Award of Medals

The Seventy-six Annual Award of Medals was held on Monday, June 9, 1986, 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, Science, and Culture.

The function was closed at 11:30 a.m.

The Recipients of Prizes and the Subjects of their Studies

Masao Ito

Studies of the Cerebellum: Neural Mechanisms and Learning of Movement

Dr. Masao Ito started his career of neurophysiology in 1954 in Kumamoto with a study of membrane properties of dorsal root ganglion cells. He then joined Sir John Eccles in Canberra (Australia) for the period of 1959–1962 and was engaged in studies on ionic mechanisms of inhibitory synapses in spinal motoneurons. His finding of peculiar multiexponential properties of motoneuronal membrane is notable.

After returning to Tokyo in 1962, Dr. Ito found the general inhibitory action of cerebellar Purkinje cells. Before this, a general belief was that only a limited population of cells having short axons are specialized for inhibition. Therefore, Dr. Ito's discovery that Purkinje cells, which provide the sole output of the cerebellar cortex, are specialized exclusively for inhibition has led to radical reformulation of the general idea about the central inhibition and its mechanisms. This finding was accompanied by specification of GABA as inhibitory neurotransmitter of Purkinje cells. The whole study by Dr. Ito and his colleagues at that time was introduced in the monograph "The Cerebellum as a Neuronal Machine" (Springer-Verlag) by Eccles, Ito and Szentágothai (1963), and contributed a great deal to the remarkable advancement of our understanding of neuronal machinery structure of the cerebellum in the 1960s.

In the 1970s, Dr. Ito continued his study on the neuronal mechanisms of the cerebellum. He thoroughly dissected neuronal connections

of the cerebellar flocculus with the vestibulo-ocular reflex arc, and proposed the hypothesis that the flocculus is the site of adaptive control of the vestibulo-ocular reflex. The hypothesis matched the theoretical proposal by Marr (1969) and Albus (1971) that synapses on Purkinje cells supplied by axons of granule cells (parallel fibers) retain a special type of plasticity that endows the cerebellum a learning capability. Dr. Ito proceeded to test this hypothesis, and after strenuous efforts for ten years, finally succeeded to derive clear experimental evidence for it. He found a new class of synaptic plasticity phenomenon, called the long-term depression (LTD), to occur at parallel fiber-Purkinje cell synapses which had been activated in conjunction with climbing fibers. He also provided evidence suggesting that the LTD is due to reduction of chemosensitivity of Purkinje cells to glutamate, a putative neurotransmitter of parallel fibers. These works opened the way of investigating memory mechanisms of the cerebellum.

Since the 1970s, Dr. Ito also devoted his efforts to experimental testing of the flocculus hypothesis of the vestibulo-ocular reflex control, and have accumulated supportive evidence with both lesion experiments and microelectrode recording from Purkinje cells. This work appears to be the first case where complex cerebellar functions are investigated on a solid basis of our knowledge of neuronal connections, cellular behavior and system performance. In his recent monograph "The Cerebellum and Neural Control" (Raven Press, 1984), Dr. Ito attempted to expand the flocculus hypothesis to a more general theory of the cerebellum. Thus, Dr. Ito's work on the cerebellum would represent a challenge to complex brain functions at neuronal network levels, and can be taken as a rare example of a success of such challenge.

Osamu OBA

A Study of the Reception of Chinese Culture in the Edo Period

The present volume is composed of two parts, that is, the main part entitled, "The Reception of Chinese Culture through imported Books", and the supplementary part entitled, "The Cultural Exchange with Chinese People and Ships".

The main part comprises 4 chapters, namely, the introductory chapter and other three chapters. In the introductory chapter, the author first gives an outline of the history of book imports from China to Japan during the period between Tang dynasty and Ming

dynasty, and next he treats of the problems in regard to the imports of Chinese books in the Edo period, picking up such materials as documents produced in connection with Nagasaki trade and existing Chinese books in Japan of which dates of imports are clear.

