

## Research Records

(Nov. 1962~Oct. 1963)

### 1. Articles Published in Scientific Journals.

(a) In "Yakugaku Zasshi" (Journal of the Pharmaceutical Society of Japan)

(1) **Kichitaro Takatori, Isao Ishiguro, Shingo Asano, Yasuji Hori, and Yasuzo Hiramatsu**: Biochemical Studies on the Metabolism of the Tumor Bearing Animals. I. Studies on the Liver Catalase Inhibitory Action of 3-Amino-s-triazole and the Related Compounds.

The inhibitory effect of liver catalase by 3-amino-s-triazole (3-AT) *in vivo* was observed commonly in mouse, rat, guinea pig and rabbit. The normal value of liver catalase activity is shown in the following order; guinea pig > rat ≈ mouse > rabbit and the inhibitory effect by 3-AT was found to be rabbit > mouse > rat > guinea pig, which was considered to be approximately in a reverse order.

Then, the related compounds to 3-AT in the chemical structure, such as 3-ureido-s-triazole (3-UT), 3,5-diamino-s-triazole (3,5-DAT), 4-amino-s-triazole hydrochloride (4-AT), Nitron, 5-amino-1,2,3,4-tetrazole (5-ATT) and 2-amino-1,3,4-thiadiazole (2-ATD) were examined in its inhibitory effects. The strongest effect was found in the original compound, 3-AT, after which 3-UT and Nitron followed. Any inhibitory effect has not been observed in the rest of four compounds. (83(6), 648~652 (1963)).

(2) **Kichitaro, Takatori, Isao Ishiguro, Shingo Asano, Hiroshi Kuzuya, Masatoshi Okamoto, Ryuichi Kono and Kunio Morishima**: Biochemical Studies on the Metabolism of the Tumor Bearing Animals. II. Researches for the Amino Acids in the Urine of the Rats fed on the DAB-rice.

Rats were fed on a rice diet containing 0.06% of 4-dimethylaminoazobenzene (DAB) and their urine was examined by two-dimensional paper chromatography. In normal rats, free amino acids in the urine were approximately seven kinds, glycine being the most abundant, and including alanine, glutamic acid, cystine, arginine, histidine, and leucine. In the urine of DAB-administered rats, kind and amount of amino acids increased with increasing dosage of DAB given. The amount of tyrosine and kynurenine tended to increase markedly.

Quantitative determination was made on the total nitrogen, free tyrosine, and free kynurenine in the 24-hour urine of one rat per week during 16 weeks after the start of administration of DAB, corresponding to the period for formation of liver tumor. There was no great variation in the amount of total nitrogen in the urine during this period but the amount of free tyrosine and free kynurenine was found to increase markedly parallel with the preceding formation of a tumor. (83(10), 981~987 (1963))

(3) **Kichitaro Takatori and Mutsuo Takashima**: A New Synthesis of Melatonin.

Application of oxalyl chloride to 5-methoxyindole gave 5-methoxyindole-3-glyoxylyl chloride as orange-red crystals, m.p. 134° (decomp.), and application of ammonia to this chloride afforded 5-methoxyindole-3-glyoxylamide as yellow plates, m.p. 248°. The yield was almost quantitative in both reactions. Reduction of this amide with lithium aluminum hydride in a mixture of tetrahydrofuran and ether gave 5-methoxytryptamine in a good yield. Condensation of 5-methoxytryptamine and phenyl acetate by heating in tetraline or  $\alpha$ -methyl-naphthalene at 160~180° for 2 hours resulted in the formation of melatonin, obtained by Lerner and collaborators from ox pineal gland. The synthetic melatonin, obtained in a good yield, came as pale yellow leaflets, m. p. 116°, and its solution exhibited a marked yellowish green fluorescence. This substance shows absorption maximum at 277.5m $\mu$  in its ultraviolet spectrum and exhibits green by Keller's reaction and violet by van Urk's reaction, which are the specific color reactions of tryptamine series compounds. (83, 795(1963))

(4) **Shigeo Senda, Hiroshi Izumi, and Yoshiaki Kurita** : Local Anaesthetics. II. Synthesis of *p*-Aminobenzoic Acid Derivatives.

