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Contributions of Filipino Scientists to the Basic Medical Sciences

JUAN SALCEDO JR. M.D., M.A.

THE contributions to the development and progress of the basic medical sciences in the Philippines by Filipino physicians, pharmacists, chemists and other scientists since the turn of the present century have been numerous and varied. To enumerate all of them and give even a brief summary of each and to assess its relative significance to Philippine medicine, public health and science would require months and even years of inquiry, compilation and evaluation. Hence, the present attempt, admittedly incomplete and superficial, is only a panoramic appraisal. Apologies are offered to Filipino physicians or scientists whose names or works may have been inadvertently omitted in this brief sketch. Several similar compilations have been consulted and their materials, text and style have been utilized. Acknowledgements are hereby expressed to the authors of these compilations.¹

¹ These compilations are: *The Golden Book of the Philippine Medical Association* Antonio S. Fernando ed. (Manila, 15 September 1953); Juan Salcedo Jr. *Chemistry in the Philippines* (Manila 1954) pp. 225-252 and 502-517; *An Annotated Bibliography of Nutrition and Related Topics* (November 1953); *Acta Medica Philippina* Vol. VI No. 3 (January-March 1950) to Vol IX No. 2 (October-December 1952); *Hygieniana Collection* compiled by Juanito G. Maquiso (August 1957).

ANATOMY

Research investigations in anatomy have included studies on physical anthropology, experimental hydrocephalus in cats, developmental abnormalities, neuromuscular endings, and effects on growth of the albino rat subjected to low-protein diet. These were made principally by Arturo Garcia, Juan C. Nañagas, Fidel Cuajunco and Marciano Limson.

BACTERIOLOGY

Onofre Garcia made extensive studies in the early 1930's in the serology of yaws and syphilis. Manuel Severino Guerrero in 1917 reported the first case of "Soduku" in our country. J. E. Montes in 1923 described the second case of "Soduku." Alfredo Pio de Roda and B. Caro in 1948 undertook a comparative study of the smear and cultural methods of laboratory diagnosis in urethral infections giving a successful isolation of *N. gonorrhoea* in 37 to 46% of positive smears; 11 to 15% of doubtful smears; and 2 to 4% of negative smears.

SALMONELLA

There were several studies made about the occurrence of *Salmonella* infection in the Philippines. Carlos Monserrat in 1934 described a case of typhoid-like infection from a fatal case and was able to isolate the organism as *Salmonella paratyphi* from blood culture. Alfredo Pio de Roda with the assistance of Z. Aviado-Tanquintic and M. Jimenez in 1951 collected during a period of fourteen months 64 cases of paratyphoid fever in the typhoid pavilion of the San Lazaro Hospital.

LEPROSY

The investigations in the field of leprosy were numerous and interesting. E. Mercado in 1914 introduced the injection of heterocyclic fatty acids of chaulmoogra oil as a treatment for leprosy for the first time in the history of the disease. Eloy V. Pineda and co-workers in 1930 proved the resemblance of clinical skin lesions in Philippine monkeys due to experimental inoculation with human leprosy material to some advanced lesions in man. This worker also in 1928 demonstrated that

ten out of eleven cases declared clinically "negative" were found to be bacteriologically positive at autopsy in smears from deeper organs, and that in 9 out of 53 cases smears of materials obtained from the femoral lymph glands were positive for the lepra bacilli. Jose N. Rodriguez in 1926 found *Bacillus leprae* four times in the cord and once in the placenta in fifteen specimens examined. Eloy V. Pineda isolated *Bacillus leprae* in the placenta and umbilical cord at Culion Sanitarium. Of the one hundred and four placentas studied, fifty-seven (or 53%) were found positive. In twenty-five cases (or 24%) the organism was discovered in the cord and not in the placenta. Cristobal Manalang in 1938 found non-acid fast forms of *Mycobacterium leprae* in leprotic lesions. Because of this finding, the presence of such non-acid fast forms tends to show the possibility of a certain phase of development in the life cycle of *Bacillus leprae*.

Later, in 1939 he showed that in the morphology of *M. leprae* the degenerative morphological changes tend to decrease while the percentage of total retrograde changes tend to increase. Manalang was of the opinion that a continuous contact of the organism with the anti-lepra drug is necessary for the subsequent degeneration of the lepra organism.

DIETARY STUDIES

Felix Hocson, collaborating with H. Aron in 1911, studied nitrogen and phosphorus metabolism of people subsisting on a rice diet. They showed that it is impossible to establish nitrogen equilibrium if the total calories are less than 1,800.