The author states that it is the main aim of his present study to elucidate the characteristics of above-mentioned materials and to offer the results of his study to the researchers in this field concerned.

In the first chapter, the author gives a summary account of Nagasaki foreign trade in Ching dynasty, making an inquiry into the percentages which the imports of Chinese books occupied in the said foreign trade. He points out the fact that the number of books brought over from Kiangsi and Chekiang provinces, where publishing business was most prosperous in China, by Nanking and Ningpo ships, was particulary great. Further he comments, with some supplementary explanations and corrections to the past studies, on the process of import restriction of books which was enforced in the 7th year of Kan'ei (1630).

In the second chapter, the author interprets the materials concerning the history of book imports by Chinese ships to Japan, dividing them into two groups, that is, group A which was produced in the procedure of trading business and group B which was compiled. Among group A, we can see, for instance, *Sairaishomoku* (lists of books brought over from China) which were presented to *Nagasaki-bugyo* (governor of Nagasaki) from captains of Chinese ships, *Taiisho* (documents which explain briefly the contents of books) and the account books which were kept at *Nagasaki-kaisho* (Nagasaki trade agency) in the course of transaction of trading business, viz. *Shoseki-motocho* (ledgers regarding imported books), etc. One of the most typical materials of group B is *Shohakusairaishomoku* (an alphabetical and chronological list of books shipped from China) owned by the Diet Library. The author elucidates the characteristics of these two groups, by way of proving so far unknown dates of compilation of some of them, and also examining the way of mentioning items in each of the materials.

In the third chapter, the author takes up not only the problem of book imports, but also that of acceptance of Chinese culture through imported books. The chief buyer of Chinese books in the Edo period was *Shogun*, and the books bought by *Shogun* were used to be placed in the Fuzan Library (The Momijiyama Library). The number of book stock in the said Library increased greatly in the reign of *Shogun* Yoshimune. Yoshimune was anxious to obtain from China in particular books on legislation and geography, and among others *Kokon-toshoshusei* (a complete catalogue of ancient and modern Chinese books). Yoshimune gave an order to the outstanding scholars of the day

to make a special study of Chinese books on legislation, revising them and also translating them into colloquial Japanese. The author examined the Chinese books on geography now owned by *Naikakubunko* (the Cabinet Library) and *Shoryobu* (the Library belonging to the Department of the Imperial Household), the successors to the Momijiyama Library that was the original owner of these books, referring to *Shohakusairaishomoku*, etc. for identification, and comments on the actual circumstances of book imports at that time. Yoshimune gave an order for *Kokontoshoshusei* (above-said complete catalogue) to China, but it was only after his death that the catalogue arrived Japan. During the Kansei period (1789–1801), the number of acquisitions to the Momijiyama Library increased. Besides the collection of Momijiyama Library, we also have another collection of *Shoheizakagakumonsho* (Shoheizaka College). The author made researches into these collections, referring to ledgers concerning book imports, etc., and also made a comparative study of them with the Chinese books existing in the Cabinet Library, etc. There are such books among them as were bought by *Roju* (senior councillors in Tokugawa Shogunal administration), and *Wakadoshiyori* (junior councillors in Tokugawa Shogunal administration). *Nagasaki-bugyo* (governor of Nagasaki) and other Nagasaki government officials were also granted a priviledge to purchase books from China.

In the last stage of Tokugawa Shogunate, several Chinese books, for instance, *Kaikokuzushi* (an illustrated book on seagirt countries), etc., informing of the new trend of East Asia in the current of world history, were published in China. The author pays attention to the fact that these Chinese books were imported into Japan soon after their appearance and came to hand of some powerful feudal lords who took part in politics of Shogunal administration, and that these books prevailed among the intellectuals of the day, reprinted in Japan.

In the supplementary part, the author accounts for the problems of establishment and enforcement of *Shimpai* system (a passport system), and the achievements produced by painters, doctors, Buddhist priests, etc., who came over to Japan at that time, and also he explains structure, crew, starting ports and days required of the Chinese ships, in the Ching period.

