Award of Medals

The Sixty-ninth Annual Award of Medals was held on Monday, June 11, 1979, at 10:00 a.m., in the presence of His Majesty the Emperor.

The function was opened with an address by the President, in which he made a brief statement of each award. Then, the Medals and Prizes were presented to the respective recipients.

After this, congratulatory addresses were given by the Prime Minister and the Minister of Education.

The function was closed at 11:15 a.m.

The Recipients of the Prizes and the Subjects of their Studies

Yoshihide Kozai

Studies of Motions of Saturnian Satellites, Artificial Satellites, and Asteroids

Kozai started his research by studying motions of Saturnian satellites by a matrix integration method, and then analyzed observations of Saturnian satellite positions including those deduced by himself by applying his new theory. Thus he derived a new set of the orbital elements of the satellites and further derived the masses of the satellites as well as the value of the oblateness parameters of Saturn. This work contributed to a revision of the ephemerides of Saturnian satellites.

In 1958 the Smithsonian Astrophysical Observatory, which was responsible for the optical tracking project of artificial satellites in the United States, invited Kozai to stay there. During his stay he engaged in the analysis of data of satellite trackings collected there to derive information on geodesy by determining the orbital elements and detecting their variation. In the process of the analyses, he developed theories of the main problem of the satellites, determined gravitational effects due to the sun and the moon, and calculated solar radiation pressure effects on satellite motions. Then he derived coefficients of spherical harmonics up to more than 20th order in the expression of the geopotential. As a pioneer in this field called satellite

geodesy, he was invited by several research institutes to give lectures on these subjects and was nominated to important positions in the International Astronomical Union, the Committee of Space Research and the International Union of Geodesy and Geophysics. He also tried to detect any temporal variations of the geopotential by using satellite tracking data and succeeded in separating out tidal effects thus deriving a new value of one of Love's numbers of the earth.

Kozai studied motions of asteroids and satellites with high inclinations by various aspects. He was the first who could find several groups of periodic orbits of the third sort discussed theoretically by H. Poincaré. And he developed a theory of secular perturbations of asteroids with high inclinations and/or eccentricities by including higher degree terms in the disturbing function and found a mechanism indicating how such asteroid motions become stable, namely, a mechnism enabling such asteroids to avoid any very close approach to Jupiter. Then he proposed a new and more appropriate method to group asteroids into families by adopting a new set of parameters relating to the inclinations besides the semi-major axes and tried to explain the origin of the families by a dynamic perspective.

Koichiro TAKASE

A Study of the Christian Century in Japan

Many works have hitherto been published, both at home and abroad, which treat of the growth and decline of Catholicism in old Japan in the days preceeding its adoption of isolation policy. In those studies, it seems, the writers' interest centers about such matters as the growth and expansion of missionary work, persecution in the latter period, the thoughts and ideas of the missionaries and believers who contributed to the growth of missionary work, and the changes in the organization of the church.

In the present volume the writer approaches the subject from a different angle, focusing his attention on another important aspect, that is, the economic side of the activities of the Jesuits which constituted the main body of the Catholic mission work in old Japan. He spent years in hunting out a large amount of relevant data from unpublished documents in the Archives of the Society of Jesus in Rome as well as a vast number of documents and records owned by various archives and libraries mostly in Southern Europe. Through careful investigations and systematic interpretation of the materials collected, he tries to clarify some of the characteristics of the activities

of early Christian missionaries.

