

**The 15th International Symposium on Molecular and Neural Mechanisms of Taste and Olfactory Perception  
(ISMNTOP2016fall: in conjunction with YR Umami Forum 2016, AISCRIB 2016)**

第15回国際シンポジウム“味覚嗅覚の分子神経機構”  
(うま味若手フォーラム2016、  
アジア国際シンポジウム“化学受容と摂食行動”2016併催)

**Organizer: Yuzo Ninomiya**

**Research and Development Center for Taste and Odor Sensing  
Kyushu University**

**PROGRAM & ABSTRACTS**

**December 3-4, 2016  
Kyushu University Station-I and II for Collaborative  
Research (Maidashi campus), Fukuoka, Japan**

## **Hosted by**

**Kyushu University, Research and Development Center  
for Taste and Odor Sensing**

九州大学・味覚・嗅覚センサ研究開発センター

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Ryusuke Yoshida (Kyushu University, Fukuoka, Japan)  
Keiko Yasumatsu (Kyushu University, Fukuoka, Japan)

## **CONTACT**

Secretary: Ryusuke Yoshida

**Division of Sensory Physiology,  
Research and Development Center for Taste and Odor Sensing  
and Section of Oral Neuroscience, Graduate School of Dental Science,  
Kyushu University  
Collabo-station II, 307/308, 3-1-1 Maidashi, Higashi-ku,  
Fukuoka 812-8582, Japan  
Tel: +81-92-642-6312 or 4620, Fax: +81-92-642-6312 or 4620  
e-mail: yoshida.ryusuke.319@m.kyushu-u.ac.jp**

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# The 15th International Symposium on Molecular and Neural Mechanisms of Taste and Olfactory Perception (YRUF2016/AISCRIB2016)

December 3, Saturday -----

■ Opening remarks 13:00 - 13:10 Yuzo Ninomiya (Kyushu Univ.)

■ Session I (AISCRIB2016 session) 13:10 – 14:55

## Chemosensory systems in insects

[Chair: Mamiko Ozaki (Kobe Univ.)]

IS1-1 13:10 - 13:40 (invited talk)

### Unveiling *Drosophila* bitter receptors

Seok Jun Moon

*Department of Oral Biology, Yonsei University College of Dentistry*

IS1-2 13:40 - 14:10

### Contact olfactory sensing for mestmate-nonnestmate discrimination in the Japanese carpenter ant, *Camponotus japonicus*

Mamiko Ozaki, Yusuke Takeichi

*Department of Biology, Graduate School of Science, Kobe University, Kobe, Japan*

IS1-3 14:10 - 14:55 (Special lecture)

### Gustation and decision-making feeding behavior of *Drosophila*

Teiichi Tanimura

*Department of Biology, Faculty of Science, Kyushu University, Fukuoka, Japan*

▶ Break 14:55 - 15:15

■ Session II 15:15 – 17:35

## Olfaction

[Chair: Kazushige Touhara (The Univ. of Tokyo)]

IS2-1 15:15 - 15:40

### Bcl11b Governs the Binary Fate of Olfactory Sensory Neurons

Takayuki Enomoto<sup>1</sup>, Hidefumi Nishida<sup>2</sup>, Tetsuo Iwata<sup>1</sup>, Kanako Nakayama<sup>2</sup>, Akito Fujita<sup>2</sup>, Takahiro Kashiwagi<sup>2</sup>, Rei Kajitani<sup>2</sup>, Takehiko Ito<sup>2</sup>, Makoto Ohmoto<sup>3</sup>, Ichiro Matsumoto<sup>3</sup>, and Junji Hirota<sup>1,2</sup>

<sup>1</sup>Center for Biological Resources and Informatics, Tokyo Institute of Technology, Yokohama 226-8501, Japan,

<sup>2</sup>Department of Life Science and Technology, Graduate School of Life Science and Technology, Tokyo Institute of Technology, Yokohama 226-8501, Japan, <sup>3</sup>Monell Chemical Senses Center, Philadelphia, PA 19104, USA

IS2-2 15:40 - 16:05

### Juvenile pheromone received by a specific vomeronasal receptor suppresses sexual behaviors in virgin female mice

Takuya Osakada<sup>1,2,4</sup>, Hiromi Mori<sup>1,2</sup>, Yoshihiro Yoshihara<sup>2,3</sup>, Kazunari Miyamichi<sup>1,2</sup>, Kazushige Touhara<sup>1,2</sup>