Ethyl *p*-(2-dialkylaminoacylamino) benzoate and  $\alpha$ -(2-dialkylaminoacylamino) benzamide derivatives were systematically prepared and examinations were made on the relationship between their chemical structure and local anesthetic activity. Of the 24 kinds of these compounds, the ester derivatives (XIV to XX) had almost equal to or better local anesthetic activity than procaine, with less toxicity. (82, 783(1962))

(5) **Yoshifumi Maki, Hiroko Kizu and Kazunaga Obata** : Studies of Rearrangement Reaction. VI. Ring-Contraction Reaction from Pyridazine Derivatives to Pyrazolone Derivatives (1)

1-phenyl-3,5-dichloro-6(1H)Pyridazinone was converted into 1-phenyl-3-hydroxypyrazole carboxylic acid by treatment with alkali hydroxide solution. The structure of 1-phenyl-3-hydroxypyrazole carboxylic acid was established mainly from infrared spectra of its derivatives and the mechanism of this reaction was also assumed. [83,725(1963)]

(6) **Yoshifumi Maki and Kazunaga Obata** : Studies of Rearrangement Reaction VII. Ring-Contraction Reaction from Pyridazine Derivatives to Pyrazolone Derivatives (2)

The behaviors of 1-phenyl-6(1H)-pyridazinone derivatives, bearing various substituent group at 3,4-, 3,5- and 5-position, on treatment with boiling 10% aqueous sodium hydroxide or 47% hydrobromic acid were investigated.

These results have shown that the ring-contraction reaction takes place by applying such starting materials and conditions as hydroxy groups are introduced into both of 3- and 5-position of the pyridazinone ring to form the possible intermediate, 1-phenyl-3,5-dioxy-6(1H)-pyridazinone. [83,819(1963)]

(7) **Yoshifumi Maki, Atsushi Numata** : Synthesis of 5-Methyl-4,5,6,7-tetrahydrothiazolo [4,5-C] pyridine-2(1H)-one Condensation of 1-methyl-3-bromo-4-piperidone hydrochloride hydrate and ethylxanthamide afforded 5-methyl-4,5,6,7-tetra-

hydrothiazolo [4, 5-C]-pyridine-2 (1H)-one, mp 144°, IR $\nu_{max}^{nujol}$  cm<sup>-1</sup>: 1670, 1660, U.V. $\lambda_{max}^{EtOH}$  245m $\mu$  ( $\epsilon$  5300).

The analgesic activity of its tartaric acid salt was estimated to be 40% of that of aminopyrine. [83 903 (1963)]

(b) In "Chemical & Pharmaceutical Bulletin"

(1) **Koichi Nakazawa**: Syntheses of Nuclear-substituted Flavonoids and Allied Compounds. IX. Syntheses of Tetramethyl Ether and Dimethyl Ether of Ginkgetin.

2-Acetyl-3,5-dimethoxyphenyl 3-iodoanisate and its 6-iodo isomer were respectively isomerized to diketones by means of KOH in pyridine, and cyclized to 4'-iodo and 8-iodo flavones, which were finally condensed each other to biflavone (28%) by refluxing in HCONMe<sub>2</sub> for 4 hours in the presence of activated Cu powder. The biflavone was demethylated at 5- and 5''-positions, when it was treated with AlCl<sub>3</sub> in PhNO<sub>2</sub> at 110° for 1 hour. The biflavone and its demethylate were identified respectively with tetramethyl ether and dimethyl ether of ginkgetin in C. H-analyses, mixed melting points and infra-red absorption spectra. (10(11), 1032~1038(1962)).

(2) **Koichi Nakazawa, Manzo Ito**: Syntheses of Nuclear-substituted Flavonoids and Allied Compounds. X. Synthesis of Ginkgetin.

