Ginling
Corres.
Lu Gwei-djen 1934-1947
Lu Mei-ying 1937-1940
Lu Shuh-chin 1945
Lu Shuh-ying 1932, 1948

Jinling

Lu Gwei-Djen

1934 - 1947

From Mrs. New March 1942

LU GWEI-DJEN

Ginling graduate, 1926. Research worker on nutrition in Lester Research Institute, (Shanghai). With Reni Alley (Chinese Industrial Cooperatives) at one time on diet for factory workers.

1937 - Typhoid, so had her furlough in England. She went to Cambridge University and got her Ph.D. in 18 months instead of 3 years. She attended the scientific congress in Zurich, Switzerland, and presented papers - China's only representative. Later, Chinese government asked her to come to the United States Pacific Congress for Scientific Research, and she presented scientific papers.

1940 - Then she stopped in Berkeley, California, and worked on her experiments. Now she is sent under International Cancer Research to Columbia University, College of Surgeons and Physicians, to be a Senior Fellow of research on Cancer. She has a very honorable, but also responsible, position.

LIST OF PUBLICATIONS 1934-1939

MISS LU GWEI-DJEN

"The Occurrence of Creatinuria in Adult Chinese Males."
Far East Assoc. Trop. Med., Nanking, (1934), 1, 379-386

"Pathological Creatinuria"
Far East Assoc. Trop. Med., Nanking, (1934), 11, 605-619

"The Study of Rice."
Proc. 3rd General Conf. of Chin. Med. Assoc., Canton, (1935)

"Intermediate Carbohydrate Metabolism in Vitamin B_1-deficiency in Man".
Proc. 3rd. General Conference (Physiol.), Chin. Med. Assoc., Canton, (1935), 18

"Chemical and Clinical Findings in Beri-Beri with Special Reference to Vitamin B_1-deficiency."
Quart. J. Medicine (1935) N.S. 5, 355-373

"Identification, Estimation and Excretion of Pyruvic Acid in Urine of Apparently Individuals."
Proc. Chim. Physiol., (1936) 11

"Pyruvic Acid and Bradycardia in Vitamin B_1-deficiency in Rats."
Prac. Chin. J. Physiol., (1937), 12, 494

"Intermediate Carbohydrate Metabolism in Vitamin B_1-deficiency with Special Reference to Cardiac Changes."
Kongressbricht 11. XVIth International Physiology Congress, Zurich, Switzerland.

"The Specificity of Coupled Esterification of Phosphate in Muscle."
Biochem. J. (1938), 32, 2043-2048

STUDIES ON THE METABOLISM OF PYRUVIC ACID IN NORMAL AND VITAMIN B_I DEFICIENCY STATES

I A Rapid, Specific and Sensitive Method for the Estimation of Blood Pyruvate.
Biochem. J. (1939), 33, 249-254

II The Blood Pyruvate Levels in the Rats, Pigeons, Rabbits and Men.

III The relation of Blood pyruvate to Cardiac Changes.
Biochem. J. (1939), 33, 774-786

IV The Accumulation of Pyruvic Acid to Cardiac Changes.
Biochem. J. (1939), 33, in press

V The effect of Exercise in Vitamin B_1-deficiency.
Biochem J. (1939) 33, in press

Nutritional Studies on Industrial Workers in Shanghai with Special Reference to Vitamin Deficiencies.
Proc. Sixth Pacific Science Congress; Section of Public Health and Nutrition. (1939)

History of Chinese Dietetics - in press (Isis)

"Pyruvic Acid and Muscle Metabolism in Normal and Vitamin B_1-deficient States."
University Library, Cambridge, England (This is a dissertation of 188 pages.

LIST OF PROFESSIONAL POSITIONS HELD SINCE COLLEGE GRADUATION

GWEI DJEN LU (This list includes information necessary relative to to researches previously pursued, when, where and with whom.)

1926-1928 Studying clinical laboratory technique, biochemistry and physiology at Peking Medical College, Peiping, China.

1928-1930 Teaching assistant in biochemistry at Women's Christian Medical College and laboratory supervisor of the hospital, Shanghai, China.

1930-1933 Instructor in biochemistry and physiology of the Women's Christian Medical College and the Pennsylvania Medical School of St. John's University, both in Shanghai.

1933-1937 Research staff, Medical Department, Clinical Division, Henry Lester Institute of Medical Research, Shanghai. All the work done in these four years was carried out in collaboration with Dr. B. S. Platt. We built a modern medical clinic research unit and devoted our time to the studies on intermediate carbohydrate metabolism in vitamin deficiencies, especially on the metabolism of pyruvic acid in normal and vitamin B_1-deficiency states. For results please see List of Publications.

1937-1939 Research Fellow, Henry Lester Institute of Medical Research, Shanghai, working at Sir. F. Gowland Hopkins' Biochemical Laboratory, Cambridge, England. Most of my research there was carried out in collaboration with Dr. Dorothy M. Needham. A considerable amount of independent studies was carried out on further pyruvic acid studies. For detailed results please see List of Publications.

1939-1941 Research Fellow, Institute of Experimental Biology, Univ. of California, Berkeley, California and Harriman Research Laboratory, San Francisco. There is no direct collaboration with experienced research workers but have students and assistants helping with the work. In Doctor Evan's Institute, studies on the constitutional and enzyme changes in the muscles of the vitamin E deficient rats were carried out. For results please see publications. At the Harriman Research Laboratory studies on the effects of adrenal cortical extract on tumor tissue as a preliminary step to isolate the active principal from the gland. Also the effects of the concentrates on transplanted rat tumors and finally on human subjects with malignant lesions. Unfortunately the results are based on small numbers of experimental subjects and I am not supposed to report it.

1941-1942 This period really covers May-December, 1941. Research Fellow, Nutrition Clinic, Hillman Hospital, Birmingham, Alabama, under the directorship of Dr. Tom D. Spies. Independent studies were carried out on Pellagrin tissues.

SPECIAL APPOINTMENTS

1937 [redacted] delegate of the Chinese Physiologist Society to the 16th International Physiology Congress, Zurich, Switzerland.

1939 Official delegate of the Ministry of Education of the Chinese Republic to the 6th Pacific Science Congress, San Francisco, California, U.S.A.

Lu Gwei-djen

Ginling College 1926

1918 - 1922 - Mingdeh Presbyterian Girls' School - Nanking

1922 - 1926 - Ginling College B. A.

1926- 1927 - Peking Union Medical College

1927 - 1933 - Teaching in Biochemistry
Woman's Christian Medical College - Shanghai
Pensylbania Medical School of Saint John's University

1933 - 1937 - Medical Department doing research of the Henry Lester
Institute of Medical Research - Shanghai

1937 - 1939 - Cambridge University - Ph.D. - Cambridge,England

July 17, 1939 - America at invitation of

National Research Council
Sixth Pacific Science Congress
San Francisco, California
July 24 - August 12, 1939
Came as Chinese representative

Thesis for Ph.D. "Pyruvate Metabolism and Vitamin B_1 -deficiency."

Vitamin B_1-Deficiency Studies in China

by
G.D. Lu (Ph.D. Cantab)

from the Henry Lester Institute for Medical Research, Shanghai, and the Biochemical Laboratory, Cambridge, England.

(delegate of the Ministry of Education of the Chinese Republic to the 6th International Pacific Science Congress)

The observations which will be offered in the ensuing communication are of interest, it is hoped, not only in themselves, but because they illustrate certain general principles applicable to biochemical investigation in the service of humanity. They form part of a programme of research which has been pursued during the past six years, first in Shanghai and then in Cambridge, on the problem of vitamin B_1 deficiency.

