbal treatment, modern drugs and sometimes relatively complicated surgical procedures such as appendectomies. According to most reports, female barefoot doctors also routinely perform abortions, using the aspiration method. □