To sum up, the author, carefully searching for lists and catalogues of imported Chinese books and collecting as many documents concerning book imports as possible from various libraries and other places concerned, made thorough examinations in regard to the contents and characteristics of these materials. He made an inquiry into dates of imports and procedure of trading business. He also made clear the classification and quantity of imported books and their changes in accordance with the flow of times. He ascertained

existence and non-existence of Chinese books ordered by the Momijiyama Library and Shoheizaka College, by way of comparing them with the Chinese books now owned by the Cabinet Library and Shoryobu Library.

It is not too much to say that with all these researches stated above, the author has opened new aspects in the study of this field.

Mikiya SUZUKI

A Study of Empedocles

— The Relation between *Peri Physeōs* and *Katharmoi* —

In his "A Study of Empedocles" (Sōbunsha, Tokyo, 1985, xv+606+24 pp.), the author, Mikiya Suzuki, aims to discuss the relationship between two works of Empedocles named "On Nature" (*Peri Physeōs*) (Diels' Fragmente 1–111) and "Purifications" (*Katharmoi*) (Diels' Fragmente 112–147). The nature and content of these two works differ each other remarkably. As to the nature of the work, "On Nature" is classified as a philosophical poem with the fashion of nature-philosophy, whereas "Purifications" is classified as an inculcating poem with the fashion of mythology. Contentwise, "On Nature" does not pay much attention to the daimone which is the central figure in "Purifications." In this connection it has been the basic problem in understanding Empedocles to clarify the relationship of these two works.

In the pre-Socratic Greek philosophy, Thales maintained that the primary substance *arkhē* is water; Anaximenes maintained that it is air; Heraclitus maintained that it is fire. Empedocles added earth to these three, and with him the four-element-theory of cosmology or cosmogony originated. This four-element-theory was supported by Aristotle and dominated the nature-philosophy throughout the Medieval period.

Empedocles tried to explain the change of the things not only in terms of these four elements but also in terms of the two factors which combine or separate these elements, that is, Love and Hate. This means that Empedocles pointed out not only the material causes but also the kinetic causes.

In this way, Empedocles attached great importance to the ratio of the combination of the elements, and eventually to the formal causes. In regard to the ratio of the combination, it is assumed that Empedocles was influenced by Pythagoras. The fragment 129 of Empedocles which reads, "the person who appropriates the richest wealth of wisdom", apparently refers to Pythagoras. Empedocles'

method to originate the physiological psychology by means of the conflict of Love and Hate is succeeded by the psychoanalysis of Sigmund Freud. These features of Empedocles which are commonly pointed out are found primarily in "On Nature." In our country, "Purifications" has not been put so much significance as on "On Nature," and has not been made the main subject of studies.

The author Suzuki carefully examines all the existent fragments of Empedocles, and goes over almost all the preceding studies on the theme from E. Zeller (1844) to G. Zunts (1971).

He concludes as follows:

1. "On Nature" deals with the mutation (re-incarnation by Suzuki) of "four roots" (i.e. fire, air, water and earth) caused by Love and Hate.

2. "Purifications" deals with the re-incarnation of the daimone.

3. There exists some interrelationship between the mutation of four roots in "On Nature" and the mutation of diamone in "Purifications."

4. Therefore, the two works teach the same proto-type idea to two different groups of readers respectively.

The author squarely copes with the extremely hard problem of analyzing the ancient works only ten percent of which are existent and that only in the form of fragments. His book is the first authentic and extensive work on the study of pre-Socratic philosophy in our country. In this sense, this work should deserve the award with very high appreciation.

Taitiro FUJINAGA

The Development of Electro-Chemical Trace Analysis

Dr. Taitiro Fujinaga has created various methodologies in the field of electro-chemical trace analysis and took a leading role in the development of analytical chemistry.

His study is divided into five chapters as follows.