<sup>1</sup>Graduate School of Agricultural and Life Sciences, The University of Tokyo, <sup>2</sup>ERATO Touhara Chemosensory Signal Project, <sup>3</sup>RIKEN Brain Science Institute, <sup>4</sup>Research fellow of Japan Society for the Promotion of Science

IS2-3 16:05 - 16:30

### Role of the ventromedial hypothalamus on sexual behavior in female mice

Kensaku Nomoto<sup>1,2</sup> and Susana Q. Lima<sup>1</sup>

<sup>1</sup>Champalimaud Neuroscience Programme, Lisbon, Portugal, <sup>2</sup>Azabu University, Sagami-hara, Japan

▶ Break 16:30 - 16:45

**IS2-4 16:45 - 17:10**

**The identification of unusual branched chain free fatty acids for individual recognition in the domestic cat**

Masao Miyazaki

*Department of Biological Chemistry and Food Sciences, Faculty of Agriculture, Iwate University*

**IS2-5 17:10 - 17:35**

**Dissection of Neural Circuit Mediating Olfactory Alarm Reaction in Zebrafish**

Miwa Masuda<sup>1,2</sup>, Sayoko Ihara<sup>2,3</sup>, Tetsuya Koide<sup>1</sup>, Nobuhiko Miyasaka<sup>1</sup>, Noriko Wakisaka<sup>1</sup>,  
Keiichi Yoshikawa<sup>3</sup>, Kazushige Touhara<sup>2,3</sup>, Yoshihiro Yoshihara<sup>1,2</sup>

<sup>1</sup>RIKEN Brain Science Institute, <sup>2</sup>ERATO Touhara Chemosensory Signal Project, JST, <sup>3</sup>Department of Applied Biological Chemistry, Graduate School of Agricultural and Life Sciences, The University of Tokyo

**■ Poster Session & Social Gathering 17:50 – 20:30**

@ Collabo-Station II, IF Communication lounge, Kyushu University

**December 4, Sunday -----**

**■ Session III 9:30 – 11:30**

**Unravelling of molecular logic of chemosensory signaling**

[Chair: Makoto Tominaga (Okazaki Inst. for Integ. Biosci.), Akiyuki Taruno (Kyoto Prefec. Univ. Med.)]

**IS3-1 9:30 - 10:10 (invited talk)**

**Proton channels and potassium channels collaborate to mediate sour taste transduction**

Emily R. Liman

*Section of Neurobiology, University of Southern California, Los Angeles, CA*

**IS3-2 10:10 - 10:40 (invited talk)**

**Structural basis for inhibition of wasabi receptor TRPA1 by HC-030031**

Makoto Tominaga<sup>1,2</sup>

<sup>1</sup>Division of Cell Signaling, Okazaki Institute for Integrative Bioscience (National Institute for Physiological Sciences), National Institutes of Natural Sciences, <sup>2</sup>SOKENDAI (The Graduate University for Advanced Studies)

**IS3-3 10:40 - 11:05**

**Induction of foreign genes in taste cells *in vivo***

Akiyuki Taruno<sup>1</sup>, Yoshinori Marunaka<sup>1,2</sup>

*Departments of <sup>1</sup>Molecular Cell Physiology and <sup>2</sup>Bio-Ionomics, Kyoto Prefectural University of Medicine, Kyoto, Japan*

**IS3-4 11:05 - 11:30**

**HCN channels are not principally involved in acid detection in mice**

Noriyuki Nakashima

*Department of Physiology, School of Medicine, Kurume University*

**▶ Lunch and Poster Session 11:30 – 13:00**

**■ Session IV 13:00 – 15:00**

**New approaches for functional identification of taste signaling molecules**

[Chair: Teiichi Tanimura (Kyushu Univ.), Yoshiro Ishimaru (Uviv. of Tokyo)]

