TMJ
MT
X-01
Copy 5

U. S. NAVAL TECHNICAL MISSION TO JAPAN
CARE OF FLEET POST OFFICE
SAN FRANCISCO, CALIFORNIA

31 January 1946

RESTRICTED

From: Chief, Naval Technical Mission to Japan.
To : Chief of Naval Operations.

Subject: Target Report - Physical Chemistry Research in Japan.

References: (a)"Intelligence Targets Japan" (DNI) of 4 Sept. 1945.

1. Subject report, covering Target X-01 of Fascicle X-1 of reference (a), is submitted herewith.

2. The investigation of the target and the target report were accomplished by Comdr., E.S. Gilfillan, USNR, with the assistance of Major W. Jorgensen, AUS., Lieut. C.E. Harper, USNR, and Lt. (jg) E. Snow, USNR, as interpreter and translator.

C. G. GRIMES
Captain, USN

33491

RESTRICTED X-01

PHYSICAL CHEMISTRY RESEARCH IN JAPAN

"INTELLIGENCE TARGETS JAPAN" (DNI) OF 4 SEPT. 1945

FASCICLE X-1, TARGET X-01

JANUARY 1946

U.S. NAVAL TECHNICAL MISSION TO JAPAN

SUMMARY

MISCELLANEOUS TARGETS

PHYSICAL CHEMISTRY RESEARCH IN JAPAN

Chemical research in Japan has been conducted in a fashion and with facilities extraordinarily similar to those employed currently in the United States. Nothing resembling a Japanese approach to research, nor any point of view, process, or substance not previously well known in the United States, was found. There are a few Japanese chemists who would be valuable to the staff of any laboratory, but they prefer to consolidate old fields of research rather than open new ones. If they are afforded even minimum facilities for carrying on and permission to publish their results outside Japan, their annual contribution should be a small but valuable and reliable increment to the sum of knowledge.

Research was far less affected by the war in Japan than in the United States. Theoretically, the government directed research into its own channels; the practical effect was very small, however, and actually no pattern connecting the activities of one laboratory with that of other Japanese laboratories, as distinguished from laboratories outside Japan, is discernible.

TABLE OF CONTENTS

REFERENCES

A. Japanese Personnel Interviewed:

Dr. Sanichiro MIZUSHIMA, Chairman of Organic Chemistry Department, Tokyo Imperial University, TOKYO.

Dr. F. ISHIKAWA, Chairman of Organic Chemistry Department., Tohoku Imperial University, SENDAI.

Dr. Hitoshi TOMINAGA, Chairman of Physical-Chemistry Department, Tohoku Imperial University, SENDAI.

Dr. Izumi HIGUCHI, Assistant Organic Chemistry Professor, Tohoku Imperial University, SENDAI.

Dr. Juro HORIUCHI, Chairman of Physical-Chemistry Department, Hokkaido Imperial University, SAPPORO.

Dr. Kawai UMEDA, Professor of Physics, Hokkaido Imperial University, SAPPORO.

Dr. Isamu NITTA, Chairman of Physical-Chemistry Department, Osaka Imperial University, OSAKA.

Dr. Ryo KIYAMA, Chairman of Physical-Chemistry Department, Kyoto Imperial University, KYOTO.

Professor Jiro OSUGI, Assistant Physical-Chemistry Professor, Kyoto Imperial University, KYOTO.

Professor Masao KOIZUMI, Professor of Physical-Chemistry, Osaka Imperial University, OSAKA.

Professor S. CHIDANI, Professor of Organic Chemistry, Osaka Imperial University, OSAKA.

Mr. Takashi EGUCHI, Director of Research, Hokkaido Artificial Petroleum Manufacturing Company, RUMOI, Hokkaido.

B. Pertinent Reports of other Investigating Committees:

Report of Scientific Intelligence Survey in Japan, September and October 1945-Professor K. T. Compton, Dr. E. L. Moreland.

INTRODUCTION

This study began with an inspection of the Tohoku Imperial University at SENDAI and a conference with Professor K. HONDA, who is probably the most productive scientist to appear in Japan. He furnished a list of outstanding Japanese chemists. All of these and others were later interviewed. Conference with Professor HONDA was followed by study of Reference B, and a conference with Commander Neeley, USNR, a member of the Naval Technical Mission to Japan, who is studying Japanese research in the petroleum field. At the end of this preliminary phase, it was realized that Japanese research was extraordinarily similar to American, and that little if any material of immediate practical interest to military scientists or occupation authorities would be found. It was decided to concentrate on detecting differences between American and Japanese points of view and methods. It was also decided not to re-interview prominent scientists who had already been exhaustively investigated by the Compton-Moreland team (See Reference B) and other American investigators. The Japanese institutions and personnel listed in Reference B were accordingly inspected and interviewed in this light.

THE REPORT

1. Specific Researches

a. Tokyo Imperial University.

Professor Sanichiro MIZUSHIMA, of this university, was trained in Germany. His research has to do with Raman Spectra, particularly with hindered rotation about the single carbon-carbon bond. Substances studied were 1,2 dichloro ethane, 1,2 dibromo methane, and 1,2 diiodo methane. He was able to prove that each exists in three forms: trans, assist, and "gauche". This experimental work is of the highest quality and proves his point beyond doubt, but all this was well known for the carbon-carbon bond generally in 1932. In other words, he has confirmed a fact already well established. He was occasionally consulted by the military on specific elementary chemical problems but was never in their confidence and did little for them.

b. Tohoku Imperial University, SENDAI.

