

Private University Research Branding Project 2017 Progress Report

Educational Corporation Code	141001	Educational Corporation Name	Azabu University of Veterinary Science		
University Name	Azabu University				
Project Title	Developing a Science of Human-Animal Symbiosis to Realize a Healthy Human Society				
Application Type	Type B	Support Period	5 Years	Accommodation Capacity	2160 individuals
Planning Team	Department of Veterinary Medicine, Department of Life and Environmental Science, Post-Graduate Course in Veterinary Medicine, Post-Graduate Course in Environmental Health				
Project Summary	The aim of this project is to scientifically explain “Human-Animal Symbiotic Systems” and to contribute to the realization of a healthy human society through information about the structure of said symbiosis. We will explore our close social relationship with animals as represented by dogs, revealing specifically why symbiosis is valid, to what extent animal-derived microbial flora promote human health due to symbiosis, and the mechanisms of human-animal symbiosis from the perspective of molecular biology. To achieve our goal, we have established the following three themes and seek to contribute to building a new science of human-animal symbiosis as well as to human society.				
① Project Purpose	<p><i>Canis lupus familiaris</i> is the oldest domesticated animal, having lived with humans for roughly 40,000 to 50,000 years. In the course of their cohabitation, humans and dogs have formed a special relationship, with dogs being found widely throughout human society as the most familiar animal. It has long been thought that living with dogs has both mental and physical benefits for humans. Thus, on this issue, we will strive to elucidate the mechanisms of the relationship between humans and animals, as represented by dogs, from the perspective of the contribution to human health using both molecular biology and ethology. We will come together as a university to create this new science of human-animal symbiosis with the ultimate goals of creating a unique brand for the university and contributing to the realization of a healthy human society.</p>				
② 2017 Execution Goals and Plan	<ul style="list-style-type: none"> ● Execution Goals <p>To achieve the objectives of this project, we established three themes and executed projects in each theme. The total of 14 projects can be broken down into 4 projects for “cognitive interaction analysis,” 7 for “identification of coevolutionary genes,” and 3 for “microbe cross-talk.” The study progressed through coordination and collaboration between projects.</p> <ul style="list-style-type: none"> ● Execution Plan <p>Goals were set and research plans established for the following 14 research projects. The projects were then implemented according to these plans.</p> <p>[Theme 1: Cognitive interaction analysis] Dynamic motor analysis will be implemented using motion capture of the dogs’ interactions with the its owner and a stranger to explore the affinity-cognitive response relationship.</p> <p>1-1. Conditions for a pet friendly community: Enacting deliberative polling (DP) with “mini-publics” and community epidemiology surveys in America and Sagami-hara</p> <p>1-2. A study of the construction of scientific communication in the science of human-animal symbiosis and its transmission</p> <p>1-3. Elucidation of the cognitive interaction between humans and canines from the perspective of behavioral genetics and assessment of the symbiotic QOL brought about by that interaction</p> <p>[Theme 2: Identification of coevolutionary genes] Comprehensive SNP (single nucleotide polymorphism) analysis of DNA for a canine disease group and a canine non-disease group will be performed.</p> <p>Polymorphism analysis, including SPN analysis, will also be conducted for coevolutionary genes.</p> <p>2-1. Analysis of common genes expressed in cancer stem cells of humans and canines</p> <p>2-2. Exploration of metastasis and infiltration driver genes through gene signature analysis and construction of a canine tumor repository</p> <p>2-3. Improvement of productivity in animals focusing on the energy-consuming protein Ucp1 gene and health</p> <p>2-4. Analysis of changes in carcinogenic susceptibility through human-animal symbiosis: Toward building a healthier environment</p> <p>2-5. Identification of pathogenic genes of viral infection through chemical genetics</p> <p>2-6. Elucidation of pathogenesis based on comparative analysis of various diseases with consideration of animal systematics and evolution: Exploring the origins of disease</p> <p>2-7. Identification of causative genes of human AA amyloidosis based on comparative pathology</p> <p>[Theme 3: Microbe cross-talk] The relationship between human epidemiological data and bacterial flora will be analyzed using Bayesian estimation.</p> <p>3-1. Elucidation of human-health-promoting mechanisms stemming from symbiosis with dogs focusing on bacterial flora cross-talk</p> <p>3-2. Exploration of allergy-suppressing bacteria from canine bacterial flora</p> <p>3-3. Foundational research on the effect of indoor mold flora due to pet ownership on the human immune system</p>				