The first dietary survey made in the Philippines was done in Taytay, Rizal. It covered a period of three months and was published in August 1909 in the *Philippine Journal of Science*. Other dietary surveys were later undertaken by Manuel L. Roxas and his co-workers and are still being carried out by various government bureaus. Francisco O. Santos of the U.P. college of agriculture and his co-workers contributed extensively to the literature on dietary surveys. They studied the diets of people not only from the U.P. college of agriculture but also

from Manila, Ilocos Norte, the Visayas and Lanao. Significant contributions were likewise made by Isabelo Concepcion of the U.P. college of medicine.

Several tables of composition of Philippine foodstuffs were prepared for local use by Francisco O. Santos and Felipe Adriano, by Isabelo Concepcion, and lately by the staff of the Institute of Nutrition, namely Carmen Ll. Intengan, L. G. Alejo, Isabel Concepcion and others. To my knowledge this series of studies which appeared in the *Philippine Journal of Science* (1953-1956) is one of the most complete, involving the analysis of 2,206 food samples.

The earlier analysts of foods include Felipe T. Adriano, Ariston Hermano, Francisco Agcaoli and Abelardo Valenzuela. Joaquin Marañon of the Institute of Science and Technology (formerly Bureau of Science) made considerable studies on the inorganic constituents (such as calcium, iron and phosphorus) of common foods while Aurelio Cruz also of the same Institute analyzed the composition of edible Philippine oils.

The studies on vitamin contents of foods were infrequent and generally qualitative in nature, by the same workers doing food analyses, especially by Ariston Hermano. The U.P. college of pharmacy under the leadership of Patrocínio Valenzuela and Alfredo C. Santos gave significant contributions to contemporary science in the production and assay of tikitiki extract. Isabelo Concepcion and his assistants undertook a series of determinations of vitamin C in fruits and in human blood. Since 1953, as a part of their work on food composition, mineral and vitamin assay was carried out quite extensively by Carmen Ll. Intengan, L. G. Alejo, Isabel Concepcion and others in the Institute of Nutrition.

URINE AND BLOOD

Researches on the determination of normal values of certain constituents for urine and blood were largely contributed by workers from the U.P. college of medicine, starting with the establishment of normal standards for urine and blood. Isabelo Concepcion pioneered in this work and up to his death in 1952

was the greatest contributor. Other investigators in this research include Ernesto Paras of the Culion Sanitarium, Jose F. Leyva of the Quezon Institute and Regino Navarro of the Philippine General Hospital.

In 1923 Isabelo Concepcion made public some notes on the blood sugar content of Filipinos. In 1927, together with Mariano Ocampo, he found that the non-protein nitrogen values for Filipinos was lower than those for Americans.

Between 1938 and 1940 Concepcion and his co-workers published a series of studies on the vitamin C content of the blood and urine among Filipinos: normal subjects, pregnant and nursing women, and subjects with pathological conditions. In a study which he made jointly with Sofia Bona de Santos in 1940 he noted that the average figures for serum proteins of Filipinos were within the normal limits observed by different workers on other Oriental subjects and Europeans. Hematology among Filipinos, according to the studies made by Potenciana Cabigting-Chavez (1930) and Regino Navarro (1937), showed, in general, distinctly lower hemoglobin values and red-blood-cell counts than American standards.

MILK

Mariano Ocampo observed in 1932 that mother's milk contains less casein and residual nitrogen and more lactalbumin and lactoglobulin than carabao's milk. In mother's milk these latter constituents are about four times its casein content. This explains why a small protein intake, as supplied by breast milk, satisfies the entire protein requirements of the infant while twice the amount is needed when diluted cow's or carabao's milk is given.

DIETARY ALLOWANCES

One of the most important developments during this period was the formulation of dietary allowances for Filipinos. Isabelo Concepcion in 1923 reviewed all the existing knowledge on food requirements for the country. Together with Ariston Hermano and Marciano Gutierrez (1939) he advocated standards for Filipinos, based mostly on those of the League of Nations. These

were approved by the National Research Council of the Philippines on 23 June 1939.

Francisco O. Santos and Marciano Gutierrez (1938, 1939) were also responsible for our knowledge of food consumption in the city of Manila. A close relationship among income, food cost, and the nutritive values of the diet was observed. City residents had a lower energy, carbohydrate and mineral intake, but they consumed more fat and protein of better quality than people in rural areas.

The diets of special groups were also examined. Subjects of study by separate groups, led by Francisco O. Santos and Isabelo Concepcion, were the diets of students in government institutions, of athletes, and of army personnel.