Professor F. ISHIKAWA, German trained, whose works were well-known to one of the present writers before the war, continued his work on the free energy and entropy of pure chemicals during the war. This is standard useful spade work, in no way new, or indicative of trends. Professor Hitoshi TOMINAGA, of the same institution, works on the practical problems of the glass industry associated with the Imperial University. This glass industry makes the laboratory glassware for all of the universities. Some samples of fuzed quartz laboratory ware prepared in the laboratory are as fine as members of the team have seen.

c. Hokkaido Imperial University, SAPPORO.

The leading figure here is Professor Juro HORIUCHI, whoustudied in Germany and England. His field is reaction kinetics. In his laboratory, work is in progress on the kinetics of recombination of atomic hydrogen, as affected by the 100, 110, and 111 planes of single zinc crystals. He is also experimenting on the heat of adsorption of hydrogen on nickel at low pressures, mechanism of metallic catalysis in hydrogenation, and mechanism of hydrogen products on electrode surfaces. His war work consisted of occasional consultation on hydrogenation at the Navy Laboratory at OFUNA, and lectures to Chemical Warfare sections of the armed forces. From the text of these lectures they must have been purely ceremonial. The listeners could scarcely have understood the topics discussed. At the same University, Professor Kawai, UMEDA made computations of Fermi-Dirac-Thomas functions. The resulting tables, similar in use to log tables, are of interest in the study of atomic processes. He did no experimental work.

d. Osaka Imperial University.

Professor NITTA studies the structure of crystals, particularly pentaerythritol and tetranitro methane. During the war he also studied strontium formate as a possible substitute for rochelle salt as a piezo-electric material. The results were negative. In Professor NITTA's laboratory, Professor Masao HARADA works on isotopic separations. In the organic

laboratory of the same institution, the chemistry of cedar oil and the pure chemicals which can be isolated from crab shells are studied.

e. Kyoto Imperial University.

Professor Ryo KIYAMA studies the properties of matter at pressures up to 5,000 kg/sq. cm. He appears more interested in the design and construction of apparatus than in its use for scientific purposes. This was the only case encountered of a Japanese scientist doing less accurately work which had been done before.

f. The Rumoi Research Institute.

The Rumoi Research Institute of the Hokkaido Artificial Petroleum Co., the only industrial laboratory visited, was of interest as being in an isolated locality untouched by the war. It was built to employ about two hundred research workers, but there were only twenty at the time of this investigation. The director, Mr. Takashi EGUCHI, is a first-class chemist with considerable experience abroad. Facilities are just as those in an American laboratory working on petroleum products. During the war the major effort was the production of motor (not aviation) fuel by a moderate pressure analog of the Fischer-Tropsch process. Some work was also done on the isomerization of normal butane on a pure alumina catalyst.

This laboratory had no connection with the Ofuna Laboratory which was doing much the same thing. The fuel projects have been given up with war and the laboratory is now concentrating on the production of standard coal-tar chemicals, and cosmetics from fish oil.

2. Quality of Research.

Apparently the aim of Japanese scientists was to be accepted as members in good standing in the international scientific fraternity. They proposed to accomplish this by reliable, thorough, pains-taking work in considerable volume rather than by brilliance. They succeeded. There is nothing resembling a Japanese approach to research nor any relation between the research programs of Japanese institutions as distinguished from laboratories outside Japan.

Professor MIZUSHIMA estimates that there are in Japan about one thousand chemists qualified to direct research and about two thousand well-qualified assistants. Of those interviewed, four could be classified with the first thousand American chemists in order of ability. The total number so qualified probably does not exceed ten. The leading men appear to think more or less as Europeans and are able to discuss any scientific or social problem. At lower levels, Japanese chemists are well-acquainted with the details of their specific, narrow fields, and have thought the questions raised by their own experiments through to the end, but they seem devoid of ideas about anything else. There were several instances of two men working in the same laboratory, neither having any accurate idea of the problems of the other. This is a phenomenon which does not occur in American laboratories. The question of why research should be done always was baffling to them; they had accepted it as axiomatic and were disturbed that the point should be raised. They seemed reluctant even to consider any social problem.

The relative standard of living of Japanese research workers in their communities compares unfavorably with Americans of similar duties and responsibilities. Notwithstanding this, all those interviewed feel they must teach. The prospect of working in industry to improve their economic position is repulsive to them.

Japanese research workers were distrusted by the general public during the war. Now they are ignored.

3. Equipment.

Japanese laboratories appear to have rather more apparatus per chemist than American laboratories, and a smaller fraction of it is home-made. The apparatus is less well-cared for and the laboratories more cluttered and untidy than American laboratories. All the familiar chemical equipment is there, differing from ours only in the Japanese characters on it. Nothing suggesting Japanese culture was apparent in the design of any of the equipment. They do not even use chopsticks to handle hot objects, as Chinese chemists do.

4. Research and the War.

Japanese research was far less affected by the war than American. At first, almost the only effect was induction of the younger men as privates. Then materials and services became harder to obtain though the Kyoto University High Pressure Laboratory was able to obtain large forgings and have them machined as late as 1944 for what was apparently a pure research project. Late in the war, the government began to realize the value of scientists and inducted them as technical officers. It also made some attempt to use professors as consultants, but never took them into confidence or disclosed the reasons for the questions asked. These conferences left the professors frustrated and the laboratory work entrusted them by the government never took a substantial fraction of their time. There was nothing similar to the American practice of assigning research projects to universities rather than individuals.

Toward the end of the war, bombing forced the removal of much key equipment and records to the country. Almost all is still there. At present, research is being carried on almost numbly, out of habit. Chemists are uncertain of the future, their system of values, and themselves. They appear to adjust to defeat and peace less easily than the humbler nationals of Japan.