(1) Differential Polarography with a Square-Wave Pulse.

In conventional polarography, the spectrum is expressed in the form of an integrated curve. In the present method, a double-pole double-throw rotating switch was adopted for the differentiation, and thereby simultaneous determination of multi-components in the matrix became possible. This method was later improved to become the "Differential Pulse Polarograph", one of the most sensitive methods used today.

(2) Short-Circuited Amperometric Titration Method Using High

Positive and High Negative Potential Electrodes.

In this method, a reference electrode having high positive or negative potential was introduced, and most of the highly sensitive amperometric titrations can be performed without external potential sources.

(3) Controlled Current Polarography.

In the conventional polarography, applied potential is controlled and the corresponding electrolytic current flowing through the cell is measured. In the present method, however, applied current is controlled, and the corresponding electrode potential is recorded.

(4) Electrolytic Chromatography and Coulo-Potentiometry.

In the present method, use was made of a principle based on electrolysis and hydrodynamics; a working electrode consisting of a column filled with carbon or metal grains is used, and electrolysis is shortened to the extent that short-lived chemical species or highly radio-active nuclides can easily be separated. The method is believed to be the origin of recent "Hydrodynamic Voltammetry".

(5) Voltammetry at the Ion Selective Electrode.

The mechanism of the potential generation at the liquid/liquid interface and that of the ion transfer reactions at the interface were elucidated by the method. In this voltammetry, the current controlled polarography (chapter 3) was applied to the solution drop electrode, by which accurate and sensitive measurement was realized even with solutions of extremely low conductance. As a result, investigations of new ion selective electrodes, which were hitherto developed by a trial-and-error method was rendered possible theoretically and systematically. It is hoped that voltammetry at the ion selective electrode will play an important role in an investigation of the ion transfer phenomena at the biological membrane.

Dr. Fujinaga has devoted more than forty years to the development of chemical methodologies such as those mentioned above. He was awarded prizes from the Kinki Association of Chemical Industry and the Japan Society for Analytical Chemistry at an early stage of his research career. In 1981 he was invited to the Royal Society of London to present a lecture entitled "Recent Advances in Potentiometry with an Ion Selective Electrode", and in 1983 he was awarded TALANTA Gold Medal which is said the highest international award in the field of analytical chemistry.

Shoji HORIE

Pleistocene Geochronological Study on Lake Biwa Sediments and on Glacial Evidence in the Japanese Islands

For the purpose of study on the Pleistocene Epoch, glacial advance and retreat were the most remarkable events. In other words, changes of climate which occurred periodically as glacial and interglacial features characterize the Pleistocene Epoch. Such features are distinct in Europe and North America since continental ice sheets extended much further south from the North Pole. Accordingly, chronological study had developed in these areas but it was still behind in Japan in which glacial and interglacial data had been scanty. It was thought that lake sediments could provide valuable information in this respect.

Dr. Horie therefore focused his study firstly on the lacustrine terraces around Lake Kutcharo and other Japanese lakes and secondly on high mountain glacial features in connection with climatic changes, particularly oscillations of temperature and precipitation. After this line of work over many years, he decided to embark on a new field of study at Lake Biwa, namely, the stratigraphic study of cores obtained by drilling operations in the lake. He organized a scientific team in the interdisciplinary frame. That group succeeded in obtaining a 200 m long core at the same spot in 1971 and clarified minor geomagnetic events, fluctuations of grain size, composition of chemistry such as carbon, nitrogen, phosphorus, and of both pollen grains and fossil diatom, during the last 500,000 years.

Based on the success of that work, finally, in 1981, one spot of 68.4 m water depth was chosen for the drilling study. The new core was 1,422.5 m long and its upper part of 910 m consisted of lacustrine sediments which recorded an approximately 3,000,000 year's history. One characteristic feature which was found at ca. 250 m depth was the existence of shallow water deposits such as sands, peats and gravels. Bed rock was either Mesozoic or Paleozoic shale and sandstone in which fossil was not yet found.