Isabelo Concepcion in 1940 summarized the results of these studies as follows: The diet of the Filipinos, while in some cases sufficient in quantity, is deficient in quality and in balance. The quality of the protein is poor; it is deficient in calcium, in vitamin A, B₁, riboflavin and vitamin C. Many times, it is deficient in iron. The fat intake is quite low. The proportion of animal protein to total protein is only one-third or even less. The milk consumption of the children even among the well-to-do is very low. The consumption of vegetables and fruit is quite low, while the consumption of meat among the well-to-do is quite high.²

DEFICIENCY DISEASES

Deficiency diseases, aside from beriberi, began to be recognized in the early thirties. E. Gamboa (1930) led the reports on vitamin A deficiency, followed by C. Ayuyao (1937) and A. Tupas and L. Pecache (1938) on keratomalacia in children. In the last year of this period a striking increase in the morbidity of avitaminosis A between the period of 1941 to 1945 was observed by Ocampo and Herrera.

The first few cases of a disease in Mindoro called "lapnus," which is similar to pellagra, were reported in 1938-39 by Leoncio Lopez-Rizal and Dychitan. Pellagra however is rare in the

² Isabelo Concepcion *Acta Med. Phil.* V (1940) 16

Philippines, even in the corn-eating areas like the Visayan Islands.

SOMATOMETRIC DATA

As early as 1926 S. Siasoco and E. Goco published a height-weight table for boys and girls. Other important growth studies include those of E. Bulatao, I. Concepcion and others in 1933 and of M.C. Icasiano and F. Z. Cruz in 1939.

NUTRIENTS

By 1941 Adelaida Bendaña-Brown and her co-workers at the U.P. department of chemistry, had already been engaged in determining the availability of nutrients in foods.

In 1940 Solita F. Camara-Besa demonstrated the lowering of vitamin C content of the blood plasma during pregnancy and lactation, but not to the same marked degree as reported by other workers abroad. Camara-Besa and her co-workers are at present busily engaged in studies on cholesterol and nutrition. She had published many interesting and informative articles since 1953 on sodium and potassium methods, their occurrence in foods and their levels in blood.

In 1950 E. Stransky, G. Aragon, and D. D. Lawas found plasma iron deficiency among Filipino pregnant women in Bataan and in Manila.

In 1952 Gregorio D. Samson obtained liquid glucose from cassava starch.

In 1953 E. Stransky and co-workers reported that the iron content of the fetal blood is higher than the iron in the maternal blood.

In 1949 F. Bocobo, G. Aragon, D.D. Lawas and J. A. Silva demonstrated for the first time that pregnancy may be detected by the use of the Philippine *Rana vittigera* Wiegmann with fairly great accuracy.

PHYSIOLOGY

Among outstanding contributions in physiology are those of Emilio Bulatao, Narciso Cordero, Jesus Celis and Wenceslao Pascual. Bulatao made valuable studies on the physiology of

the stomach, the adrenal medulla and of the circulation. Cordero undertook extensive researches on respiration and blood chemistry, alveolar CO₂ tension and muscular exercise, posture on p.s.p. test for kidney function, etc. Celis did plenty of work on circulatory physiology, the central nervous system and endocrinology. Pascual published many articles on blood groups, industrial fatigue, CO₂ on nerve impulse, coronary circulation, etc.

PARASITOLOGY

Candido Africa in a series of papers published together with Eusebio Y. Garcia and Walfrido de Leon in 1935-1937 described the discovery and relationship to heart disease of an obscure fluke, the heterophyds. Africa made also many valuable contributions on the life cycle of the ascaris and the epidemiology of schistosomiasis japonica.

The life cycle of *Euparyphium ilocanum* was worked out by Marcos Tubangui before the last war. He discovered also the intermediate host of *Schistosoma japonicum* in Palo, Leyte. Tubangui, collaborating with Benjamin D. Cabrera and Mariano G. Yogore Jr., published in 1950 studies on the life cycle of the human lung fluke (*Paragonimus*) in the Philippines. Other studies on paragonimiasis were made by Mariano G. Yogore Jr., B. D. Cabrera and others in 1956-1957 giving more information on this parasite and the illness it produces. Howard F. Smith, Francisco J. Dy, Deogracias J. Cabrera and others made outstanding contributions (1947-1950) on the therapy of malaria, the breeding habits of *Anopheles minimus flairostris*, pictorial keys for the identification of Philippine anopheline larvae and adults, use of smoke generator for mosquito and fly control, and the Smith automatic siphon. Trinidad P. Pesigan made an exhaustive analysis of 4,302 cases of schistosomiasis japonica in 1951. He with his co-workers proposed in the same year an intradermal test for this disease and later made hematological studies of this malady, studied liver function tests and evaluated fuadin therapy.