The book consists of two parts. Part I is made up of three introductory chapters and Part II ten chapters which constitute the main part of the book, in which the writer estimates in detail, making use of minute quantitative data, such basic factors of missionary work as the expenditure, assets and liabilities of the church. Then he proceeds to give a full account of the methods the church adopted to raise funds and arguments for and against them within the church, and makes investigations on the landed properties the Jesuits in Japan possessed in various parts of India, estimating the incomes they drew from them and throwing light on the way the money was spent. Next, he makes close inquiries about the fathers who successively took charge of financial affairs, giving a detailed and clarifying account of their functions and the improvement of their position in the church. A careful examination is also made of the intermediary actions performed by missionaries in overseas trade. The writer then investigates the role missionaries played in raw silk trade which formed an important part of Portuguese merchants' trade with Japan, and estimates the yearly amounts of the trade the church itself handled taking advantage of the Portuguese merchants' trade with Japan and the profits the church reaped, which, he demonstrates, constituted a very important portion of its revenues reaching ordinarily an amount large enough to cover two thirds or more of its expenses. Another aspect of the subject looked into is the intermediary activities in overseas trade and internal business activities in Japan which without the approval of the Society some Jesuits personally took part in, besides the approved commercial activities, with the intention of contributing to missionary work, and criticisms such unauthorized activities invited.

To sum up, the present volume is a fruit of very elaborate and painstaking researches the writer conducted, making full and free use of a large number of unpublished source materials, in various aspects of the economic activities of the Society of Jesus, the area of study he is the first to explore in this country though only a few related points have been touched upon by some European scholars. The work is to be highly valued as a positive achievement which has broken fresh ground in the study of early Christianity in Japan.

Taketoshi SATO

A Study of Ancient Chinese Silks

This work consists of two volume: Volume I on studies of silk in pre-Ch'in, Ch'in and Han periods, Volume II on studies of silk in Six Dynasties, Sui and T'ang periods.

In the former Volume, the author explains the aims and the methods of this study in introductory remarks. Next he deals with the early history of silk from Yin to the Age of Wars. The kind of silk in that period is revealed by using both documents and archaeological materials. Relating to the production of silk, the author studies places and forms. He also discusses the distribution of silk which is carried on by grant, dealing and barter. In the Han period, silk production increased even more. The author deals with the problems of types, production and distribution. Examining the technique and form, he gives a reason for an increase of silk production. Most of the products farmers were gathered as tax or tribute, and those formed a financial foundation for the dynasty. As for the distribution, he studied not only grant and dealing in the country, but also the silk trade.

In the latter volume, the author at first deals with the kind of silk in Six Dynasties. Next he refers to the production and distribution. As for Sui and T'ang periods, this book presents a very detailed study. In particular, many archaeological materials are introduced and investigated. Using those materials and other documents, he reveals the types of silk. Furthermore, he researched silk production, such as the locations, weaving looms and forms. Finally, regarding the distribution in Sui and T'ang periods, his particular investigation about grant, salary, merchandise and trade points out the fact that silk was one of the most important goods in ancient China. As a supplement, he adds the consideration of the archaeological materials in Chou and Han periods.

This work of the author expresses many new and excellent views on various points concerning silk in ancient China.

Hisashi SATO

Studies in the Historical Geography of Tibet

The present work seeks to clarify the principal Tibetan place-names, and the tribe- and clan-designations, as well as the geography of the most important routes, found in the Chinese and Tibetan historical texts, laying special emphasis on the period of the establishment of the Old Tibetan kingdom (6th to 9th centuries). Using extensively the Chinese and Tibetan materials, including Tun-huang texts, the author approaches the historical geography by studying a series of interrelated subjects in the following order in five chapters.

Chap 1. The "Official Route" of the Ching period between Lhasa and Hsi-ning is verified and the itineraries followed by the Third Panchen Lama, the Fifth Dalai Lama and the Seventh Dalai Lama are identified.

Chap. 2. Based upon the results acquired in Chap. 1, investigations are made on the details of the same route as it existed in the T'ang period, "Road into T'u-fan". The author fixes the locations of the garrisons that existed in the T'ang period along the upper reaches of the Yellow River and east of Lake Kokonor, and also carries out studies on the itinerary between Lhasa and India.

Chap. 3. The historical-geographical data thus established are used in turn as a basis for the identification of place-names relative to the T'u-yü-hun; and the studies are made on the campaign routes followed by the Chinese troops when they attacked T'u-yü-hun under the Sui and T'ang dynasties.