On the other hand, Dr. Horie continued his field work in high mountains in both Central Japan and Hokkaido. At least five moraine groups were confirmed and the lowest extension was 1,400–800 m.a.s.l. These recent discoveries on the evidence of Pleistocene multiglaciation and Recent glaciation which was found in both Tateyama and Daisetsu Mountains are an outstanding achievement in Japanese glacial geology and this work continues as a joint project with European glacial geologists.

This study created and organized by the effort of Dr. Horie is

now highly evaluated as a new field of Pleistocene study. Its achievement lies in showing detailed chronology in Asia by an entirely new method. In this perspective, it is stressed that Japanese investigators can now be favorably compared with European and North American workers in the field of Paleolimnology and glacial geology on the Pleistocene Epoch.

Masayoshi NAGATA
Studies on Commutative Algebra

In 1958, Nagata distinguished himself by solving the 14th problem of Hilbert: one of the 23 famous problems posed by Hilbert in his invited lecture at the International Congress of Mathematician at Paris in 1900. This problem, originated from Hilbert's own study on the theory of invariants, asks whether a certain subring of the ring of rational functions over a given field is finitely generated. It had been proved that the answer is positive in certain special cases by Hilbert, H. Weyl and other mathematicians, but the question remained open for more than fifty years. Nagata showed that the answer is negative by constructing an ingenious counter-example.

Nagata's studies on commutative algebra concern the invariant theory, the theory of local rings as well as algebraic geometry.

In the theory of invariants, he obtained the renowned result on the 14th problem of Hilbert as explained above.

He began his research in the theory of local rings in the early 1950's. This field had been initiated by Krull in the 1930's, and was developed further by Zariski and Chevalley in the following decade. A particularly remarkable progress was made after Nagata joined in the studies. He singled out a certain kind of rings with good properties appearing usually in algebraic geometry, and called them "pseudo-geometrical rings" and proved that every complete Noetherian local ring is pseudo-geometrical. He also introduced the notion of Henselization, which is now fundamental in the theory of algebraic spaces and in the theory of étale topology. His book "Local rings" published in 1962 is still considered as the standard text in this domain.

Toward the end of the 1950's, algebraic geometers were interested in the question of whether every complete algebraic variety is projective. It was known that the answer is positive for varieties of 1 or 2 dimensions and was generally believed that the same would also hold for higher dimensions. Astonishment was therefore great, when Nagata constructed a counter-example showing that this is not

the case for 3 dimensions.

On the other hand, Nagata proved that every algebraic variety can be embedded as an open subvariety in a complete algebraic variety, the fundamental tool for the study of non complete algebraic varieties. He proved also that the theory exposed in Weil's well-known book "Foundations of Algebraic Geometry" (1946) can be extended to the case where the ground field is replaced by any Dedekind domain. This was essential for arithmetical applications of algebraic geometry and laid the way to the contemporary theory of schemes.

These important works rank the author among the foremost mathematicians in this field.

Hitosi NOZAKI

Contribution to the Development of Synthetic Methods Using Organometallic Compounds

Development of efficient methods for selective synthesis of the desired compounds is of great importance from both academic and industrial points of view. Over four decades, Dr. Hitosi Nozaki has made truly outstanding accomplishment along this line. His major and perhaps most creditable achievement is the creation of a wide variety of new synthetic reactions based on organometallic chemistry; utilization of inherent electronic characteristics of metallic elements and the perturbation with appropriate auxiliaries and ligands led to discovery of a number of highly selective organic reactions. Among Dr. Nozaki's superb contributions the following should be mentioned.

First of all, Dr. Nozaki reported the first example of asymmetric homogeneous catalysis using transition metal complexes by discovering asymmetric cyclopropanation of olefins with a diazoacetate in the presence of a chiral Schiff base-copper complex catalyst. This phenomenon is explainable in terms of the generation of a chiral carbene-copper complex as reactive intermediate. This finding provides a general, effective way for chemical multiplication of chirality and, on the basis of this strategy, several important industrial processes for synthesis of physiologically active compounds have already been established.