Much has been heard in recent times about the importance of "clinical research" as such (emphasized, for instance, by Sir Thomas Lewis). But from our point of view biochemistry occupies a central position. In one direction it is linked with clinical observation (the collection of accurate case-histories, samples and the like) in which the psychological cooperation of biochemists, medical and nursing staff, and patients is absolutely essential; and with clinical practice, in which the therapeutic fruits of biochemical knowledge become apparent. In another direction it is linked with what at first sight seem to be purely theoretical experimental studies on vertebrates other than man. These alone can furnish the clues required for the interpretation of what happens in human disease, and without them there would be no testing material to enable the pure chemist to isolate the active substances such as the vitamins from foods and other agents from the tissues of the body. But there is a third direction with which biochemistry is connected, namely the social and economic conditions which lead to vitamin deficiencies. However great our knowledge of the functions

of the vitamins and of the way in which they perform their work in the body, however great our power of healing acute cases, it is only by the application of modern knowledge of dietary constituents to the food of the people by those responsible for it, that vitamin deficiencies and all the ill-health which they occasion can be banished from human society. Such a point of view has been repeatedly stressed by the greatest pioneers of vitamin discovery, such as Sir Frederick Gowland Hopkins.

To the above remarks it need only be added that the clinical dissentanglement of the multitude of symptoms due to the common occurrence of mixed vitamin deficiencies and concurrent diseases of other origin, calls for the highest qualities of medical observation. But this must not be of the conventional type, ready to dismiss unusual combinations of symptoms as mere modifications of the classically described syndromes; it must rather be allied to the experimentalist's outlook. At this point, the biochemist helps by working out statistically well-established values for the relevant constituents of the body-fluids and tissues in normal cases.

For example, Beri-beri was formerly frequently mis-diagnosed on account of heart-failure, uraemia, nephritis and albuminuria occuring at the same time. But after the establishment of raised blood pyruvate level as a specific indication of vitamin B_1-deficiency, it was found that all these symptoms may be incidental to the deficiency for they clear up completely within 24 hours after giving the vitamin. On the other hand they may have quite different origins, which B_1 therapy can do nothing to change.

There are two reasons why vitamin studies are particularly intimately connected with China. In the first place the Chinese people have lived for centuries in conditions, if not of over-population, of relatively high population-density, yet subject to constantly recurring natural calamities, such as earthquakes, and especially floods, (on a scale quite unknown in Europe) with their concomitant

destruction of harvests and widespread famine. Vitamin deficiencies have therefore been endemic in Chinese life. It should also be pointed out that in contrast with the milk-and-mutton diet of the Mongolian plateaus, the Chinese farmers were always exclusively agricultural, not pastoral, growing wheat in the north and rice in the south, and using oxen only for draught purposes, not for milk or (anciently) for flesh food. Of the vitamins, therefore, A and the B group were derived from cereals and oils, and C from herbs of all kinds, and sprouted and pickled vegetables. It may be pointed out here that within the limits of the possible, the Chinese understood very well the choosing and cooking of a well-balanced diet. The intake of D was probably always on the borderline, sufficient in the south where there is plenty of sunshine, but not in the north. We shall return in a moment to another important difference between north and south.

The second connection of vitamin studies with China is one of much interest, though generally quite overlooked. We do not generally realize the antiquity of human knowledge concerning deficiency diseases. As early as the 12th century B.C. the Book of Rites (Chou Li) of the Chou Dynasty mentions that besides the Imperial Physician and the Imperial Surgeon there was also an Imperial Dietician among the medical officers of the court. As regards beri-beri, itself, the recognition of this disease as of dietary origin is often attributed to the eminent Japanese naval medical man, Takaki, in 1880. But already in the 14th century, about 1330 A.D. Hu Se-huei, who himself had held the post of Imperial Dietician, wrote his book "The Principles of Correct Diet" (Yin Shan Cheng Yao), prefacing it with the motto "she liao chu bing" i.e. "Food Cures Various Diseases". In this book he gave a number of recipes for diets suitable for curing beri-beri, including various meats and herbs. A special study of the history of Chinese dietetics has been made, and will shortly be published.[1]

1. Lu Gwei-Djen & Needham, J. Isis, (in the press)

We now come to some of the detailed results obtained in the programme of research previously referred to. First of all a survey was made of the estimated vitamin B_1-intake in standard diets for all the provinces of China.[1] It was found that in the wheat-eating north (e.g. Shansi and Shantung) the intake per day was from 450-690 international units (I.U.) per day; the value required for normal health being from 300-600 I.U. per day. But in the rice-eating south (e.g. Kuantung and Chekiang) the intake was from 250-320 I.U. per day, that is to say, on or below the borderline of danger. It is therefore not surprising that beri-beri should be particularly prevalent in the southern provinces, as is shown by modern surveys.[2] But it is interesting that this was well appreciated as far back as the 8th century A.D. when the famous writer Han Yü noted in one of his essays that the disease had the same distribution. This is in contrast with conditions in Europe, where, if we may judge from a recent interesting book,[3] the B_1 danger line was never reached by any section of the population at any time since the beginning of the middle ages, although of course sub-deficiencies must have occurred wherever any degree of malnutrition existed.

Our studies of vitamin B_1-deficiency were originally stimulated by the important finding of the Oxford school that pyruvic acid occurs as an abnormal product of the metabolism of brain tissue respiring in vitro from the avitaminous pigeon. We therefore studies the bisulphite-binding substances and the pyruvate itself in the blood of normal and vitamin B_1-deficient human subjects. In 1935 we succeeded in isolating pyruvic acid from the blood, urine, and cerebro-spinal fluid of acute beri-beri cases,[4] a finding which has since often been confirmed, notably by Japanese investigators. It later became quite clear, as we had originally suspected, that not the bisulphite-binding substances, but only pyruvate itself, can be regarded as a specific and definite indication of Vitamin B_1-deficiency.[5]

1. Working on the data collected by Suen Wen-yü and J. Lossing Buck
2. Hou Hsiang-chüan Nutrition Notes China, 1935
3. Drummond J. & Wilbraham, A. "The Englishman's Diet", London, 1938
4. Platt B.S. & Lu, G.-D. , Chinese Journ. Physiol., 1935; Quart, Journ. Med.(N.S.), 1936
5. Platt, B.S. & Lu, G.-D., Biochem.Journ. 1939 (for man); Lu G.D., Biochem.Journ. 1939 (II) (for animals)

At this stage in the course of the work it became essential to gain a clearer understanding of the exact relationships between the deranged carbohydrate metabolism (as manifested in the changed blood pyruvate level) and the cardiac changes so characteristic of vitamin B_1-deficiency. As is generally known, bradycardia in rats has been made the basis of a rapid method of assay for vitamin B_1[1]. But when the blood pyruvate changes and the cardiac abnormalities were studied in parallel on the same animals (rats and rabbits), the rather surprising result was obtained that although there is usually a parallelism between blood pyruvate level and cardiac dysfunction, the latter cannot be the direct result of the former since normal animals can be loaded with amounts of pyruvate far greater than those met with in vitamin deficiency without any marked effects on the heart-beat.[2] This must mean that the pyruvate changes and the cardiac changes are rather the results of a common cause, than directly cause and effect. The lack of untoward effects when large amounts of pyruvate are injected has also been verified by American workers on human subjects.[3]

All this indicates that a knowledge of the pyruvate level in the blood is of prime importance in assessing vitamin B_1-deficiency, even in its minor forms. For this reason, a good deal of pains were taken to elaborate a rapid and specific micro-method, fit for general application, capable of estimating pyruvate accurately in 0.2 - 0.5 cc. blood. It involves the use of a photo-electric colorimeter with appropriate filters, and estimates accurately down to 5 of pyruvate.[4] With this micro-method it was possible to distinguish between simple, mixed, and chronic or acute deficiencies.

It having been established that a direct connection exists between raised blood pyruvate level and vitamin B_1-deficiency, there still remained some considerable difficulty in distinguishing between sub-acute cases or latent deficiency and

1. Birch, L.W. & Harris, L.J., Biochem.Journ., 1934
2. Lu, G.D., Biochem.Journ. 1939 (III)
3. Wilkins, Weiss & Taylor Ann. Internal Med., 1939
4. Lu, G.D. Biochem. Journ. 1939 (I)

normal subjects. For example, the normal level of blood pyruvate in man is 0.-4-0.75 mgm./100 gm. and that of acute ("fulminating") cases is 1.0-5.77mgm./100gm. But that of sub-acute cases varies from).77 to 1.93 mgm./100 gm. so that diagnosis may not be easy, especially where the deficiency is complicated by concurrent disease of other origins. These facts have indeed been urged against the use of blood pyruvate level as the principal test for vitamin B_1-deficiency.