The condensation of 3'-iodo-5-henzoyloxy-4',7-dimethoxyflavone and 5-benzoyloxy-8-iodo-4',7-dibenzyloxyflavone was carried out at 225~230° for 40 minutes with activated Cu powder. The CHCl<sub>3</sub> extract of the reaction mixture was heated with 10% H<sub>2</sub>SO<sub>4</sub> in AcOH at 110° for 10 minutes to hydrolyze protecting groups. The hydrolysate was dissolved in a mixture of dioxane and ether, and shaken with 10% K<sub>2</sub>CO<sub>3</sub> solution to obtain yellow, sandy crystalline precipitate of K salt of ginkgetin. This salt was purified by recrystallization from 10% K<sub>2</sub>CO<sub>3</sub> solution, decomposed with acid, and the free ginkgetin thus obtained was recrystallized from AcEt to pale yellow, small plates, m.p. 336°. Its acetate formed colorless needles, m.p. 259°. Ginkgetin and its acetate synthesized above were respectively identified with the corresponding materials of natural origin (11(3), 283~288(1963)).

(3) **Kichitaro Takatori, Terushige Kato, Shingo Asano**(Gifu College of pharmacy), **Masayori Ozaki, Toshio Nakashima** (Department of Pharmacology, School of Medicine, Nagoya City University): Choline in Panax ginseng C. A. Meyer (Communication to the Editor).

Roots of *Panax ginseng*. C. A. MEYER has been used as a valuable Chinese drug from ancient times, but pharmacologically effective components of this drug have been yet actually unknown. Taking a great interest in Petkov's report (Arzneimittel Forschung, 9, 305(1959)) that alcoholic extract of ginseng roots has a marked hypotonic action on blood pressure which is completely suppressed by atropine, the authors attempted to separate this effective components in parallel with the hypotonic tests on rabbits.

Effective hypotonic substances were extracted with methanol or ethanol. This

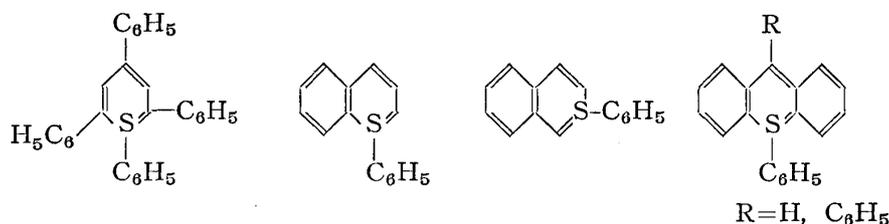
extracts, were dissolved in water and passed through the column of IRC-50(H-type). On treatment of this column with diluted hydrochloric acid, the hypotonic fraction was collected into early eluted fraction. Reineckate of the effective quaternary ammonium base was obtained. This Reineckate was purified with alumina-celite 535 (1 :1) chromatography and a pure Reineckate(I). m.p.262~265°(decomp.), was obtained. Following the usual procedure, I was decomposed with silver sulfate and treated with bariumchloride, colorless and hygroscopic crystals of this chloride were obtained. This chloride was identified as choline chloride. Choline contents of this crude drug was 0.1~0.2% weight of the roots.

This facts finely coincide with the reports of many authors that *Panax ginseng* has parasympathomimetic action, and the Petkov's report that ginseng extract was suppressed by atropine. (11(10), 1342-1343(1963))

(d) In "Journal of the American Chemical Society"

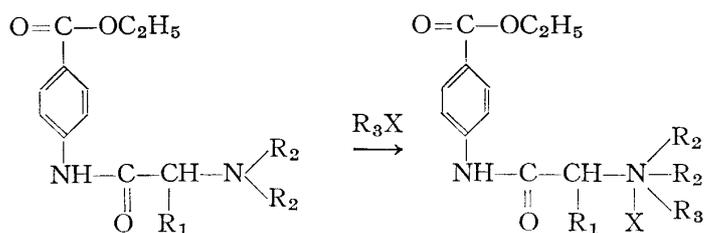
**Charles C. Price, Mikio Hori, Thyagaraja Parasaran and Malcolm Polk:** Thiazobenzenes. IV. 1-and 2-Thianaphthalenes and 10-Thiaanthracenes. Evidence for Cyclic Conjugation.