PHARMACOLOGY

The development of pharmacology as a basic medical science in the Philippines started in 1903 with the publication

of *Medicinal Plants of the Philippine Islands* by the very distinguished Filipino botanist, Leon Ma. Guerrero. Proceso Gabriel, a government physician, was credited with starting the treatment of beriberi with tikitiki even before 1906 when E. Vedder and Robert R. Williams manufactured tikitiki extract. Manuel S. Guerrero in 1911 investigated the influence of beriberi milk on frog heart. From 1918 to 1921 Faustino Garcia, later followed by Romulo Guevara and Jose E. Jimenez, pioneered in the use of biological assay methods in the country, especially on digitalis, ergot and related drugs. In 1921 Daniel de la Paz, the dean of Filipino pharmacologists, studied the alleged anthelmintic property of niyug-niyugan and introduced the method of study generally known now as "ascarigram." He made many important contributions in physiology and pharmacology principally on experimental human nutrition, apomorphine, emotional stimulation of adrenals, regulation of blood sugar, astringents, liquid petrolatum and other subjects.

From 1922 onwards Faustino Garcia and Romulo Guevara, who with their associates are the principal contributors to the studies on the action of local medicinal plants, made pharmacodynamic studies with physiologic assay of talampunai, kalimatatas, duhat, tanga-tanga oil, dita bark, etc. Conrado Dayrit, a promising and energetic pharmacologist-cardiologist, did highly valuable work in 1947-1948 on hexaethyl tetraphosphate, thevetin, digitalis glucosides, quinidine, ouabain and various cinchona alkaloids. In 1951 Eduardo Quisumbing, an internationally known Filipino botanist, published his *Medical Plants of the Philippines*. Another promising young pharmacologist-physiologist is Agustin P. Sevalle who, with Homobono Calleja, Ignacio Castro and A. Chan, began since 1949 intensive investigations on pH of blood in diseases, sympathectomy, progesterone, hypothalamus, physiological and chemical antidotes, antibiotics, and similar topics.

The contributions to the related sciences of physiology and pharmacology would certainly be incomplete if we fail to mention the works of Jesus B. Nolasco, a well-trained physiologist, on the phrenic nerve, acute cardiac failure due to posterior pituitary extracts, Ishihara test for color perception, auriculo-

ventricular conduction, surgery of congenital heart diseases and very lately on "bangungot."

PATHOLOGY

According to Benjamin Barrera, present head of the department of pathology, college of medicine, University of the Philippines, this department was established as one of the basic sciences of the medical school when this was organized in 1907. Barrera writes that

During that time until 1923, the headship of the department was in the hands of Americans with Filipino professors under them. This small group of Filipino pathologists can rightly be called the nucleus of Philippine Pathology as from this pioneer group came out teachers of pathology in different universities and hospitals. Dr. Liborio Gomez was the first Filipino appointed to occupy the chairmanship of the department. Even as an undergraduate in the Rush Medical School in Chicago, Dr. Gomez had contributed important studies in pathology. He was co-worker with Dr. Ricketts, Assistant Professor of Medicine of the University of Chicago, when they made studies on Rickettsial diseases. Dr. Gomez also made valuable contributions in the study of Rocky Mountain Spotted fever, diphtheria and cancer in the Philippines. During her incumbency as professor of pathology, Dr. Maria Paz Mendoza-Guazon described for the first time the pathologic changes seen in the well known but enigmatic entity called Bangungot. With her studies, the interest in this condition was aroused and until now, studies of this condition are being carried out. Another ranking member of the department who made contributions in pathology may be mentioned: Dr. Walfrido de Leon, now head of the Department of Laboratories, Department of Health. He was interested in cancer and other malignant tumors and put out informative statistical data on the incidence of this tumor among Filipinos. He collaborated with Dr. Africa in their studies on heterophidiasis in the heart. He envisioned and gave life to the now well known Alabang Serum Laboratory where sera and vaccines are manufactured. Dr. Juan Z. Sta Cruz was likewise interested in cancer, and repeated the experiments of Japanese workers in producing liver cancer in rats by feeding them with butter-yellow.³

Barrera himself made studies on the pathology and bacteriology of ileo-colitis among Filipino children, cirrhosis of the liver and reported the first case of cat-scratch disease in the Philippines. Jose Nolasco and Casimiro Lara made considerable contributions in the study of leprosy in Culion. Regino J.

³ Benjamin Barrera in a personal communication, September 1957.

Navarro's contribution in pathology is his study on bilirubin in the blood in various clinical conditions.

On the whole, the medical and allied professions of the Philippines have justifiable cause to be encouraged by the research achievements of their members. We can look forward to an even more productive future so that clinical medicine and the related disciplines could be of more effective assistance to our people.