Chap. 4. These findings concerning T'u-yü-hun are then used in order to help identify the locations in which various Ch'iang tribes were based in the Han period. The political activities of these tribes are also explained.

Chap. 5. Finally, on the basis of all the findings mentioned, the author turns his attention once more toward the period of the Old Tibetan kingdom, corresponding to the Sui and T'ang periods in China, to identify the place-names and tribe- and clan-designations of the Tibetan plateau as they existed at that time.

The results of the study of this book are displayed on the seven separate maps which accompany the text volume.

The present work is closely related to the author's previous publication entitled "A Study on the Ancient History of Tibet" (2 vols. 1958, 1959). Thus, the author contributes to the clarification of the

history of the Old Tibetan kingdom and simultaneously to the historical geography of the foregoing and the subsequent periods.

Yoshio KAWAKITA

The Historical Basis of Modern Medicine

Published in 1977, this voluminous work comprising 2 volumes, 43 chapters and more than 1300 pages, is a comprehensive history of Western Medicine from the ancient Orient up to the present. The author seeks the starting point of modern medicine in the monumental work of William Harvey in the 17th century on circulation of the blood, and points out that this signalled the revolt against traditional Western Medicine which was dogmatized in medieval Europe.

In order to accurately evaluate the significance of Harvey's work and define the course of development of modern medicine which followed, the author analyses in detail the conflicting concepts on disease based on natural philosophy and the various metaphysical problems concerning *life* and/or *anima* in ancient and medieval medicine. Traditional medicine was substantially different in character to the ideas and methods of modern science, so modernization of medicine as "biology of diseases" had to wait until the science of biology attained maturity in the latter half of the 19th century.

Starting from Morgagni in the 18th century, the establishment of pathological morphology clarified the inter-relationship between medicine and biology. Then, with this modern pathology in the background, the process leading to the birth of modern medicine in its global features by way of the Paris School following the French Revolution and the German School which rapidly gained prominence in the latter half of the 19th century is described in detail. The current absorbed biochemistry, microbiology, genetics and other biological sciences one after the other and became the mighty river of Modern Medicine, and it is significant that the author's pen challenges the difficult task of describing contemporary history up to the period following the end of the Second World War.

The major concern of scientific medicine based on biology is naturally somatic diseases but its connection with psychiatry and hygiene is unfortunately not very clear in medical history. The author finished the present work by pointing out that medicine should aim for the recovery of humanity by making new inroads into "anthoropology."

Contemporary medicine seems to have arrived at a critical stage owing to the revolutionary but, so-to-speak "dehumanized", headlong

progress of natural science since around the 30's of this century. It is of unique significance that the present work was written by an author who actively participated in the above mentioned development of biological sciences and, at the same time, was fully aware of the orientations of contemporary medicine.

Hiroshi INOSE

Studies on "Time Slot Interchange" in PCM (Pulse Code Modulation) Integrated Communication Systems

In recent years, pulse code modulation (PCM) telephone transmission systems, in which a plurality of binary-coded speech signals are carried by time slots in a time-division-multiplexed frame, have been increasingly implemented worldwide. The PCM technique, when used for telephone switching as well, provides a PCM integrated communication system in which speech signals in coded and time-division-multiplexed form, are not only transmitted over the links of a telephone network but also are switched at its nodes. This arrangement prevents degradation of speech signals by eliminating additive noise and reduces network cost by avoiding the modulation and demodulation at each link and by replacing the inefficient space-division-switching at each node.

PCM integrated communication systems require some means of selectively connecting a time slot to any other time slots in a frame. The "time slot interchange" technique invented by him was recognized to be especially suitable for this purpose. Analogous to a space-division switch by which any input line is selectively connected to any output line, the time slot interchange technique that employs temporary memory, provides the connection between any input time slot to any output time slot. His theoretical and experimental studies on time slot interchange have been recognized all over the world and the result has been appreciated as an indispensable technique in organizing PCM integrated communication systems in several countries including the United States, France and Japan.