It was therefore of interest to find that an exercise tolerance test could be used to reveal latent vitamin B_1-deficiency.[1] It is possible to produce a state of exhaustion and a high level of blood pyruvate in sub-acute cases by an amount of muscular effort (sitting up and lying down in bed 20 times, a total of 40 secs.) much less than that which is well tolerated by subjects not deficient in vitamin B_1 and which can be accomplished by them without any significant changes occuring in the blood pyruvate level. Heavier work (stair-climbing) will quickly raise the blood pyruvate level still further and induce a condition closely resembling that of the acute deficiency. In normal subjects the blood pyruvate rise due to exercise quickly returns to normal, but in sub-acute cases this return is always greatly delayed. These results may be accounted for either by supposing that less pyruvate is formed by the normal subject during exercise or that it is more rapidly removed by the normal subject after exercise.

In the course of these investigations it became clear that the amount of crystalline vitamin B_1 required to restore an acute case of beri-beri to normal has often been somewhat overestimated. Anything in excess of 5 mgm. will be rapidly excreted without beneficial effect. Doses of ten times this amount, as sometimes recommended, are therefore unnecessary, and this fact may be of much importance in countries where beri-beri is common and supplies of the crystalline vitamin may be low.[2] Another point of interest is that after administration of the vitamin

1. Lu, G.D. & Platt, B.S. Biochem. Journ. 1939
2. Platt, B.S. & Lu, G.D., Biochem. Journ. 1939

there is always a lag period of from 4-6 hours before its effects are observable; this may plausibly be interpreted as due to the necessity of the formation of some compound or complex in which the vitamin participates (e.g. phosphorylation or combination with protein).

From the clinical point of view therefore, it is evident that we have in blood pyruvate level, the exercise tolerance test, and the crystalline vitamin, a satisfactory system of diagnosis and cure. In the proper adjustment of the diet, if it could always be assured, we have an equally satisfactory system of prevention. But there still remains the problem of the function of the vitamin in the body, and particularly the mode of removal of pyruvate which will only proceed in the presence of the vitamin. On this subject work is still in progress.[1] According to one theory,[2] two molecules of pyruvic acid are reduced to form one of succinic acid, and the latter is then converted successively into fumaric, malic, oxaloacetic, and finally one molecule of pyruvic acid. Another theory[3] postulates that the oxidation of pyruvate is preceded by an anaerobic change; two molecules of pyruvate interacting to form one molecule of lactic acid, acetic acid, and carbon dioxide respectively. A third view[4] would hold that the removal of pyruvate is a direct oxidation to carbon dioxide and water, such as that which exists in the brain. It has also recently been shown, in bacteria at any rate, that the phosphorylated form of the vitamin (co-carboxylase) also acts as the co-enzyme of pyruvic dehydrogenase.[5] Our contribution to this problem[6] is that in mammals other than man the injection of a large amount of pyruvate immediately greatly increases the amount of reducing substance in the blood other than glucose or pyruvate. Later on the blood lactate is much increased, and later still, the blood glucose. It does not seem

1. Lu, G.D. & Needham, D.M.
2. Toenniessen & Brinkman Zeitschr F. Physiol. Chemie 1930
3. Krebs, H.A. & Johnson , Biochem. Journ. 1937
4. Peters, R. A. Lancet, 1936
5. Lipmann, F. Enzymologia 1938
6. Lu, G.D. & Needham, D.M. (in press)

that the muscle tissue plays any very great part in the removal of pyruvate, for after injection of amounts more than sufficient to raise the blood pyruvate level to that met with in acute vitamin B_1-deficiency, no more than 2% of the quantity injected can at any time be found in the muscles, and there is no increase in muscle lactate or muscle glucose. But as it is known that liver glycogen is increased after injection of pyruvate,[1] it is likely that the liver may be involved. Various workers have found that in vitro there is no production of lactate from pyruvate by blood, but if hexose diphosphate and adenylic acid are added, together with inorganic phosphate, then lactic acid is formed from pyruvate (at any rate in the case of the rabbit and rat). This of course means that pyruvate removal may possibly be closely bound up with the important energy-yielding oxido-reduction reaction whereby triosephosphate reacts with pyruvate to form lactate and phosphoglycerate. The exact mechanism of pyruvate removal requires much further study.

In conclusion we may return to affairs of more immediate practical importance. In conjunction with the Industrial Department of the Shanghai Municipal Council the operation of a factory restaurant for electrical workers was made available for scientific study. In this way it was possible to investigate the question of the exact condition of the rice, so important in a country where this is the principal article of diet. It was found that if the rice is milled (polished) on the day of use, vitamin B_1-deficiency does not develop. This would at first sight appear to be contrary to the classical recognition of polished rice as a diet deficient in the vitamin, but the paradox is explained by the fact that if the rice is stored for a long period after being milled it is attacked by moulds, bacteria and insects so that it has to be washed before use, and with this wash-water disappears the highly-soluble vitamin. In ancient times the milling was done on the day of use, and this still takes place in some country families, so that there is no necessity for washing, and hence no removal of the vitamin. Polishing followed by prolonged

1. Meyer, Biochem. Zeitschr. 1912

storage was a practice introduced only by modern industrialism. These facts may therefore stand as an example of the way in which modern science may sometimes be able to redress the evils of modern industrialism.

There remains little more to be said. But one must emphasize again that modern biochemical knowledge has now reached a point at which we can see that the ill-health and mortality caused by vitamin deficiencies are definitely preventable. This knowledge, however, must be applied on a scale commensurate with the scale of humanity, and we therefore pass here from the realm of biochemistry and medicine to that of economics and good government. A heavier burden than ever before rests upon those who are responsible for it, for where in the past without knowledge there could be little blame, today the failure to put into practice our hardly-won theoretical knowledge, is the sin against the light.

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Chinese Contributions to Medical Science

BY JOSEPH NEEDHAM AND GWEI-DJEN LU

AMONG the various departments of the history of science and medicine few have been less studied by Western scholars than the contributions of the Oriental civilisations to our knowledge of nature and our control of natural phenomena. This is due, of course, to the barriers which separate the true ideographic languages of the east from the alphabetic ones of the west, and also to the great geographical barriers which for so many centuries isolated the peoples of the Atlantic and Pacific seaboards of the Euro-Asiatic land mass. There can be little doubt, however, that as the history of science comes more and more to include what happened during the long stretch of Chinese civilisation, it will be recognised that although complex social and economic causes prevented that flourishing of science which in the west went hand in hand with the rise of our industrial civilisation, the Chinese were ahead of the Europeans, often by several centuries, in advances which have revolutionised human society.

If we glance first at a few of these before proceeding to the main subject of this note, we find that three of the greatest discoveries were Chinese: the compass, gunpowder, and printing. The mariner's compass (ting-nan-ch'ên, the "must-point-south-needle") originated in China before the ninth century A.D., and reached Europe by a slow diffusion lasting several centuries around the south Indian trade routes. Kipling, in *The Knights of the Joyous Venture*, it will be remembered, did justice to this fact by depicting a Chinese pilot with his compass among the Viking explorers. Gunpowder (chiang-yü) appeared some time during the T'ang dynasty, i.e. about the eighth century A.D., and, as befitted a truly civilised people, its use was restricted to fireworks. The discovery of gunpowder is significant since Chinese contributions to the development of alchemy were extremely important. The first known book on alchemy in any civilisation was Chinese; it was written by Wei Po-Yang in 142 A.D. Though alchemy was later known as lien-ch'in-shu, the art of refining gold, it was originally connected with religious, especially Taoist, conceptions, and had a medical significance in its search for the "Golden Egg" or Pill of Immortality (Ch'in Tan). Lastly, moveable-block printing originated in 932 A.D. so that Fêng-Tao has some five hundred years seniority over Guthenberg. The geographical steps by which printing diffused across Central Asia to Europe have been carefully worked out.