By reaction of appropriate thiopyrylium salts with phenyllithium, four new thiazobenzene analogs have been prepared. The new compounds are much more stable to heat, light and oxygen than 1,2,4,6-tetraphenylthiazobenzene. Covalent conjugated bonding in all five compounds is indicated by the single aromatic band in the proton n.m.r.spectra and by the low dipole moments (1.5~1.9D.). [85, 2278(1963)].



(d) In "Pharmaceutica Acta Helvetiae"

**S. Senda, H. Izumi, and Y. Kurita:** Potential antispasmodic agents derived from p-aminoacylaminobenzoic acid: Regarding to the close chemical relation between cocaine and atropine, in which a tropane ring is included commonly, it has been of interest to know whether the above mentioned compounds such as SA-7 and SA-6, and their quaternary ammonium salts might have either antispasmodic activity or autonomic ganglionic blocking activity. By the reaction in a benzene solution of ethyl p-(2-diethylaminopropionylamino)-benzoate (SA-4), ethyl p-(piperidinoacetylaminobenzoate (SA-7) or ethyl p-(2-piperidinopropionylamino)-benzoate (SA-8) with either methyl bromide or with allyl bromide, corresponding quaternary ammonium salts (I)-(V) were prepared.



After being tested against acetylcholine-induced spasm and  $\text{BaCl}_2$ -induced spasm in the isolated strip of guinea-pig's intestine, p-aminoacylamino benzoic acid derivatives such as SA-6, SA-7 and SA-8, are about as potent as  $\beta$ -diethylaminoethylamino phenyl acetic acid isoamyl ester (Avacan®) (see table 1). Moreover, the effect of quaternarization of the above mentioned free bases show a tendency to increase toxicity, losing local anesthetic activity. (38, 470(1963))

(e) In "Eiyo to Shokuryo" (The Nutrition and Food).

(1) **Isao Ishiguro, Junko Naito and Kiyoko Tanaka** : Nutritional Studies on the Royal Jelly. I. On the distribution of thiamine and riboflavin in royal jelly.

Free and esterified thiamine and riboflavin in royal jelly were estimated by the fluorometric method.

The thiamine content in the fresh material was  $8.70\gamma/\text{g}$  and the ratio of free to esterified was 8.41 : 91.59. Ratio of FAD to FMN in total riboflavin of  $9.99\gamma/\text{g}$  was 94.9 : 5.81 and free riboflavin was not found. From these results, it was found that thiamine and riboflavin existed mostly as esterified forms in royal jelly.

On the other hand, according to careful investigation about the variation of riboflavin content in connection with hatching of 5, 10 and 15 days, it was found that the total riboflavin content was much higher in larval phase than of pupa phase. [16, 127(1963)]

(2) **Isao Ishiguro, Junko Naito and Kiyoko Tanaka** : Nutritional Studies on the Royal Jelly. II. On the distribution of phosphate compounds and phosphatase activity in the royal jelly.

The distribution of phosphate compounds and phosphatase activity in fresh royal jelly were investigated .

1. Content of total phosphate was  $2.78\text{mg}/\text{g}$  in which organic phosphate was 67.3%.
2. Acid phosphatase activity was 0.29 unit and alkaline phosphatase activity was 0.35 unit.

Since these activities were very weak, the reasons why thiamine and riboflavin in royal jelly are mainly existed in esterified forms and considerably stable were understood.

3. When the phosphate compounds were distributed and examined, acid-soluble P occupied 94.24% and nucleic P, lipoic and protein P were little. [16, 130(1963)]

(f) In "The Journal of Hygienic Chemistry"

(1) **Yoki Ose, Shozo Morishita and Kozo Ikuta** : Fundamental Studies on the En-

environs of Schools. XIV. Sanitation of water Closets of Schools in Ogaki City.

The number of stool, the volume of excrements, the cost of treatment, sanitation state and utilization of water closets were investigated (9(1), 53(1963)).

(2) **Yoki Ose, Hideo Matsui, Taira Ikeda, Shozo Morishita, Genji Ogiso and Kazuko Matsuno** : Fundamental Studies on the Environs of Schools. X V. On the Dust in School.