Kei ARIMA

Studies on Industrial Utilization of Microorganisms

In the field of industrial utilization of microorganisms, microbial enzymes and fermentation products, as well as ability of microorganisms to decompose numerous kinds of substances for cleaning of natural environment, have been considered important. The author made remarkable achievements in basic research in these fields as follows:

1) Metabolism of Aromatic Compounds. He established a new main metabolic pathway, i.e. the gentisic acid pathway in oxidative decomposition of various kinds of aromatic compounds, and crystallized *p*-hydroxybenzoic acid hydroxylase and the stable enzyme-substrate complex which is the inevitable intermediate in Michaelis-Menten enzyme reaction equation. And, taking advantage of these two stable crystals, he made clear for the first time the role of substrate as an effector of the enzyme protein giving a new fundamental knowledge to enzymology.

2) Production of ADD (Androsta-1, 4-dien-3, 17-dione) from Cholesterol by Microorganisms. By a new type of fermentation method in which iron chelators such as α, α'-dipyridyl are added to cholesterol fermentation broth of *Arthrobacter simplex*, accumulation of ADD was achieved by splitting off the side chain of cholesterol. And, from ADD, many kinds of androstan and estran hormones, as male and female steroid hormones, can be industrially produced. Thus a new road opened for the steroid hormone industries of the world.

3) Microbial Milk Clotting Enzyme. The cheese industry uses 25% of the world's milk production. The milk clotting enzyme obtained from calf stomachs has necessarily been in short supply. A new milk clotting enzyme, *Mucor* rennin produced by *Mucor pusillus* was discovered and crystallized and is now used for more than half the amount of world's cheese production. Active site of this enzyme and the mechanism of the milk clotting were elucidated.

Besides, he discovered new enzymes as lipoproteinlipase of *Pseudomonas*, lipoxygenase of *Fusarium*, nuclease of *Aspergillus*; new physiologically active substances of microorganisms as pyrrolntrin, tomaymycin, baciferacin, surfactin. He isolated the pigmentless mutant of *Penicillium chrysogenum* Q 176 which contributed to production of pure penicillin.

Toshio ITO

Studies on Fat-storing Cells in the Liver

In 1950, T. Ito found a new cell type in the perisinusoidal space of the liver in man, and thereafter a similar cell type was identified in many animals from mammals to fish. He termed this cell a "fat-storing cell". It is clearly distinguishable from Kupffer cells and endothelial cells of the hepatic sinusoids. The fat-storing cell is now widely accepted as a component of the sinusoidal wall, and is frequently termed an "Ito cell".

The morphological properties of fat droplets contained in fat-storing cells show a distinct species difference without exhibiting any individual variations; for example, fat-storing cells of the human liver regularly contain many fat droplets of small size, and the same of fat droplets is found in fat-storing cells of monkey, rabbit, horse, birds, amphibia and fishes. In the calf, pig, whale, snake and some fishes, fat-storing cells show a quite different morphological pattern regularly containing a single droplet of large size.

Numerous light and electron microscopic findings have indicated that fat-storing cells may be involved in several essential functions. Thus, 1) fat-storing cells synthesize lipids in their cytoplasm and store them as lipid droplets for supply on demand to hepatocytes where they may be utilized as a source of energy for hepatocytic activities; 2) fat-storing cells may also be involved in the storage of fat-soluble vitamin A in the liver, in contrast to the traditional theory of vitamin A storage in Kupffer cells; 3) they could participate in the intralobular fibrogenesis occurring in the liver; 4) they could participate in reinforcement of the endothelial lining of the hepatic sinusoids; and 5) they may have an antidotal function against excess vitamin A, benzen hexachloride (BHC) and toxic agents in the broad sense.

Concerning the cytogenesis of the fat-storing cell, T. Ito considers that this cell may represent a mesenchymal cell belonging to the category of fibroblasts which, however, may have differentiated specially in a particular physiological environment such as the hepatic perisinusoidal space.