Now as regards medical science, the earliest idea of the physician in China, as everywhere else, was no doubt that of a more or less benevolent wizard, willing to combat for a consideration the devils of disease, whose behaviour he claimed to understand. This ancient idea is enshrined (like so many other ancient ideas) in the Chinese characters, for the character for physician is (i-sêng). Here the

top left-hand part means a basket (fang) of arrows (shih), the top right-hand part means a spear (shu), and the bottom part (wu) means a "sorcerer."

Later this was replaced by ch'un, meaning wine or tincture of a drug. But as the centuries went by, a large body of practical medical art grew up which when the first Europeans came to know it was too much despised. It is true that in some branches, such as anatomy, the Chinese made very little progress, presumably because of the age-old taboo restrictions against defacing the body, the image of the venerated ancestors; but in pharmacology many valuable drugs were known. Some of these, such as ephedrine (from the plant *Ephedra vulgaris ;* ma-huang), had no representative at all in western medicine. Rhubarb, too, was of purely Chinese origin. The Romans knew it as "Rha barbarum," and it came from China along one of the silk routes, sharing with cast iron, furs, and cinnamon, the position of minor element in the great import flow from the Far East to the Roman Empire. Other drugs such as stramonium, were common to both Chinese and Galenic pharmacopeias. It is interesting that the mineral or "chymical" remedies, such as arsenic, which the followers of Paracelsus had all the difficulty in the world in introducing into western medicine in the sixteenth century, were familiarly used by the Chinese in the thirteenth. So also was the iodine-containing seaweed (hai-ts'ao) and the anti-leprosy chaulmoogra oil (ta-fêng-dze). Particularly interesting is the fact that while the Chinese did not know of the cardiac-stimulating properties of the foxglove, they obtained a digitalis-like drug from the skins of toads (ch'an-su). As we now know, both these classes of active principles are members of the steroid group. Most surprising of all, however, is the fact that a kind of vaccination was practised as far back as the Sung dynasty in the time of Wang Tan (eleventh century); the contents of smallpox pustules were inoculated into the nasal mucous membrane, an operation called "shui-miao" or planting drops of water. The origin of the discovery is obscure, and is attributed legendarily to a Taoist nun.

In one direction Chinese medical practice was extremely advanced, i.e. that of nutrition. Shên Nung (ca. 2700 B.C.), the "heavenly husbandman," one of the earliest sages of Chinese history, who is said to have originated the cultivation of the five sorts of grain and invented the plough, has always been regarded as the first experimentalist who tasted all kinds of plants and classified them according to their nature and their effects on the individual. (See figure.) The great classical herbal of China, known as the Shên Nung Pên Ts'ao, which dates certainly from before the first century B.C., lists many hundreds of varieties of plants with their properties, and has been revised by many famous men, such as Hua-T'ou, who is said to have performed abdominal operations successfully by lost arts in the second century A.D.

The existence of a knowledge of dietary treatment of various diseases in China can be traced back as early as twelve centuries B.C. The Chou-Li, or "Record of Rites of the Chou dynasty," dating from about 1100 B.C., lists among the four Imperial Medical Officers, not only the Imperial Physician, the Imperial

Surgeon, and the Regius Professor of Medicine, but also an Imperial Dietician. When we come to the third century A.D. we find that deficiency diseases are clearly recognised as such. The Ching Kuei Yao Lüeh of Chang Chi (sometimes called the "Chinese Hippocrates") contains many vivid accounts of deficiency diseases in their various stages, and describes diets and dishes which, as we know to-day, would be rich in the various vitamins. This knowledge, constantly extended, was summarised in the fourteenth century A.D. by a great writer, Hu Se-Hui, who occupied the post of Imperial Dietician from 1314–1330 A.D., and wrote a book called Yin Shan Chêng Yao, i.e. *The Principles of Correct Diet.*

The sage Shên Nung tasting all the plants in the world to establish their virtues and dangers for mankind.

Wood block from a popular manual of Confucianism of the Ch'ing dynasty; Shêng Hsien Tao, "The Way of the Saints and Sages" (about 1800 A.D.).

Hu Se-Hui even distinguished between the two forms of beriberi, known to-day as the wet and the dry. He gave sixty-two different diets which would supply, as we know to-day, the missing vitamins of the B group. The motto of his book was "Food alone cures many diseases." In face of these facts, it is somewhat piquant that recognition of beriberi as having a dietary origin is usually ascribed to Takaki in 1880 A.D., an admiral of the Japanese navy. As a matter of fact, ancient dietetic knowledge is so deeply embedded in the Chinese people that in China no distinction is made between grocers' and apothecaries' shops, and the phrase "grandmother's cures" is used of dieting. Contrary to common belief, beri-beri was not common in China till modern times. Traditional knowledge sufficed for the following reason. Anciently rice was ground in every family on the day it was intended for use; this preserved a

thin fatty layer on the grain and a large portion of the embryo which contained sufficient B_1. With modern industrialisation, there grew up the practice of milling the rice in factories and then storing it in polished form so that bacterial and mould action necessitated subsequent washing, which removes the vitamin. By investigations of this sort modern science has been able to counteract an evil caused by modern industrialism.

In conclusion, it must be said that much study should be devoted to the contributions which Chinese civilisation has made to human knowledge. These have often been overlooked, partly because hidden behind a language, the difficulty of which is often over-estimated, and partly because Chinese science was a slow and never spectacular growth. But in the story of the development of world culture, they must be raised to their rightful position of honour.

[17 over

Kaiser Wilhelm Institute
Berlin-Dahlem
June 29th, 1939.

Dear Mrs. MacMillan;

Miss Lin En Lan suggested that I should write to you about my coming to the States. As I am already en route I don't have much time for writing and thus will only say that I am a graduate of Ginling College (1926). Since I left College ~~years~~ I have been connected with different medical schools in Shanghai. For the last 4 years before I left Shanghai (Aug. 1937) I was doing research work in the Henry Lester Institute of Medical Research, Shanghai, China. During the last two years I was working for my Ph D. degree in the Sir William Dunn Institute

[2]

JUN 29 1939

of Biochemistry, University of Cambridge, England. I have been very fortunate to be able to finish my degree in the two years.

I have been invited by Dr. K. F. Meyer, secretary of the Public Health, Sixth Pacific Science Congress, National Research Council of U.S.A. to read a paper on my work at the meeting to be held in California (July 24th - Aug 24). I am coming to the Congress as an official chinese representative by the "Queen Mary" arriving N.Y. on the 17th July. My Cabin No. is E 119. (Tourist)

It would be a

JUN 29 1939 [3] over

great kindness if you would be so kind as to arrange for some body to meet me on landing. The arrangements (as already made before I saw Miss Lin) were that I stay in New York for two days ("E" (29 W. 48th) Bristal Hotel), leaving by train to Philadelphia on ~~on~~ Wednesday morning (the 19th July). Miss Lin has also given me the address of Miss Chester who is in Philadelphia. I shall write to arrange to see her (as I only have one day in Philadelphia, I shall be glad if you would let me know of where she might be in case she had already left for the holiday).

[4]

JUN 29
1939

Looking forward to
meeting you and the
rest of Ginling members.
With best regards

Sincerely yours
G. D. Lu

(Lu Gwei Djen: 魯桂珍)

July 30, 1939

Mrs. T. D. MacMillan
Ginling College
150 Fifth Avenue
New York, N. Y.

Dear Mrs. MacMillan:

It was very kind of you to send a cable on board "Queen Mary" to say that you would meet me at the pier. I cannot find enough words to express sufficiently how very grateful I am to you for all the arrangements you made which helped to make my two days staying in New York very pleasant and successful. Miss Ewing was so good that I had no difficulty at all. She even typed the final copy of my paper for this congress (that was very necessary as I did the first draft copy while I was travelling in Europe). It had to be such a rush because I had no idea that I would be sent by the Ministry of Education to attend this Congress until a few days prior to my departure in England. However, I am very pleased to say that the paper went off very well last Tuesday. As the paper had to be handed in on Tuesday I was very grateful that she did the copy for me for else I should have had another rush to type it out on the day of my arrival.

