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| Division of Natural System | Research field | Insect Molecular Biology | Lab. ID |
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| Laboratory web site | http://kiya.w3.kanazawa-u.ac.jp/ | | |
| Research subjects | | | |
| <p>Insects exhibit a variety of interesting biological phenomenon, such as metamorphosis and innate behaviors. Using the silkworm (<i>Bombyx mori</i>), vinegar fly (<i>Drosophila melanogaster</i>), and honeybee (<i>Apis mellifera</i>), we are investigating molecular and genetic mechanisms of sexual behaviors of insects and interplay between hormone and behavior. The main research topics are as follows.</p> | | | |
| <p>1. Visualization and manipulation of neural circuits that regulate sexual behavior in insect brains.</p> <p>Insects communicate sexual information using species-specific sex pheromones. The actions of sex pheromones are well-investigated, but the neural mechanisms that regulate sexual behavior in response to sex pheromones are still elusive. Recently, we identified a novel immediate early gene (whose expression is upregulated by neural activity), Hr38, which is conserved in all insect species (Current Biology, 2013). By utilizing the neural activity-dependent transcriptional activity of Hr38, we are establishing a novel activity-mapping systems with gene-modifies insects, such as flies and silkworms. Our final goal of this study is to understand how sensory information is calculated and integrated and how decision is made in the insect brains.</p> | | | |
| <p>2. Novel actions of metamorphic hormones on brain functions.</p> <p>Recent progress on insect molecular biology revealed that metamorphic hormones, such as ecdysone and juvenile hormone, have important actions on insect brain functions. Since Hr38, a novel immediate early gene identified by our group, is a type of ecdysteroid receptor, we are focusing on the functional importance of Hr38 and ecdysteroids on behavioral plasticity. Using the courtship learning of <i>Drosophila</i> and appetitive learning of honeybees, we are revealing how humoral factors and their receptors regulate behavioral and neural plasticities.</p> | | | |
| <p>3. Sexual difference of insect brain function.</p> <p>Insects exhibit a large difference in appearance between males and females. Not only the appearance but also the behavior is drastically distinct between the sexes. The sexual differences in behavior are most evident in the sexual behavior, where sexually dimorphic neural circuits play essential roles. By employing the silkworm as a model organism, we are addressing the questions how sexually dimorphic brain function is produced and what neural circuits governs these behavioral differences. So far, we conducted a comprehensive screenings using subtraction, differential display, and microarray methods, and identified several genes that show sexually differential expression. Utilizing the latest technology, such as genome editing by TALEN and CRISPR/Cas9 systems, we are addressing the above questions.</p> | | | |
| Master/Doctor course: Education policy, curriculum, typical activity in the laboratory | | | |
| <p>Both Master and Doctor course students give presentations in the lab meeting. Twice per half year of progress reports and once per half year of journal club is regular schedule. Depending on the progress of research, conference presentation is possible. We request foreign students to have enough English skills (At least TOEFL > 85 /TOEIC > 800 /IELTS > 6.0). To obtain Ph.D., Doctor course students need to publish at least one paper in the international journals with citation index.</p> | | | |
| Daily life in the laboratory, etc. | | | |
| <p>Students need to be in the lab until 10AM on week days. Lab members are friendly and polite. To obtain MEXT scholarship for PhD program, which is very competitive, candidates need to have at least two papers (including 1st author publications in Master deg. with impact factor) and high GPA score at least > 3.0/4.0.</p> | | | |
| Message or comments by the laboratory faculty staffs | | | |
| <p>We welcome highly motivated students who are willing to work hard for interesting research and good publication. We like students who have playful mind to enjoy good science. Many alumni are working as academic professors at universities or research staffs in national and private institutes. Some alumni contribute to the society as public employees.</p> | | | |
| Recent Master theses in these 3 years (+ more if appropriate) | | | |
| year.month | Thesis title (including English translation of Japanese thesis title) | | |
| 2016.3 | A novel immediate early gene, <i>Hr38</i> , facilitates formation of the long-term courtship memory in the vinegar fly, <i>Drosophila melanogaster</i> | | |

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| 2016.3 | Visualization and manipulation of the neural circuit that respond to sex pheromones of silkworm, <i>Bombyx mori</i> , using activity-dependent expression of a novel immediate early gene, Hr38 |
| 2015.3 | Elucidation of neural circuits in <i>Drosophila melanogaster</i> by neural activity visualization and quantification |
| 2015.3 | Visualization and manipulation of neural circuits responsive to sex pheromone in the silkworm, <i>Bombyx mori</i> |
| 2014.3 | Functional importance of Dhr38 on the long-term courtship memory in the vinegar fly, <i>Drosophila melanogaster</i> |
| 2014.3 | Establishment of transgenic silkworms to visualize neural circuit of sexual behavior |
| 2014.3 | Ecdysteroid signaling facilitates the long-term memory formation in the brain of honeybee, <i>Apis mellifera</i> |
| Recent Doctoral theses in these 3 years (+ more if appropriate) | |
| year.month | Thesis title (including English translation of Japanese thesis title) |
| 2017.9 | Functional Analysis of glioma-associated homolog 1 in maintaining invasive and mesenchymal-like properties of melanoma cells |
| 2012.3 | Studies on the genes induced by ecdysteroid in the larval brain of the silkworm, <i>Bombyx mori</i> . |
| 2011.3 | Studies on the regulation mechanism of sugar metabolism during the larval-pupal transition of the silkworm, <i>Bombyx mori</i> . |
| 2010.9 | Studies on the molecular structure, organization, and expression of novel bombyxin genes of the silkworm <i>Bombyx mori</i> . |
| 2010.9 | Determinations of the active sites of yeast killer toxin HM-1 and the <i>Saccharomyces cerevisiae</i> genes involved in the killing action of HM-1. |
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