Tomoji SUZUKI

Protein Chemistry on Kinin System and Its Control Mechanism

In order to elucidate the processes of cardiovascular diseases, biochemical studies have been continued in the areas of catecholamines, renin-angiotensin, prostaglandin and kinins.

Bradikinin in its very low dose, such as 10^{-9}/kg, exhibits actions to dilate peripheral blood vessels, lower the blood pressure, stimulate the vascular permeability etc. Peptides which show similar actions in human and animals are called kinin. Redness, edema and pain which occur in inflammation are due to kinin. Kinin is produced by an enzymic hydrolysis of a protain which is called kininogen. The enzyme is called kallikrein.

Suzuki discovered kininogens, that is, low molecular weight kininogen and high molecular weight kininogen. He elucidated the mechanisms of the hydrolysis of these kininogens by plasma kallikrein, pancreas kallikrein or snake venom kallikrein and determined the structural part of these kininogens involved in their actions. It was clarified that plasma kallikrein hydrolyzed high molecular kininogen into bradykinin, fragment-1, 2, and a residual part. Suzuki also succeeded in the complete purification of plasma prekallikrein, kallikrein and activated Hageman factor and elucidated the biochemical processes involved in bradykinin formation. Fragment-1, 2 inhibited the activation of Hageman factor and thus was found to control bradykinin formation.

He discovered and isolated inhibitors of kininase from snake venom and determined their structures. These inhibitors are peptides rich in proline. They also inhibited the enzyme which converted angiotensin I to II. On the basis of this finding, kininase and the converting enzyme were found to be identical. Thus, the biochemistry of kinin system and its relation to reninangiotensin system were clarified.

Suzuki's study briefly described above has contributed to the progress in biochemistry of cardiovascular functions and diseases, to the finding of two genetic diseases lacking high molecular weight kininogen or prekallikrein and also to the development of hypotensive compounds of a new mechanism.

PROCEEDINGS AT THE 730TH GENERAL MEETING

The 730th General Meeting of the Academy was held on Tuesday, June 12, 1979 at 1 : 00 p.m., Dr. Kiyoo WADATI, President, taking the chair. Eighty-two members were present, and the following communications were made:

On "trials without lawers". . . . . Kisaburo YOKOTA, M. J. A.

Mathematical economics after Walras. . . Ichiro NAKAYAMA, M. J. A.

Cloning of gene(s) for fetal *γ*-globin subunit from mouse yolk sac cells . . . . . Yoji IKAWA, Gen-Ichiro SOMA, and Masuo OBINATA
Communicated by Toshio KUROKAWA, M. J. A.

Possible evidence for the karyotype evolution of the Indian spiny mouse due to tandem fusion of the house mouse chromosomes . . . . . Tosihide H. YOSIDA

Karyotype of F_1 hybrids between Mauritius and Oceanian type black rats . . . . . Tosihide H. YOSIDA

A karyotype study of eleven species of Labrid fishes from Japan. . . . . Yoshio OJIMA and Eiji KASHIWAGI

Detection of 8 azaguanine resistant mutants of embryonic cells induced by products formed in the stomach on oral administration of sodium nitrite plus aminopyrine to pregnant golden hamsters . . . . . Naomichi INUI, Yoshisuke NISHI, Makiko MORI, Masako TAKETOMI, Miyako YAMAMOTO, and Akio TANIMURA

Some observations of hatching of electron-irradiated *Artemia* eggs under a scanning electron microscope . . . . . Seizo FUJIKAWA and Yuh H. NAKANISHI

Chromosomal studies on interspecific hybrids of butterflies (Papilionidae, Lepidoptera). XV. Crosses among *Papilio machaon gorganus*, *P. machaon hippocrates*, *P. machaon britannicus*, *P. oregonius*, *P. bairdii*, *and P. rudkini* . . . . . Kodo MAEKI and Shigeru A. AE

A case of slight anemia with the long arm interstitial deletion of no. 5 chromosome (46,XY,5q-) . . . . . Tetsuji KADOTANI, Takashi KATANO, Motochiyo MURAKAMI, and Yoko WATANABE
Above seven, communicated by Sajiro MAKINO, M. J. A.