I had intended to write you earlier but failed because of the busy programme arranged for the official delegates. It is indeed a great pleasure to be here. This congress has been a great success (especially the sessions on Nutirtion and Public Health) which I attended. For the last week I have greatly enjoyed the privilege of getting to know and discuss problems with some of the most eminent [illegible] scientists of the Pacific Countries. As an official delegate I have had a better opportunity to meet the delegates from other countries at social gatherings. This enables me to learn about the social and economic conditions of other countries as well. I had attend two other International Congresses before but I must say this is the most interesting one of the three; some say that the beautiful scenery and the peaceful state of California help to make this corgress more successful.

Yesterday morning I went to San Francisco to see Miss Chester off at noon. We had a lot to talk and very little time. I met Miss Shoup at the pier. There were two other American friends of mine (Prof. and Mrs. Waterfall who had been to China) who had accompanyed me to the pier to see Miss Chester off so we had a little party of five.

I was sorry that I missed the opportunity of seeing you when I passed New York. I would have tried to come to Northampton to see you if I had time to do so and get here on the morning of the 24th. However, I enjoyed seeing your staff and knew that you would help me wherever possible.

(2) [2]

JUL 30
1939

While I was in New York I told Miss Ewing about my present difficulties; I expect that she has already told you about them. First of all, because of the short notice I had to come for this congress (Due to complication with immigration law etc.) the Chinese Embassy had to provide me with a diplomatic passport inorder to make it possible for me secure the necessary visa for America to get here in time. It was very useful in many instances during my travel in Europe and for my landing in U.S.A. I had a free entry ; no difficulty at all. But it is not to be of any more help hereafter. In fact, I have been advised by several friends not (or never) to attempt to go back to China via Japan with this Passport. For certain technique reasons I was told in London that I could only change for another one after I get back to England. At the time I realized what it meant and thought of not coming. However, Prof. Hopkins and other friends in Cambridge all agreed that it would be a pity if China was not represented in the Congress at this time, so I decided to come. This really mean more than it looks at the first sight, for I am having a very good position in the Henry Lester Institute of Medical Research Institute in Shanghai, which demands me to get back before the middle of September. This means I stand a great chance of lossing that job. It is very sad because I could only get the equipments to do the kind of research I want to do from institutions of that type. As you know we do not have mary of the kind in China. Thus my other alternative was to go back to England and then to Honkong and to Chengtu. I went to consult Mr. Roger S. Greene in Chicago on my way to San Francisco about various possiblities. He agreed with the advise I had from England that I should try to stay and continue my research in this country for some time until I finish the piece of work that I am now interested, namely chemical charges in the muscles of vitamin deficiencies and their relations to clinical and subclinical conditions observed in man. He has written to Dr. Alan Gregg of the Rockefeller Foundation and the China Foundation about my case and promised to do his best. He said that he was quite dubious about the possibility of securing the fellowship which I needed on account of the fact that he knew all the awards were made at the end of June.

I am enclosing copies of two letters of recommendation from Prof. Hopkins and Dr. Needham of Cambridge together with a list of my publications for reference in case you know of any possibilities in Michigan e.g the Barbour Scholarship or some other fellowships in the medical school.

With my best regards and good wishs for a restful holiday.

Yours sincerely

Gwei-Djen Lu

Gwei-Djen Lu.

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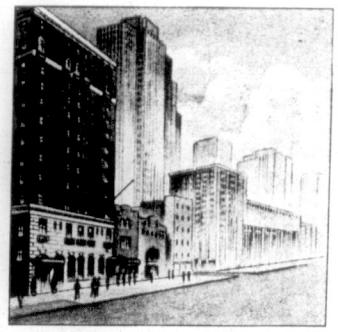
T. ELLIOTT TOLSON, PRESIDENT

JOSEPH E. BATH, MANAGER

Hotel Bristol



ADJACENT TO RADIO CITY

129-135 WEST 48TH STREET

New York

VISIT NEW YORK WORLD'S FAIR 1939 · · · MAY TO NOVEMBER

[1]

c/o Thomas Cook ans Son
San Francisco, California
August 20,1939

Mrs. T. D. Macmillan
150 Fifth Avenue
Ginling College
New York, New York

Dear Mrs. Macmillan:

Thank you very much indeed for your letter dated the 16th of August. I have already sent a copy each of the letters of recommendation from Prof. Hopkins and Dr. Needham, a list of my publications, past experience and an application together with your enclosed letter to Professor Rufus yesterday.

Since the end of the Pacific Science Congress (August 12) I have been kept busy most of the time visiting the universities and hospitals, with the view of getting something for next year. So far I have had cardial invitaions to use the laboratory facilities both at the Stanford University (through the curtsey of Dr. J. Murray Luck) and at the University of California (thorugh the curtsies of Dr. A. F. Morgan, Home Economics and Prof. Evans of the Institute of Biology). Before I left Europe I had words from Professor Hastings of the Dept. of Biochemistry, Harvard Medical School that I could make use of the facilities of his laboratory. The question at present is to secure some fellowship or a job to assist my living expense etc. Every one of the above mentioned and Mr. Roger S. Greene have tried their level best to obtain a grant for me from various institutions. Unfortunately there is no sign of any possiblity for the fact that all fellowships were awarded before the end of June. I am very excited to know that you may hear of last-minute vacancies or other possiblities from other universities and foundations. I shall be very glad to send in the necessary papers for applications if you would let me know of the address.

In order to save time I enclose a copy each of the papers for you to send it onwards if necessary. In the event I do get a grant of some kind I should like to work at Harvard Medical School. Of course I realize that I have to be working at what-ever place the grant is intended for. Michigan would be a very nice place too.

With best wishes to you and your staff especially Miss Ewing.

Sincerely yours
Lu Gwei-djen
Lu Gwei-djen

[27]

COPY

UNIVERSITY OF CAMBRIDGE,
SCHOOL OF BIOCHEMISTRY

Telephone: Cambridge 4361
Reference:

SIR WILLIAM DUNN INSTITUTE,
TENNIS COURT ROAD,
CAMBRIDGE.

28th June 1939

Miss LU GWEI DJEN has worked in this Department for nearly two years, and has obtained the degree of Ph. D. of this University. I have acquired a very high opinion indeed of her talents, which are quite exceptional. She has displayed great industry and quite unusual skill as an experimentalist. Her knowledge of the general field of Biochemistry is remarkable, and she has displayed sound critical judgement in dealing with the problems she has worked at. In sum, I would like to say that I think her one of the most intelligent students who has ever worked in my Department.

I may be allowed to add that her courtesy and her charming personality have made her presence in the Department most welcome to all her colleagues.

/s/ F. Gowland Hopkins
O. M., F. R. S.

Professor of Biochemistry.

[1]

UNIVERSITY OF CAMBRIDGE
SCHOOL OF BIOCHEMISTRY

Telephone: Cambridge 4361
Reference:

Sir William Dunn Institute,
Tennis Court Road,
Cambridge.

June 1939

It is a pleasure for me to write a general letter in recommendation and appreciation of Miss Gwei-Djen Lu, who for the last two years has worked as a scientific investigator in this Institute, and taken the degree of Doctor of Philosophy here. All those who have come in contact with her have been deeply impressed by her scientific ability, technical competence, and high intellectual standing. We are fully convinced both of her capability for first-class Independent research (for she has made herself widely known as an authority of vitamin B_1-deficiency) but also of her power as an organiser of research and teaching. Of this she had several years' experience in China before coming to Cambridge. Her experience at Shanghai, too, gave her unusual opportunities of seeing the clinical side of biochemistry. In a word, we believe that as time goes on she will become, given reasonable chance, a biochemist of acknowledged standing and a great credit to Chinese science.