Dr. Nozaki found a novel ring-enlargement using lithium carbenoids, whose utility was shown by selective synthesis of muscone, a natural perfume. Metal carbenoids have played a key role in his stereospecific synthesis of sirenin (sperm attractant produced by the female gametes of a water mold), Cecropia juvenile hormones, sinensal (constituent of a natural perfume), etc. He also discovered

several chromium-mediated reactions which are useful for carbon-carbon bond formation.

Among many others one of the most impressive is his research in the area of organoaluminum chemistry. First, he succeeded in elaboration of new, stereospecific transformation of oxiranes to the allylic alcohols using diethylaluminum amides, and the remarkable selectivity was interpreted in terms of coordination of the Lewis-acidic aluminum atom to the oxirane oxygen which in turn results in enhancement of basicity of the amide nitrogen. The general concept of "combined acid-base reaction" postulated by Dr. Nozaki finds an extremely wide applicability. The particularly valuable applications among others are the diisobutylaluminum oxide-promoted cyclization of neryl phosphate, giving limonene, and methylaluminum bis(trifluoroacetate)-assisted cyclization of allylic acetates to afford karahanaenone. A very practical aldol reaction was explored by reduction of α-bromo carbonyl compounds with diethylaluminum chloride and zinc followed by addition of carbonyl components.

Significantly, the reactive methylene reagent formed from dibromomethane, titanium tetrachloride, and zinc serves as an efficient methylating agent towards carbonyl compounds, and this new procedure is even superior to the well-known Wittig reaction. Dr. Nozaki drew forth the high chemical potentiality of silicon, tin, and germanium compounds and devised numerous original selective organic reactions. Further, he discovered a series of selective oxidation methods for primary and secondary hydroxyl groups by use of compounds of vanadium, chromium, molybdenum, ruthenium, cerium, etc.

In summary, Dr. Nozaki's scientific accomplishment, comprising over 380 articles, has exerted paramount influence on the development of synthetic organic chemistry.

Eishiro SHIKATA

Studies on Plant Viruses and Viroids

Dr. Shikata has extensively studied on plant viruses, particularly on insect borne viruses for 36 years of his research career, and made remarkable contributions to plant virology. During last 10 years, he also pioneered studies on viroids in Japan and his work now is acknowledged internationally as a leading research.

Through a series of his intensive studies on plant Reoviruses such as rice dwarf, wound tumor, rice black-streaked dwarf and rice ragged stunt viruses, he has succeeded in demonstrating virus etiology and in localizing precisely virus particles in infected plants which

were restricted in phloem cells, and in insect vectors which were systemically distributed in almost all organs and tissues of insects by electron microscopy. Furthermore, he discovered the fine cytopathological change specifically present in the infected cells of both hosts, called "viroplasm" which could be the site of virus formation. He finally indicated direct evidence for the controversial hypothesis that insect borne plant viruses multiplied in their insect vectors. Since none was known on localization of plant viruses within both hosts, a series of his researches at the early sixties was greatly acclaimed in the world. Based on comparative studies on virion structure, cytopathology and genome composition of plant Reoviruses, he proposed a new subgroup for rice ragged stunt virus, which is now widely accepted.

In the studies on plant Rhabdoviruses, he demonstrated bullet form of rice transitory yellowing virus associated with nuclear membrane at maturation, but bacilliform of northern cereal mosaic virus associated with cytoplasmic membrane. He, however, pointed out that the maturation site in the cells of respective insect vectors of both viruses was not the same as respective plant hosts.

The first evidence of plant virus multiplication in nuclei of plant cells was shown in pea enation mosaic virus, and localization of Luteovirus restricted in phloem cells was first found in potato leaf roll virus through his tremendous work of ultrathin sections.