Weekly and monthly variation of falling dust in school, and that by the influence of weather were investigated. The variation of dust in class-room according to each height and the influence of sweeping was investigated (9(1), 56 (1963)).

(3) **Yoki Ose, Taira Ikeda, Mitsugu Nakao, Shozo Morishita, Takeshi Kasugai, and Yoshihiro Tanahashi** : Fundamental Studies on the Environs of Schools. XVI. School Environs Sanitation when damaged by flood.

We were engaged in the sanitary action in some flood disasters. In this report several examples and analytical data of polluted and drinking water in school before, in and after flood disasters were reported (9(1) 58 (1963)).

(g) In "Journal of Water and Waste"

(1) **Yoki Ose, and Taira Ikeda** : The Function of Injective Air-ation System Waste Treatment and Analysis of the Waste Water. I.

A plan for the construction of new type waste treatment apparatus was drawn up, and the test plants were constructed. The function of those plants have been proved good (5 (2) 107 (1963)).

(2) **Yoki Ose, Taira Ikeda, Shozo Morishita and Sumi Nishiwaki** : Sanitation of Swimming Pools. V. Theoretical Calculation of Exchanging water and the Methode of Examination.

The following theoretical formula were derived from,

$$d = \frac{V \times [S - (S' - S'')]}{\sum^N B}$$

$$W = \frac{D}{d} V + \frac{D}{\sum} E + \frac{D}{\sum} O + \frac{D}{\sum} F + 2R$$

In this formula, B means Factor of Contamination by Swimming, and the degree of mud will be represented by means of 1g/man • day unit, and  $\text{KMnO}_4$  spending will be by 2.5g/man • day unit. (5 (7) 533 (1963))

(h) In "Reserch Journal of School Health"

**Yoki Ose** : Ventilation in School (Review).

The significance of ventilation in school was written, especially on the method of measurement, relation between absence and ventilation, and good ideas for ventilation (5(11), 9(1963)).

(i) In "The Annual proceedings of Gifu Prefectural Medical School".

**Shoichi Nagata, Makoto Nakamura, Mineko Nagata, Isamu Okada, Masaru Nakagami Yoshio Hayashi, and Kunio Takahashi.** Study of the Social Extermination

of Trachoma. Hygienic Investigation and Research of Trachoma. On the Percentage of Contraction of Trachoma Viewed from the Settled Accounts of City, Town and Village : In part 1 it was reported that there was a definite relation between the percentage of contraction of trachoma in primary schools and the settled accounts of the cities, towns and villages where they are located. This reports treats the investigation of junior high schools, by which we have been more convinced of the truth of the relation. [10-1, 49~56(1962)].

## II. Articles to be Published in Scientific Journals.

### (a) In "Journal of Medicinal Chemistry"

**Mikio Hori, Hajime Fujimura and Yutaka Yamakawa** : Local Anaesthetics. (I) Derivatives of hydrogenated Quinolines.

### (b) In "Chem. pharm. Bull."

**Yoshifumi Maki, Kazunaga Obata** : Studies of Rearrangement reaction (VIII) Ring-contraction Reaction from Pyridazone derivatives to Pyrazolone derivatives (3)

### (c) In "Tetrahedron Letters"

**Shojiro Uyeo, Kanichi Ueda, Yoshitomo Yamamoto and Yoshifumi Maki** : Structures of Taxinin and Taxinol.

### (d) In "The Archives of Practical Pharmacy"

(1) **Mamoru Sugiura, Mitsue Yamamoto, Yoko Yamada, and Hidero Tanaka** : Pharmaceutical Studies on Anti-Tuberculosis. (5) On the Effect of PAS on the Tryptophan Metabolism (3) On the Activity of Tryptophan Metabolism Enzyme by continuous Administration of PAS.

(2) **Mamoru Sugiura, Taro Ogiso** : Pharmaceutical Studies on Enzyme Preparations (2) Amylase Activity and Anti-acid Power of Enzyme Preparations.

(3) **Mamoru Sugiura, Taro Ogiso** : Pharmaceutical Studies on Enzyme Preparations (3) Amylase Activity of Digestive Enzyme Preparations by Temperature and Humidity

(4) **Mamoru Sugiura, Taro Ogiso** : Pharmaceutical Studies on Enzyme Preparations (4) Invalidation of Amylase Activity by Differentiated Degree of Preservation Condition of Enzyme Preparations.