/s/ Joseph Needham

Sir William Dunn Reader in Biochemistry,
University of Cambridge

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LIST OF PUBLICATIONS: 1934-1939

"The occurrence of creatinuria in adult Chinese males."
Far. East Assoc. Trop. Med., Nanking,(1934), L, 379-386

"Pathological creatinuria."
Far East Assoc. Trop. Med., Nanking,(1934), 11, 605-619

"The study of rice."
Proc.3rd. General Conf. Chin. Med. Assoc., Canton (1935)

"Intermediate carbohydrate metabolism in vitamin B_1-deficiency in man."
Proc. 3rd. General Conf. (Physiol.), Chin. Med. Assoc.,Canton, (1935), pp.18

"Chemical and clinical findings in beri-beri with special reference to vitamin B_1-deficiency."
Quart. J. Medicine (1936) N.S. 5, 355-373

"Identification, Estimation and Excretion of pyruvic acid in urine of apparently healthy individuals."
Proc. Chin. Physiol., (1936), 11,

"Pyruvic acid and bradycardia in vitamin B_1-deficiency in rats."
Proc. Chin. Physiol., (1937), 12, 494

"Intermediate carbohydrate metabolism in vitamin B_1-deficiency with special reference to cardiac changes."
Kongressbricht 11, XVIth International Physiol. Congress, Zurich, Switzerland.

"The specificity of coupled esterification of phosphates in muscle."
Biochem. J. (1938), 32, 2043-2048

STUDIES ON THE METABOLISM OF PYRUVIC ACID IN NORMAL AND VITAMIN B_1-DEFICIENT STATES

"I. A rapid, specific and sensitive method for the estimation of blood pyruvate." Biochem. J.(1939),33,249-254
"11. The blood pyruvate levels in the rat, pigeon, rabbit and man."
"111. The relation of blood pyruvate to cardiac changes."
Biochem. J. (1939), 33, 774-786
"IV. The accumulation of pyruvic acid and other carbonyl compounds in beri-beri and the effect of vitamin B_1.
Biochem. J. (1939), 33, in the press.
"V. The effect of exercise in vitamin B_1-deficiency."
Biochem. J. (1939), 33, in the press.

"Nutritional studies on Industrial workers in Shanghai with special reference to vitamin deficiencies."
Proc. Sixth Pacific Science Congress: Section of Nutrition and public health, (1939).
"History of Chinese Dietects." Isis (1939), in the press.
"Pyruvie acid and muscle metabolosm in normal and vitamin B_1-deficient states."
University Liberary, Cambridge, England.(This is a dissertation of 188 pages.)

Past Experience

1926	B.A. degree, Ginling College, Nanking, China
1926-1928	Studying physiology, biochemistry, and clinical laboratory sciences in Peiping Medical College, Peiping, China.
1928-1933	Instructor of biochemistry and physiology of the Woman's Christian Medical College and Medical College of St. John's University, Shanghai, China.
1933-1937	Biochemist and sinior assistant of the Department of Medicine of the Clinical Division of Henry Lester Institute of Medical Research, Shanghai, China.
1937-1939	Research fellow of the Henry Lester Institute of Medical Resezrch working in the Sir William Dunn Institute of Biochemistry, Cambridge, England.
1939	Ph.D. degree, University Cambridge, England.

1934	Lester Institute's delegate to the Far East Association of Tropical Medicine, Nanking China.
1938	Chinese National Physiology Society's delegate to the XVIth International Physiology Congress, Zurich, Switzerland.
1939	Delegate of the Ministry of Education of the Chinese Republic to the Sixth Pacific Science Congress, Berkeley, Stanford, and San Francisco and California.

send address this day [17]

Institute of Experimental Biology
University of California
Berkeley, California

August 31, 1939

Mrs. T. D. Macmillan
Ginling College
150 Fifth Avenue
New York, N. Y.

Dear Mrs. Macmillan:

Thank you very much for your letter of the 28rd August and the telegram. I can never be sufficinely grateful for all that you and some other friends have done for me since I landed this country. It is a great pleasure to know that the sympathy of the people in this great land is with the Chinese although politics appears to be the other way.

It was last Friday when Dr. Evans first mentioned of a slight possibility to arrange a special fellowship for me to stay and do research in his department. He was very anxious that I should be given opportunity to continue research yet he had no more vacancy in his institute. However, he took great pains to arrange with the authorities of this university to give me a special research grant. It is a very small fellowship which includes a room in the International House here plus 600 dollars a year and exemption from all laboratory fees. He was very kind to say that he regreted that he could not secure a more liberal one for me. As you know Dr. Evans is the discoverer of vitamin E and certain hormones. Naturally his institute has the best equipments for vitamin research in animals. I am especially fortunate to have the excess of his already deficient animals to start the experiments right away, some of which take 18 months to get ready. My special problem is to find out the biochemical lesions underlying the clinical manifestation of muscular dystrophy in vitamin E deficient rats, and the effect of vitamin B1 and E mixed deficiencies on chemical changes in the muscles. While this is a almost new field of approach in vitamin E studies it is to be as interesting as the type of studies I have done with vitamin B_1.

Dr. Evans has been extremely kind to permit me to accept this specially arranged fellowship on a temporary basis for three months so that in case if I found a better opportunity for next year I should be in the position to accept it. At the same time I can go on with this one if no better offer is available. All this was arranged on the day your letter arrived and one day before your telegram. Although I was not able to consider the possible offer at St Lawrence University I appreciate your help just as much as if I had taken it. I am very sorry that I had to sent the telegram by collect as I had no time to get to San Francisco to take more money out before I sent the reply that afternoon. I wish you will let me the total cost so that I can send you a post money order for all.

With best wishes, Yours sincerely,
Lu Gwei Djen

8-31-39

P.S. Just now I am busy to firish up my research on the dystrophic [2] vitamin E-deficient rats muscles and writing up the paper for the 4th Convertion of American Physiologist Soceity to be held in New Orleans March 13-16. Since the beginning of 1940 I have had another appointment to work part time at the Haarman Research Laboratory of the S. P. Hospital. I am very fortunate that the S. P. Company has given me a free passage to go for the Convention. Thus I am leaving here on the evening of March 8, train 2, Sunset Limited, for New Orleans in order to be there in time to give my paper. Dr. Evens and my friends DR. Emerson and Dr. Okey are also going on the same train. As I work in the Institute of Biology only in the first three days of the week it will be better for you to send my letters to the International House, Berekeley, inorder to avoid delay. When I am on the train I may have time to write you more about my work. My best wishes to all.

G. H. Lee.

14 September 1939

Dear Miss Lu:

I do congratulate you on the good fortune of having secured the appointment at the California Institute of Technology. I hope it may prove the beginning of a very satisfactory connection for you.

I believe ydu will be hearing from some of your friends in this country when they have time to write. Last evening I had a delightful time with Deng Yu-dji, who is to study in New York University this year, and who is to live at Christadora House, 147 Avenue B; Wang Hsi-hsi, who is to continue at the Biblical Seminary in New York; Gao Ren-ying, who is to be at Boston University and live at 146 Commonwealth Avenue, Boston; Mrs. Mei Yi-pao(V.K.Nyi), who will be living for the next three months at 100 Ferry Avenue, Detroit while she studies at the Merrill-Palmer School; and Ong Hwei-lan, who is to be again a student at the University of Chicago. A sixth Ginling alumna, Li Gwan-yuen, is in New York but we could not get in touch with her. Miss Li is to study next year at the Westminster Choir School in Princeton, New Jersey.

Sincerely yours,

Mrs. T. D. Macmillan

EHM:am
Encl. "Ginling in America 1938-39"

Miss Lu Gwei-djen
Institute of Experimental Biology
University of California
Berkeley California

0155

Sent carbon copy of letter to Agnes Yin 26/11/40

UNIVERSITY OF CALIFORNIA
INSTITUTE OF EXPERIMENTAL BIOLOGY
BERKELEY

Nov. 21, 1940

Dear Mrs. Scott:

Many thanks for your letters. It would be very nice if the California members of the Ginling Family could arrange to hold a meeting to celebrate the Founder's Week. I am very sorry to say that I don't have the time to participate in organizing such a meeting, but I shall try my best to join one if it could be arranged.