**IS4-1 13:00 - 13:40 (invited talk)**

**Interrogating sweet taste cells**

Robert F. Margolskee

*Monell Chemical Senses Center, 3500 Market Street, Philadelphia, PA 19104, USA*

**IS4-2 13:40 - 14:10 (invited talk)**

**Structural and functional properties of the ligand-binding domains of taste receptor T1r heterodimer: dimerization, taste-substance binding, and conformational change**

Atsuko Yamashita

*Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama University*

**IS4-3 14:10 - 14:35**

**Opening the door to a new era of taste research**

Ken Iwatsuki<sup>1</sup>, Jiang Peihua<sup>2</sup>

*<sup>1</sup>Department of Nutrient Science and Food Safety, Tokyo University of Agriculture, Tokyo, <sup>2</sup>Monell Chemical Senses Center, Philadelphia, PA*

**IS4-4 14:35 - 15:00**

**Functional analyses of fat and bitter taste perceptions in chickens**

Fuminori Kawabata, Yuko Kawabata, Bapon Dey, Shotaro Nishimura, Shoji Tabata

*Laboratory of Functional Anatomy, Faculty of Agriculture, Kyushu University, Fukuoka, Japan*

▶ Break 15:00 - 15:10

**■ Session V 15:10 – 16:40**

**Nutrient sensing for preference and energy homeostasis**

[Chair: Satoshi Wakisaka (Osaka Univ.)]

**IS5-1 15:10 - 15:40 (invited talk)**

**A mixture of umami substances, but not single components, conditions flavor preference in weanling rats**

Takashi Yamamoto

*Department of Nutrition, Faculty of Health Sciences, Kio University, Nara, Japan*

**IS5-2 15:40 - 16:10 (invited talk)**

**Role of hypothalamic sweet taste receptor in the control of energy homeostasis**

Daisuke Kohno<sup>1,2</sup>, Miho Koike<sup>1</sup>, Yuzo Ninomiya<sup>3,4</sup>, Itaru Kojima<sup>2</sup>, Tadahihiro Kitamura<sup>2</sup>, Toshihiko Yada<sup>5</sup>

*<sup>1</sup>ASRLD Unit, Gunma University, <sup>2</sup>Institute for Molecular and Cellular Regulation, Gunma University, <sup>3</sup>Research and Development Center for Taste and Odor sensing, Kyushu University, <sup>4</sup>Monell Chemical Senses Center, <sup>5</sup>Department of Physiology, Jichi Medical University*

**IS5-3 16:10 - 16:40 (invited talk)**

**Stimulation of the Calcium-sensing Receptor by Physiological Concentrations of Glucose**

Itaru Kojima

*IMCR Gunma University, Maebashi, Japan*

**■ Closing remarks 16:40 - Teiichi Tanimura (Kyushu Univ.)**

[Discussants:

Kyung Nyun Kim (Gangneung Natl Univ), Jeong Won Jahng (Seoul Natl Univ), Je Won Jung (Seoul Natl Univ), Seok Jun Moon (Yonsei Univ Coll of Dent), Dong Min Shin (Yonsei Univ Coll of Dent), Inik Chang (Yonsei Univ Coll of Dent), Soon Hong Park (Yonsei Univ Coll of Dent), Jeong Oh Shin (Yonsei Univ Coll of Dent), Hyung Joon Ahn (Yonsei Univ Coll of Dent), Yamamoto T (Kio Univ), Kojima I (Gunma Univ), Tominaga M (Okazaki Inst for Integ Biosci), Toyono T (Kyushu Dent Coll), Seta Y (Kyushu Dent Coll), Hayashi Y (Kyoto Univ), Inui C (Osaka Univ), Inui T (Osaka Univ), Ishimaru Y (Univ of Tokyo), Iwatsuki K (Tokyo Univ Agricul), Kawabata F (Kyushu Univ), Kido M (Saga Univ), Kohno D (Gunma Univ), Nakashima N (Kurume Univ), Sako N (Asahi Univ), Yamashita A (Okayama Univ), Taruno A (Kyoto prefec Univ Med), Hirota J (Tokyo Tech Coll), Osakada T (Univ of Tokyo), Nomoto K (Azabu Univ), Miyazaki M (Iwate Univ), Masuda M (RIKEN), Imai H (Kyoto Univ), Kohmura M (Ajinomoto Co Inc), Uneyama H (Ajinomoto Co Inc), Ohkuri T (Suntry Global Innovation Center Ltd)]