(5) **Mamoru Sugiura, Seiko Kato, Hidero Tanaka, Kazuko Atarashi, and Akiko Katagiri** : Pharmaceutical Studies on Enzyme Preparations (5) On the Alkaline Protease.

## III. Oral Reports in Scientific Society

(a) In the 16th Annual Meeting of "The Pharmaceutical Society of Japan" (Nov. 1962, Shizuoka)

(1) **Takeshi Shimano, Mizuo Mizuno** : On the Plants Cultured in the Heirin-soo by Y. Iinuma in his Remained Manuscripts.

- (2) **Kichitaro Takatori and Mutsuo Takashima** : A New Synthesis of Melatonin.
- (3) **Kichitaro Takatori, Terushige Kato, Shingo Asano** (Gifu College of Pharmacy), **Masawaka Ozaki, Toshio Nakashima** (Department of Pharmacology, School of Medicine, Nagoya City University): Choline in Panax ginseng C. A. Meyer I.
- (b) **In the Ordinary Meeting of the Tokai branch of "The Pharmaceutical Society of Japan"**(Dec. 1962).
- (1) **Kichitaro Takatori, Terushige Kato, Shingo Asano**(Gifu College of Pharmacy), **Masawaka Ozaki, Toshio Nakashima** (Department of pharmacology, School of Medicine, Nagoya City University) :Choline in Panax ginseng, Meyer. II.
- (2) **Kazuo Ito, Kazuhiko Hanai, Wataru Ono and Noriyoshi Oya**: Studies on the Syntheses of 2-Nitrophenylacetic Acid Derivatives, Syntheses of 2-Nitro-4-methoxy-, and 2-Nitro-4-benzyloxyphenylacetic Acid, Investigations of so-called Reissert Reaction.
- (c) **ibid**(Feb. 1963)
- (1) **Kichitaro Takatori, Shingo Asano, Mutsuo Takashima and Yoshiro Shibata**: Studies on Hallucinogens. I.
- (2) **Isao Ishiguro, Junko Naito** : Effect of Serum Component on Tryptophane Pyrrolase Activity.
- (d) **In the 17th Annual Meeting of "The Pharmaceutical Society of Japan"**(Apr. 1963. Kanazawa)
- (1) **Yoshio Kato, Noriko Kanematsu, Yoko Yamauchi and Noriko Misu**: Pharmaceutical Studies on Royal Jelly (1), On the Antibacterial Activity and the Application.
- (2) **Yoki Ose**: Sanitation of Swimming water.(Symposium"Public Swimming Water")
- (3) **Mamoru Sugiura, Mitsue Yamamoto and Yoko Yamada**: On the Effect of PAS on the Tryptophan Metabolism(3) On the Activity of Tryptophan Metabolism Enzyme by Continuous Administration of PAS.
- (e) **In the Ordinary Meeting of the Tokai Branch of "the Pharmaceutical Society of Japan"** (May. 1963)
- (1) **Kichitaro Takatori, Shingo Asano and Kazuo Imai**: Studies on Hallucinogens. II.
- (2) **Isao Ishiguro, Junko Naito and Rikio Shinohara**: Biochemical Studies on the Royal Jelly (part 7).
- (3) **Yoshibumi Maki, Kazunaga Obata** :Studies of Rearrangement (8)
- (f) **ibid** (July, 1963)
- (1) **Takachiyo Okuda, Naomichi Kato** :Acylation of Lencomethylene Blue.
- (2) **Mikio Hori**: Thiabenzenes-A New Cyclic Conjugated Ring System(Review)
- (3) **Mamoru Sugiura, Seiko Kato, Akiko Katagiri and Kazuko Atarashi**: Pharmaceutical Studies on Enzyme Preparations (1) On the Alkaline Protease.