On the cofactor of glucose dehydrogenase of *pseudomonas fluorescens* . . . . . Yujiro IMANAGA, Yuko HIRANO-SAWATAKE, Yoko ARITA-HASHIMOTO, Yumiko ITOU-SHIBOUTA, and Ritsuko KATOH-SEMBA
Communicated by Shiro AKABORI, M. J. A.

On a nature of convergence of some Feynman path integrals. I . . . . . Daisuke FUJIWARA

Global branching theorem for spatial patterns of reaction-diffusion system . . . . . Yasumasa NISHIURA

Some characterization of the Schwartz space and an analogue of the Paley-Wiener type theorem on rank 1 semisimple Lie groups . . . . . Takeshi KAWAZOE

On the asymptotic behavior of iterates of nonexpansive mappings in uniformly convex Banach spaces . . . . . Kazuo KOBAYASHI

On the boundary behavior of Taylor series of regular functions of some classes in the unit circle . . . . . Chuji TANAKA

Above five, communicated by Kôsaku YOSIDA, M. J. A.

Invariants of reflection groups in positive characteristics . . . . . Haruhisa NAKAJIMA

Communicated by Shokichi IYANAGA, M. J. A.

On the geological age of the Tanjong Malim limestone in peninsular Malaysia . . . . . Teiichi KOBAYASHI, M. J. A., GAN Ah Sai, and K. N. MURTHY

Construction of complex structures on open manifolds. . . . . Masahisa ADACHI

A note on almost-primes in short intervals. . . . Yoichi MOTOHASHI

Above two, communicated by Kunihiko KODAIRA, M. J. A.

Biosynthesis of the neuron-specific enolase (14-3-2 protein) in a cell free system from wheat germ extract directed with poly (A)-containing RNA from rat brain . . . . . .Kenji SAKIMURA, Yutaka YOSHIDA, Yo-ichi NABESHIMA and Yasuo TAKAHASHI

Radioimmunoassay for biopterin . . . . . Toshiharu NAGATSU, Tokio YAMAGUCHI, Takeshi KATO, Takashi SUGIMOTO, Sadao MATSUURA, Ken-ichiro KOBAYASHI, Miki AKINO, Shoichiro TSUSHIMA, Nobuhiko NAKAZAWA, and Hiroshi OGAWA

Above two, communicated by Setsuro EBASHI, M. J. A.

Effect of prolactin on post-castration changes in ultrastructure of the ventral prostates in male rats . . . . . Sumio TAKAHASHI and Seiichiro KAWASHIMA

Communicated by Kiyoshi TAKEWAKI, M. J. A.

Histochemical demonstration of biosynthetic pattern of ABH isoantigens in various tissues . . . . . .Ikuo ISHIYAMA

Communicated by Shoei ISEKI, M. J. A.

After a recess, during which the members present met in their respective Sections, the General Meeting was resumed for business transactions.

First, Dr. Tomio TEZUKA, M. J. A., and Dr. Yasuji KATSUKI, M. J. A., paid a high tribute respectively the late Dr. Ryozo NIIZEKI's and the late Genichi KATO's meritorious services to the academic circles.

Next, the Chairmen of both Sections made reports on the matters dealt with at the Sectional Meetings.

Then, it was reported on the result of election of half the members of the Administrative Committee, which had taken place at the Sectional Meetings. The Committee members elected are: Taro SAKAMOTO, Tsunahiro KIKUI, Yoshitaro WAKIMURA, Yoshio FUJITA, Takayuki SOMIYA, Hitoshi KIHARA, and Teizo OGAWA.

The Meeting adjourned at 4: 50 p.m.

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