## ■ Poster Session

### ISP01

#### **Gustatory second-order neurons that convey sugar taste information to the feeding/reward systems in *Drosophila***

Takaaki Miyazaki<sup>1,2,3</sup>, Tzu-Yang Lin<sup>1</sup>, Chi-hon Lee<sup>1</sup>, Mark Stopfer<sup>1</sup>, Kei Ito<sup>2</sup> and Emiko Suzuki<sup>3</sup>

<sup>1</sup>NIH-NICHD, <sup>2</sup>IMCB, Univ. Tokyo, <sup>3</sup>National Institute of Genetics, Japan

### ISP02

#### **A ghost leg-like 3D network of the dendritic processes of 100 receptor neurons in the nestmate-nonnestmate discriminating sensillum of the Japanese carpenter ant, *Camponotus japonicus***

Yusuke Takeichi<sup>1</sup>, Kouji Yasuyama<sup>2</sup>, Naoyuki Miyazaki<sup>3</sup>, Kazuyoshi Murata<sup>4</sup>, Masaru K. Hojo<sup>1</sup>, Mamiko Ozaki<sup>1</sup>

<sup>1</sup>Kobe University, <sup>2</sup>Kawasaki Medical School, <sup>3</sup>Osaka University, <sup>4</sup>National Institute of Physiological Science

### ISP03

#### **Neural circuits underlying glucose chemotaxis learning in *Caenorhabditis elegans***

Risshun Chin, Yutaro Ueoka, Chihiro Uchiyama, Keita Katae, Masahiro Tomioka, Yuichi Iino

Department of Biological Sciences, Graduate School of Science, The University of Tokyo

### ISP04

#### **Roles of the Cl<sup>-</sup> channel *clh-1* in salt chemotaxis learning of *Caenorhabditis elegans***

ChanHyun Park, Yuki Sakurai, Hirofumi Kunitomo, Yuichi Iino

Department of Biological Sciences, School of Science, University of Tokyo

### ISP05

#### **Analysis of a regulatory mechanism of taste avoidance learning in *C. elegans***

Yasuaki Ike, Tao Jiang, Masahiro Tomioka and Yuichi Iino

Department of Biological Sciences, Graduate School of Science, The University of Tokyo

### ISP06

#### **Roles of FOXO transcription factor in taste avoidance learning in *C. elegans***

Takashi Nagashima, Masahiro Tomioka, Yuichi Iino

Dept. of Biological Sciences, Graduate School of Science, The Univ. of Tokyo

### ISP07

#### **Fish taste receptor type 1 (T1R) extracellular domains exhibit broad specificity for ligand binding**

Nanako Atsumi<sup>1</sup>, Yukiyo Nomura<sup>1</sup>, Norihisa Yasui<sup>1</sup>, Maude Baldwin<sup>2</sup>, Atsuko Yamashita<sup>1</sup>

<sup>1</sup>Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama University, <sup>2</sup>Max Planck Institute for Ornithology

### ISP08

#### **Expression patterns of multiple umami taste receptors in chickens; metabotropic glutamate receptor type 4 is not involved in umami receptor systems of chickens**

Yuta Yoshida, Fuminori Kawabata, Shotaro Nishimura, and Shoji Tabata

Laboratory of Functional Anatomy, Faculty of Agriculture, Kyushu University, Fukuoka, Japan

### ISP09

#### **Functional analysis of the extracellular calcium-sensing receptor (CaSR) of chicken**

Hikaru Omori, Yuko Kawabata, Fuminori Kawabata, Shotaro Nishimura, Shoji Tabata

Laboratory of Functional Anatomy, Faculty of Agriculture, Kyushu University, Fukuoka, Japan

### ISP10

#### **The expression of T1r2-independent sweet taste molecules and preferences for sweet substances in chickens**

Momoko Higashida, Yuko Kawabata, Fuminori Kawabata, Shotaro Nishimura, Shoji Tabata

Laboratory of Functional Anatomy, Faculty of Agriculture, Kyushu University, Fukuoka, Japan