(g) In the 12th Annual Meeting of the Tokai branch of "The Pharmaceutical of Japan" (Oct, 1963, at Yokkaichi)

(1) **Yoshio Kato, Noriko Kanematsu**: Pharmaceutical Studies on Royal Jelly (2) On the Antibacterial Components.

(2) **Kenji Kaji, Hiroshi Nagashima, Yasuhiro Naka and Keisuke Shigezane**: Nucleophilic Displacement in Pyridazine Ring. (1)

(3) **Kazuo Hirose, Shigeo Ukai and Takuya Hattori**: Syntheses and Antibacterial Activities of Mercaptochalcones.

(4) **Yoki Ose**: Air Pollution in Gifu City (Symposium "Air Pollution")

(5) **Mamoru Sugiura, Yahito Kotake**: On the Tryptophan metabolism of Hypophysectomized Rats.

(6) **Taro Ogiso, Mamoru Sugiura**: On the Amylase Activity of Enzyme Preparations.

(h) In the 15th Annual Meeting of "The Japanese Vitamin Society" (Apr. 1963) **Isao Ishiguro, Junko Naito, Rikio Shinohara and Kazuo Hotta**: Enzymatic Degradation of FAD and FMN in Vivo.

(i) In the 35th Annual Meeting of "The Japanese Biochemical Society" (Oct, 1962)

**Kazuo Hotta, Isao Ishiguro and Junko Naito**: Studies on the Kynurenine in Rat's Hair and Examination on Tryptophan.

(j) In the 141st. Informal Meeting of "The Vitamin B Group Research Committee". (Mar. 1963)

**Kazuo Hotta, Isao Ishiguro**: Degradation of FAD in vivo.

(k) In the 9th Annual Meeting of "The School Health Society of Japan" (Nov. 1962).

(1) **Yoki Ose**: School Environs Sanitation in Gifu Prefecture (Symposium "School Environs Sanitation")

(2) **Yoki Ose, Teruo Komori, Yoshiko Miyabe, Shozo Morishita, Minoru Kawai Kiyoyuki Kutami, Mitsuko Sakai and Fusa Terakura**: Fundamental Studies of School Environs X X. The Relation between the Absence and Ventilation.

(3) **Shoichi Nagata, Hironori Huwa, Makoto Nakamura, Isamu Okada, Masaru Nakagami, Yoshio Hayashi and Kunio Takahashi**: A Study of Tuberculosis of pupils and their settled Circumstances, the results of area Investigation in the Circumstances of pupils suffering from Tuberculosis.

(4) **Shoichi Nagata, Makoto Nakamura, Isamu Okada, Masaru Nakagami, Yoshio Hayashi and Kunio Takahashi**: A Study of the social Extermination of Trachoma Hygienic Investigation and Research of Trachoma.

(5) **Masaru Nakagami**: Hygienic Studies on the Actual Condition of the so-called Delicate Children and their Physical and Health Education. (5)

(l) In the 13th Annual meeting of "The physical Education Society of Japan"

(Nov. 1962)

**Masaru Nakagami** : Hygienic Studies on the Actual Condition of the so-called Delicate Children and their Physical and Health Education (6)

(m) In the 33rd Annual Meeting of "The Hygienic Society of Japan" (April.1963)

**Shoichi Nagata, Makoto Nakamura, Isamu Okada, Masaru Nakagami, Yoshio Hayashi and Kunio Takahashi** : Hygienical Studies on the Farmen's Dwellings and their Way of Living in Gifu prefecture.

**Shoichi Nagata, Senzi Kishimoto, Makoto Nakamura, Isamu Okada, Masaru Nakagami, Yoshio Hayashi, Risaburo Iwata and Kunio Takahashi** : Biological and Hygienical Studies on plankton and Algae in Fresh water (5)

(n) In the 11th Annual meeting of the Tokai Branch of "The Physical Education Society of Japan" (June. 1963)

**Ryoichi Hayashi, Masaru Nakagami and Yoki Ose** : On the Health Control of Sportsman (1) On the Results of Health Observation in the Athletic Sports Club Members during their Lodging together.

#### IV 著 書

広瀬一雄, 小瀬洋喜 (分担執筆) : 衛生化学および試験法 (広川書店) (昭和38年4月)