Chang Hwei-lan is not in California now. She is studying in M. I. T., Cambridge, Mass. not very far from New York, may be shall can join your group.

With cordial greetings to you and all the members who are going to attend the celebration on December first.

Yours sincerely
Lu Gwei Djen

Gwei-djen Lu [1]

(Rec'd in Genetics Office 8/7/47

PUBLICATION LIST

The Occurrence of Creatinuria in Adult Chinese Males. Trans. Ninth Congress, Far East Assoc., Trop. Med., Nanking, 1934, 1, 379-386.

Pathological Creatinuria. Trans. Ninth Congress, Far East., Assoc., Trop. Med., Nanking, 1934, 2, 605-612.

Bisulfide Binding Substances in the Urine of Beriberi Cases--this may not be the exact wording as I don't have a copy in front of me now. Chinese Physiol. Soc. 10, Proc., (1935).

A Study on Rice, Proc. Physiol. Section of Chinese Med. Assoc., Canton, 1935.

Pyruvic Acid and Brady Cardia in Vitamin B_1 Deficient Rats. Proc. Chin. Physiol. Sec. 1937, 27, 1936.

Identification, Estimation and Excretion of Pyruvic Acid in the Urine of Apparently Healthy Individuals. Proc. Chin. Physiol. Soc. 1937, p. 663.

Bisulfite Binding Substances in Patients with Vitamin B_1 Deficiency (Can't remember the exact title) Quart. Journal of Med., (N.S.), 5, 335, 1936.

Report Henry Lester Inst. Med. Res., 1936, p.24.

Some Aspects of Pyruvic Acid Metabolism in Normal and Vitamin B_1-deficiency, with Special Reference to Cardiac Changes, Kongressbericht 11. XVIth Intern. Physiol. Congress, Zurich (1938).

The Specificity of Coupled Esterification of Phosphate in Muscle. Biochem. Journal, 32, 2040-2048 (1938).

Studies on the Metabolism of Pyruvic Acid in Normal and Vitamin B_1-deficient States.

(1) A Rapid, Specific and Sensitive Method for the Estimation of Blood Pyruvate Biochem. J., 33, 240-254, (1938).

(2) Blood Pyruvate Levels in the Rat, Pigeon, Rabbit and Man

(3) The Relation of Blood Pyruvate to Cardiac Changes Biochem. J. 33, 774-786, (1938).

(4) The Fate of Injected Pyruvate in the Normal Rabbit Biochem. J. 33, 1544-1548, (1939).

(5) The Effect of Exercise on Blood Pyruvate in Vitamin B_1-deficiency in Man Biochem. J. 33, 1538-1543, (1939).

(6) The Accumulation of Pyruvic Acid and Other Carbonyl Compounds in Beriberi and the Effect of Vitamin B_1 Biochem. J. 33, 1525-1537, (1939).

History of Chinese Diatetics. J. Isis, 1939.

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1947

PUBLICATION LIST-cont.

Vitamin B_1-deficiency States in China. Proc. 6th International Pacific Science Congress, San Francisco, California, (1939).

Chinese Contributions to Medical Science. Cambridge University Medical Society Magazine. (1940).

Adenylic Deaminase Activity in B_1-avitaminosis and in Starvation. Biochem. J. 35, 392-403, (1941).

Nutrition and Reconstruction in China* - a monograph with seven Chapters covering most of the essential facts up to the Spring of 1945, in press as a series from the International Labor Office.

Three papers on Changes of phosphorylation enzymes in Vitamin E-deficiency rats, in blood of patients with muscular dystrophy and in the muscles of Pellagrins were published in between 1941-44, but I don't have the reference here.

The Metabolism of p-dimehtylaminoazphbenzene in Rats and its Relation to Wasting. In press.

A Study of Soybean, its product and the nutritive value of Glycinin, In Preparation.

Remark: Some of the above mentioned papers were published in collaboration with Dr. B. S. Platt, others with Dr. D. M. Needham, and Dr. J. Needham. Others are by myself.

*Written together with Miss E. M. Hinder, formerly of the Industrial Division of the Shanghai Municipal Council.

1947

LIST OF PROFESSIONAL POSITIONS HELD SINCE COLLEGE GRADUATION

LU GWEI DJEN (This list includes the necessary information relative to researches previously pursued.)

1926-1928 Studying clinical laboratory technique, in biochemistry and physiology at Peking Medical College, Peiping.

1928-1930 Teaching assistant in Biochemistry at Women's Christian Medical College and laboratory superviser of the Margaret Williamson Hospital, Shanghai.

1930-1933 Instructor in Biochemistry and in Physiology of the Women's Christian Medical College and the Pennsylvania Medical School of St. Johns University, both in Shanghai.

1933-1937 Research assistant, Medical Department, Clinical Division, Henry Lester Institute of Medical Research, Shanghai. All research work done in those years was carried out in collaboration with Dr. B. S. H. Platt, as that was the beginning of the Medical Department. We started a modern medical clinic research unit and devoted our time to the studies on intermediate carbohydrate metabolism of pyruvate metabolism in normal and vitamin B_1-deficiency states. For results see List of Publications.

1937-1939 Research Fellow, Henry Lester Institute of Medical Research, Shanghai, working at Sir F. Gowland Hopkins' School of Biochemistry, Cambridge, England, concurrently a graduate student of the University of Cambridge.

1939-1941 Research Fellow, Institute of Experimental Biology, University of California, Berkeley, California and The Harriman Research Laboratory, San Francisco. In Berkeley, studies on the constitutional and enz yme changes in the muscles of the vitamin E-deficient rats were carried out. At the Harriman Research Laboratory studies on the effects of adrenal cortical extract muscle enzymes and on tumor tissues of hosts with marked changes in carbohydrate metabolism.

1941-1942 Research Fellow, Nutrition Clinic, Hillman Hospital, Birmingham, Alabama, Independent studies were carried out on biochemical lesions in the blood and tissue of Pellagrins.

1942-1945 Research Fellow, International Cancer Research Foundation, Philadelphia, Pa., working at the Biochemistry Department of the College of Physicians and Surgeons, Columbia University, New York, U. S. A. Concurrently consultant on nutrition problems of the Far East, Department of Agriculture, Washington., D. C.

The research problems of this period were: (1) The possible relation of malnutrition and vitamins deficiency to cancer of the liver; (2) The metabolism of 2; 4 dimehtylaminoazobenzene, (Butter Yellow) and its relation to the wasting as seen in rats with cancer of the liver and (3) The problem of planned nutrition in reconstruction in China. The last item had a special grant from the International Labor Office, Montreal, Canada.

1945-1947 Adviser on Nutritional Science and Biological Sciences for the British Council in London to work in China with the British Council Science Office in Nanking, headed by Dr. Joseph Needham until his departure for office in UNESCO. Since the fall of 1946 I have been also Professor of Nutritional Science in Ginling College.

1947

My term of office with the British Council ended last January and I am now with Ginling College, spending part of my time in writing up some of the work that was carried out in the U. S. A.

Special Note: In 1939, I went to the U. S. A., from England to attend the 6th Pacific Science Congress, San Francisco, California as a Fellow of Academia Sinica and Official Delegate of the Ministry of Education of the Republic of China. The other delegate to the Congress was Dr. Chao Yuan-ren.

July 1947: Invited by UNESCO and the Organizing Committee of the International Physiological Congress to attend the 17th meeting to be held in Oxford, August 22-23.

Ginling

Lu Mei-ying

1937-40

Lu Mei-ying
Linling, 1937

DEBUT AS AIR STEWARDESS

The daring young Chinese girl has embarked on a new career. Forsaking the solid safety of the ground, she has now joined the ranks of China's navigators of the air.

Petite, pretty, and charmingly attractive in trim uniforms, the China National Aviation Corporation's air hostesses accompany its passengers from Hongkong to Chungking, to Kunming and Rangoon.