Hop stunt disease, which caused serious damage to hop in Tohoku district, could not be controlled because of its unknown etiology. In 1977, Dr. Shikata established a bioassay method and successfully erradicated the disease. He also proved that the disease was caused by a viroid. This was the first finding of viroid in Japan and encouraged development in viroid research. Hence, his cooperative work with Japanese biochemists has brought fruitful results. They demonstrated that *in vitro* RNA transcripts from cloned cDNA of hop stunt viroid and cDNA itself were infectious. Dr. Shikata established 303 nucleotide sequence and its secondary structure of cucumber pale fruit viroid, which occurred only in Holland, from cloned cDNA copies. It was 6 nucleotides longer than and had 95% homology to hop stunt viroid, and thus was concluded to be an isolate of hop stunt viroid. Furthermore, he discovered a viroid from grapevine which had high sequence homology to hop stunt viroid and determined its full length structure. It had only one nucleotide substitution from hop stunt viroid and was concluded to be another isolate of hop stunt viroid. This was the first discovery of a viroid from grapevine. Since it was isolated from almost all grapevine cultivars from all over the world, his finding poses a great problem to grapevine cultivation. However, he developed a bioassay and gene

indexing methods that will enable grapevines free from the viroid.

Due to his distinguished contributions to plant virology, Dr. Shikata was awarded a prize from the Phytopathological Society of Japan and Setou Prize from the Japanese Society of Electron Microscopy. He was invited to international meetings, universities and institutions in the world more than twenty times. He serves as one of the editors of Archives für Phytopathologie und Pflanzenschutz (Akademie-Verlag, Berlin).

Yasutomi NISHIZUKA

Mechanism of Hormone Action and Cell Surface Signal Transduction

The biochemical basis of cell surface receptor mechanism and signal transduction has long been a subject of great interest in physiology and medicine. In recent years much attention has been paid to the role of inositol phospholipid turnover in membranes that is commonly observed after the interaction of a wide variety of hormones, neurotransmitters, secretagogues, chemoattractants, growth factors, and many other biologically active substances with their specific cell surface receptors. This turnover of membrane phospholipids is normally associated with an increase in intracellular Ca^{2+}, which appears to mediate many of the subsequent physiological responses. It now becomes clear that phosphatidylinositol bisphosphate is immediately broken down when the receptor is stimulated, and the early products of this reaction are diacylglycerol and inositol trisphosphate. This inositol phosphate serves as an intracellular messenger for Ca^{2+} mobilization from its internal stores.

Dr. Y. Nishizuka discovered a unique protein kinase, protein kinase C, that is widely distributed in mammalian and other animal tissues, and showed its role of crucial importance in cell surface signal transduction. In this mechanism, the diacylglycerol derived from the breakdown of inositol phospholipids activates protein kinase C. Evidence has been obtained for the direct linking of the signal-induced membrane phospholipid turnover with this protein kinase activation, and for the importance of that activation in subsequent cellular responses. Using several tissues such as platelets, Dr. Nishizuka first demonstrated that the activation of cellular responses by this protein kinase is separate from and synergistic to those activated via an increase in intracellular Ca^{2+}. The synergistic role of protein kinase C and Ca^{2+} has been subsequently shown for physiological responses of a wide variety of tissues and cell types such as secretion and exocytosis of many endocrine and exocrine tissues, release of neurotransmitters,

modulation of membrane conductance, smooth muscle contraction, enhancement of several metabolic processes as well as cell growth and proliferation. He has also clarified that tumour-promoting phorbol esters such as 12-*O*-tetradecanoylphorbol-13-acetate are intercalated into the membrane phospholipid bilayer, where it activates protein kinase C directly by substituting for diacylglycerol, and that the enzyme-phospholipid complex probably serves as a receptor for tumour promoters. A series of studies developed by Dr. Nishizuka has provided clues essential for understanding the biochemical basis of signal transduction and cellular responses, and given enormous impacts on various research fields of medical sciences including endocrinology, cancer research, neurosciences, immunology, haematology and vasculo-cardiology.