#### **ISP11**

##### **Disruption of oral somatosensory relay, but not taste sensory, may increase depression-like behaviors in rats**

Sena Chung, Doyun Kim, Jong-Ho Lee, Jeong Won Jahng

*Dental Research Institute, Department of Oral & Maxillofacial Surgery, Seoul National University School of Dentistry, Seoul, Korea*

#### **ISP12**

##### **Temperature changes affect intercellular adhesion of oral epithelial cells**

Reiko Yoshimoto<sup>1,2</sup>, Reona Aijima<sup>4</sup>, Yasuyoshi Ohsaki<sup>3</sup>, Jing-Qi Zhang<sup>3</sup>, Cao Ailin<sup>3,4</sup>, Tamotsu Kiyoshima<sup>2</sup>, Mizuho A. Kido<sup>4</sup>

*<sup>1</sup>Periodontology, <sup>2</sup>Oral Pathology, <sup>3</sup>Molecular Cell Biology and Oral Anatomy, Graduate School of Dental Science, Kyushu University, <sup>4</sup>Anatomy and Physiology, Faculty of Medicine, Saga University*

#### **ISP13**

##### **Analysis of the function of SP/KLF family in the promoter of mouse T1R1 amino acids (umami) receptor gene in C2C12 cells**

Takashi Toyono<sup>1</sup>, Yuki Hirata<sup>2</sup>, Shinji Kataoka<sup>1</sup>, Mitsushiro Nakatomi<sup>1</sup>, Ryuji Hosokawa<sup>2</sup>, Yuji Seta<sup>1</sup>

*<sup>1</sup>Division of Anatomy, Department of Health Promotion, Kyushu Dental University, <sup>2</sup>Division of Oral Reconstruction and Rehabilitation, Department of Oral Functions, Kyushu Dental University*

#### **ISP14**

##### **The antibody against a bitter taste receptor affects bitter sensitivity**

Atsushi Dan<sup>1</sup>, Kaho Kanatani<sup>1</sup>, Sohei Sato<sup>1</sup>, Kimihiko Mizutani<sup>1</sup>, Bunzo Mikami<sup>1</sup>, Kenji Maehashi<sup>2</sup>, Takashi Iino<sup>3</sup>, Mujo Kim<sup>3</sup>, Yukako Hayashi<sup>1</sup>

*<sup>1</sup>Grad. Sch. Agr., Kyoto Univ., <sup>2</sup>Dept. Ferment. Sci., Tokyo Univ. Agri., <sup>3</sup>Pharma Foods International Co., Ltd.*

#### **ISP15**

##### **The Signal of Sour Taste have Specific Route to Gustatory Nerve Fivers**

Norihiro Fujimoto, Hidenori Shimizu, Yukako Hayashi

*Laboratory of Quality Analysis and Assessment, Grad. Sch. of Agric. Kyoto Univ.*

#### **ISP16**

##### **Bitter taste rejection and recognition in mice after repeated bitter exposure**

Emi Mura, Minako Yagi, Kohei Yokota, Kentaro Matsumiya, Yasuki Matsumura, Yukako Hayashi

*Grad. Sch. Agriculture., Kyoto Univ.*

#### **ISP17**

##### **Aging-related changes in taste sensitivity and preference**

Rihoko Shimizu, Yukako Hayashi

*Graduate School of Agriculture of Kyoto University*

#### **ISP18**

##### **Comparison of sweet taste sensitivity between Japanese monkey and human**

Emiko Nishi, Kei Tsutsui, Hiroo Imai

*Molecular Biology Section, Dept. of Cellular and Molecular Biology, Primates Research Institute, Kyoto University*

#### **ISP19**

##### **The effects of optogenetic stimulation of the basolateral amygdala on the retrieval of conditioned taste aversion in mice: a preliminary study**

Tadashi Inui

*Osaka University*

#### **ISP20**

##### **The effects of the intake of unpalatable chow on the feeding behavior and development of mandibular condyle in young rats**

Chizuko Inui-Yamamoto<sup>1</sup>, Tadashi Inui<sup>2</sup>, Shiho Honma<sup>1,3</sup>, Makoto Abe<sup>1</sup>, Satoshi Wakisaka<sup>1</sup>

*<sup>1</sup>Oral Anatomy and Developmental Biology, Osaka University Graduate School of Dentistry, <sup>2</sup>Behavioral*



#### **ISP21**

##### **Measurement of saltiness using a hybrid sensor composed of lipid/polymer membrane sensor (taste sensor) and Na ion sensor**

Y. Muto<sup>1</sup>, Y. Kaneda<sup>2</sup>, K. Toko<sup>2</sup>

<sup>1</sup>SLS, Kyushu Univ., <sup>2</sup>ISEE, Kyushu Univ.