Travelling in one of this company's giant, steady Douglases is a satisfying thrill in itself. The presence of a calm companion, reassuring in her smiles and small attentions to one's comfort, now turns the voyage across the vast spaces over China's territory into fast-flying hours of complete luxury and relaxation.

Out of the five girls who were enrolled last April 15 to start this new service, three have remained to pioneer in this new field for Chinese women. Many were the applicants, but a rigid examination eliminated most of them who did not fulfill the requirements of being registered nurses, able to speak good English, the national language and the Shanghai and Cantonese dialects.

While the ship is speeding at the rate of 250 miles an hour, the air hostess serves the passengers with sandwiches and coffee or tea. She ministers to those affected by the altitude, and adjusts the seats into angles more conducive to dozing or reading.

Though she has had only half a year of experience in her work, her efficiency has already made her an essential part of the corporation's personnel.

The China
FORTNIGHTLY
Vol. II No. 7, October 16, 1940

Letter to KBMacmillan from Mrs. Way-sung New (Tsu Ih-djen, Ginling, 1919), Oct. 31, 1940

* * * * * * *

Yesterday we had our first meeting to talk about what should be done here in Hongkong to celebrate quietly yet conspicuously enough to make a few distinguished leaders more aware of Ginling and her history.

One of our girls, Miss Lu Mei-ying was wounded in the C.N.A.C. Douglas passenger plane attacked by the Japanese. We were having our meeting in the home of Mrs. Ma, Lu Mei-ying's sister, when the news came, and we continued with the discussion of the Anniversary program. Later on Miss Ivy Ho whispered to me: "Bad news; Lu Mei-ying has died." That was shocking. Then Mrs. Ma collapsed in my arms and wept bitterly. Of course, all our plans of the 25th Anniversary were forgotten for the time. But later we gathered up our senses and carried on just the same and finished the meting.

The afternoon will never be forgotten. It was hard for Mrs. Ma because last October we were holding our meeting in her home when the news came of the death of the older sister in Chengtu, and she carried through the meeting calmly.

Mei-ying had served as hostess on the air routes for six months, giving excellent service on the trip between Hongkong and Chungking. She had resigned at the request of her husband, but had accompanied this trip on the urgent summons of the officials of the line. She went in good second-mile spirit, but she was caught in the tragedy. The attack was by five enemy planes.

* *

Note: Lu Mei-ying left Ginling at the completion of her pre-nursing studies and took her diploma in nursing at the Peking Union Medical College in 1938. Her family home before the war was Nanking.

the Class of 1937

Excerpt from letter of Frank Price to Helen Loomis
Chengtu, November 1, 1940

On October 30,
~~Recently~~ Japanese planes shot down a Chinese passenger plane flying between Chungking and Kunming. The American pilot and seven Chinese passengers were killed. The stewardess, Miss Lu Mei-ying, was severely injured and died the next day. She was a bright and winsome Christian girl, a graduate of Ginling College and P.U.M.C. Nurses Training School. Her aged parents, Mr. and Mrs. Lu Sze-ching, are in Nanking. Her mother was one of my mother's first pupils more than fifty years ago in Hangchow. I traveled on the same plane with Miss Lu from Kumming to Chungking in August, and I can still see her waving me a cheery good-bye as I stepped out of the plane at Chungking. Now she is another victim of Japan's cruel might which America helped to arm.

(Mr. Lu Sze-ching was a pastor in the Christian Church.)

Jinling

Lu Shuh-Chin

1945 -

DEC 1945

Lu Shuh-chin

How the War Affected My Family

In the old days when I was a little girl, I was always proud of my home because it seemed to me it was the happiest one, full of love and sympathy, though it was neither rich nor grans. It was in a city right where two railways crossed in North China. In a little house well-equipped we lived happily and comfortably. Because it was in the northern part of China sowe could escape the hot summer of southern regions, and in winter skating gave us much joy. Our family consisted of my parents, three brothers, three sisters and I. Father was a railway engineer. The family was happy and thriving.

But when the war broke out, my father's work ceased; because he had worked by contract, he was obliged to pay a large amount of money when his contract was not fulfilled. He sold some of his houses to pay this debt. In the second year of the war, all our houses in another city were demolished by bombs. The city where we were living came to be nearer and nearer the front, so we moved to north-west China. In this new place we were very uncomforatble, and news came that our native city was occupied by the Japanese. Whereas we had had spacious rooms before the war, now one small room became bedroom, dining-room , guest-room where the whole family crowded together for all activities of life. It was not long before my mother died of grief. My elder sister and her husband were captured by the Japanese in the occupied area and died of harships. My younger brother was killed by the enemy because he was discoverd doing some spying work. These losses the war has brought me.

- Lu Shuh-chin

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Ginling

Lu Shah-ying

(Mrs. T. T. Mar)

Timothy

Mt. Holyoke College,
South Hadley, Mass.
June 7, 1932.

Dear Miss Griest:

I hope that you will understand that it was because of my work that I have never been able to write you. I just finished my thesis last week and am preparing for my Master's examination this week.

It has been so nice to have Dr. Hackett here so that once in awhile we could get some news of our Ginling faculty and friends both in China and in other countries, from her. I think perhaps you have already heard that Ho I-djen is here taking graduate work in the Chemistry dept.. Tang Ming-sin is now studying at Smith College. She enjoys the college life there very much.

I received a letter from Miss Mary Thayer last week asking me to go to Smith College to give a short address to their '' Ginling Meeting '' on June 19. She said that they would like very much if I could tell them what some of the G. C. girls are doing after graduation. I wonder, Miss Griest, if you have heard recently what some of the alumnae are doing at present. The latest letter I got was at Xmas time and I know there are lots of changes since the war in Shanghai in March.

I was hoping to stay for two more years to finish my Doctor's degree at Bryn Mawr since I have been granted a scholarship from there for the next year. The last letter I got from my parents asking me to go back home this summer. They thought that I should teach for a few years before I work for my advanced degree. Since I get my M. A. this June so I think perhaps it will be better for me to stop and get some experience before I go on to study. I wonder, if there is any chance that Ginling College will need any Physics and Mathematics teacher for the coming year. Since I am planning to study summer school at Columbia University this summer, so I am afriad perhaps it will be too late for me to apply after I arrive Nanking. Do you think it is wise for me to send a cable to Ginling to inquire for it ? I nope that you will let me know what I canedo. I know that this is cuite late but I am sorry to say that I did not receive the letter from home until yesterday.

JUN 7
1932

If you would like to have some information concerning my academic work please write to either Professor Rogers D. Rusk, under whom I take most of my graduate courses and do my research work, or Prof. E. R. Laird who is the Head of the Physics Department.

Miss Griest, I am sorry to trouble you with this. My father wrote me saying that Mr. David Hsaing had been inquiring him about my returning to Ginling. Since by that time I was having my plan definitely made to stay here so my father did not make arrangement with him. I don't know whether or not this is too late to ask them.

I am so glad that I can have the chance to go to Columbia University this summer so that I can see Fan Gwan very often and probably we shall stay together. Wish very much that you could be in New York sometime this summer so that we can see you before we leave America.

With best wishes,

Very sincerely yours,

Shuang-i Lu

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Mar, Mrs TT

3610 Jocelyn St., N. W.
Washington, 15, D. C.
April 27, 1948.

Dear Miss MacKinnon:

Thank you for your letter and the little pamphlet on recent conditions at Ginling College. In reply, I like to inform you that I have already made my contribution directly to Ginling just recently in Nanking.

A Church Woman's Club here in Washington has asked me to speak to their meeting on May 11th. I understand the ladies of this club are giving financial help to one of our Ginling graduates who is now doing social service work in Nanking. Therefore they would like very much to know more about Ginling and the kind of work that her graduates are doing in China. Will you kindly send me some material on the history of Ginling College and also the reports on their social service work at your early convenience? If you could spare a few pictures I think they would prove interesting to the audience.

Thank you for your attention.

Sincerely yours,

T. T. Tu Mar.

(Mrs. T. T. Mar)