PROCEEDINGS AT THE 800TH GENERAL MEETING

The 800th General Meeting of the Academy was held on Tuesday, June 10, 1986, at 1:00 p.m., Dr. Hiromi ARISAWA, President, taking the chair. Ninety-two members were present, and the following communications were made:

Brain death from the aspect of criminal law . . . . . Shigemitsu DANDO, M. J. A.

Contributions of Cambridge School of economics on the scheme of economic process as a whole . . . . . Hideo AOYAMA, M. J. A.

Renin: Purification, structure determination and active site . . . . . Tadashi INAGAMI and Kunio MISONO

Behavior of filltype dam during earthquake. Case study of Namioka Dam . . . . . Toshio SAWADA

Above two, communicated by Hisateru MITSUDA, M. J. A.

Optical activity in the incommensurate phase of ferroelectric $\{N(CH_3)_4\}_2 \cdot ZnCl_4$ . . . . . Jinzo KOBAYASHI and Kazuya SAITO

Communicated by Ryoichi SADANAGA, M. J. A.

Chromosomes of flounder, *Paralichthys olivaceus* . . . . . Tsukasa KIKUNO, Yoshio OJIMA, and Naoki YAMASHITA

A case of XY-female from the family with two 3/4 reciprocal translocations . . Tetsuji KADOTANI, Yoko WATANABE, and Ichiro TAKEMURA

Two siblings with the XY-female having heavy mental retardation from the parent with the normal phenotype . . . . . Tetsuji KADOTANI, Yoko WATANABE, and Ichiro TAKEMURA

Above three, communicated by Sajiro MAKINO, M. J. A.

L-threo-3,4-dihydroxyphenylserine treatment for dementia of various etiologies . . . . . Natsue SHIMIZU, Mieko OTSUKA, Yoshikuni MIZUNO, and Mitsuo YOSHIDA

Communicated by Osamu HAYAISHI, M. J. A.

On semi-idempotents in rings . . . . . M. I. JINNAH and B. KANNAN

Galois type correspondence for non-separable normal extensions of fields . . . . . Angel POPESCU

Class number relations of algebraic tori. I . . . Shin-ichi KATAYAMA

Proof of Masser's conjecture on the algebraic independence of values of Liouville series . . . . . Kumiko NISHIOKA

Above four, communicated by Shokichi IYANAGA, M. J. A.

About the real systematic position of the Nothosaur *Metanothosaurus nipponicus* Yabe & Shikama, 1948 . . . . . Jean Michel MAZIN

Communicated by Teiichi KOBAYASHI, M. J. A.

A new Permian genus of Trilobita from Bolivia . . . . . Teiichi KOBAYASHI, M. J. A., and Takashi HAMADA

Crystallization of human recombinant interleukin-2 . . . Chiaki SANO, Nobuya NAGASHIMA, Takashi TSUJI, Tetsuya KAWAKITA, Ken-ichi FUKUHARA, Kohki ISHIKAWA, Yukio MITSUI, and Yoichi IITAKA

Communicated by Setsuro EBASHI, M. J. A.

A characterization of Heegaard diagrams for the 3-sphere . . . . . Takeshi KANETO

Tori whose covering spaces have convex distance functions . . . . . Nobuhiro INNAMI

Characterizations of P^3 and hyperquadrics Q^3 in P^4 . . Iku NAKAMURA

Canonical bundles of compact complex surfaces containing global spherical shells . . . . . Kenji NISHIGUCHI

Above four, communicated by Kunihiko KODAIRA, 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. Yasuji KATSUKI, M. J. A., paid a tribute of admiration to the late Dr. Shoei ISEKI's meritorious services to academic circles.

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

Finally, 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: Teiji ICHIKO, Sanji SUENOBU, Yuzo YAMADA, Masao KOTANI, Shinji FUKUI, Shingo MITSUI, and Yasuji KATSUKI.

The meeting adjourned at 5:00 p.m.

日本学士院紀要

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