#### **ISP22**

##### **Development of inverse opal photonic crystal array for odor sensing**

Y. Komori<sup>1</sup>, T. Onodera<sup>2</sup>, K. Toko<sup>1,2</sup>

<sup>1</sup>Graduate School of Information Science and Electrical Engineering, Kyushu University, <sup>2</sup>Research and Development Center for Taste and Odor Sensing, Kyushu University

#### **ISP23**

##### **Analysis of sweet taste and its enhancement by NaCl via SGLT1 in mouse chorda tympani and glossopharyngeal nerves**

Keiko Yasumatsu<sup>1,2</sup>, Tadahiro Ohkuri<sup>2</sup>, Shusuke Iwata<sup>2</sup>, Robert. F. Margolskee<sup>3</sup>, Yuzo Ninomiya<sup>1,2,3</sup>

<sup>1</sup>Division of Sensory Physiology, Research and Development Center for Taste and Odor Sensing, Kyushu Univ., Fukuoka 812-8582, JAPAN, <sup>2</sup>Sect. Oral Neuroscience, Grad. Sch. of Dent., Kyushu Univ., <sup>3</sup>Monell Chemical Senses Center

#### **ISP24**

##### **The expression of glucose-dependent insulinotropic polypeptide receptor (GIPR) and insulin receptor (IR) in mouse taste cells**

Shingo Takai<sup>1</sup>, Yuzo Ninomiya<sup>2,3</sup>, Noriatsu Shigemura<sup>2</sup>

<sup>1</sup>Section of Oral Neuroscience, Graduate School of Dental Sciences, Kyushu University, <sup>2</sup>Division of Sensory Physiology, Research and Development Center for Taste and Odor Sensing, Kyushu University, <sup>3</sup>Monell Chemical Senses Center

#### **ISP25**

##### **Intracellular acidification is implicated in full activation of the sweet taste receptor in taste-modifying effect of miraculin**

Keisuke Sanematsu<sup>1</sup>, Masayuki Kitagawa<sup>1</sup>, Ryusuke Yoshida<sup>1,2</sup>, Satoru Nirasawa<sup>3</sup>, Noriatsu Shigemura<sup>1</sup>, Yuzo Ninomiya<sup>1,4</sup>

<sup>1</sup>Section of Oral Neuroscience, and <sup>2</sup>OBT Research Center, Graduate School of Dental Sciences, and <sup>4</sup>Division of Sensory Physiology, Research and Development Center for Taste and Odor Sensing, Kyushu University, Fukuoka, Japan, <sup>3</sup>Japan International Research Center for Agricultural Sciences, Tsukuba, Ibaraki, Japan

#### **ISP26**

##### **Renin-angiotensin system (RAS) in peripheral taste organs**

Noritsu Shigemura<sup>1,2</sup>, Yuzo Ninomiya<sup>2</sup>

<sup>1</sup>Section of Oral Neuroscience, Graduate School of Dental Science, Kyushu University, <sup>2</sup>R&D Center for taste and odor sensing, Kyushu University, Japan

#### **ISP27**

##### **Responsiveness of gustducin-expressing taste cells to multiple bitter compounds**

Ryusuke Yoshida<sup>1,2</sup>, Singo Takai<sup>1</sup>, Keisuke Sanematsu<sup>1</sup>, Robert F. Margolskee<sup>3</sup>, Noriatsu Shigemura<sup>1,4</sup>, Yuzo Ninomiya<sup>1,3,4</sup>

<sup>1</sup>Section of Oral Neuroscience, and <sup>2</sup>OBT Research Center, Graduate School of Dental Sciences, Kyushu University, Fukuoka, Japan, <sup>3</sup>Monell Chemical Senses Center, Philadelphia, PA, USA, <sup>4</sup>Division of Sensory Physiology, Research and Development Center for Taste and Odor Sensing, Kyushu University, Fukuoka, Japan