<p>③ 2017 Project Achievements</p>	<ul style="list-style-type: none"> ● Primary Research Results <p>[Theme 1: Cognitive interaction analysis]</p> <p>1-1. A descriptive epidemiological survey was performed to investigate what kind of pet communities are being formed in America. Further, saliva samples from pet owners were collected and flora analysis executed. In the future, our plan is to increase the survey sample and perform an integrated analysis.</p> <p>1-2. Panels were held at the university festival and open campus days and a science fair put on to increase knowledge of this new field, “the science of human-animal symbiosis.” An awareness survey regarding the project was then performed via questionnaires for participants.</p> <p>1-3. The spatiotemporal change in canine-human mutual communication using an accelerometer and electrocardiograph was quantified. Further, identification of genes controlling dogs’ exceptional sociality with humans was carried out and several candidate genes found.</p> <p>1-4. Lactic acid fermentation was performed with meat obtained from deer captured under wild animal damage prevention policies. The deer meat was confirmed to have higher antioxidant effects and angiotensin I-converting enzyme inhibitory actions than meat for human consumption.</p> <p>[Theme 2: Identification of coevolutionary genes]</p> <p>2-1. It was revealed in 9 cases of canine mammary cancer that xCT gene expression matches CD44v8-10 gene expression. Thus, the canceration mechanism was found to be the same as in humans.</p> <p>2-2. Eight cases of canine malignant melanoma and twelve cases of other tumors were stored to build a repository.</p> <p>2-3. Full-length cDNA for four bovine UCP1 variants were determined and their genetic diversity discovered.</p> <p>2-4. Gene polymorphism of xenobiotic metabolizing enzymes in healthy dogs (beagles) was explored and polymorphism different from past findings discovered in the CYP1A2 gene.</p> <p>2-5. Two compounds, SF232 and SF235, which are effective against the bovine leukemia virus, were discovered and their mechanisms of action analyzed.</p> <p>2-6. The involvement of tau proteins, which appear in Alzheimer’s-disease-related lesions seen in high rates in former Felinae animals, in the hyperphosphorylation process was revealed.</p> <p>2-7. The amino acid sequence of AA amyloid being deposited in cases of AA amyloidosis in pigs, dogs, cats, cows, humans, and goats was determined and the specific structures involved in deposition discovered.</p> <p>[Theme 3: Microbe cross-talk]</p> <p>3-1. A cohort study of adolescent children was performed. A questionnaire about dog ownership and samples of saliva, etc., were collected from 376 children to create a nasal/oral bacteria library.</p> <p>3-2. An allergy diagnosis, stool sample, and oral swab were collected from 14 dogs in group A that were in the same environment and of the same breed. DNA was extracted from these samples and flora examination performed through genetic analysis.</p> <p>3-3. An investigation of mold flora in 19 homes with a pet (dog) living indoors and 6 homes without pets was performed.</p>
<p>④ 2017 Self-Evaluation/Assessment & External Evaluation Results</p>	<ul style="list-style-type: none"> ● Self-Evaluation/Assessment <p>The execution goals and plan for this project fit with the overall objective, the concept of “Developing a Science of Human-Animal Symbiosis to Realize a Healthy Human Society.” Thus, the contents were in agreement with our research foundation and are considered appropriate for a project establishing a brand for this university. When we performed a self-evaluation/assessment of the research project contents, there were differences in the progress for each project in terms of their 2017 research achievement status. Therefore, with reference to the opinion of an external evaluation committee, we constructed a research plan for 2018 to allow groups for whose study progress is good to shift their research contents to become even more appropriate for branding as well as to resolve the challenges resulting in delays for projects that have seen slow progress. We have confirmed that steady results will be attained in both research and public relations activities through this kind of objective understanding of the status of research progress and implementation of a PDCA cycle to make appropriate assessments and improvements.</p> <ul style="list-style-type: none"> ● External Evaluation <p>We commissioned an assessment by an external evaluation committee of 4 members. In April 2018, presentations on the 2017 research results and public relations activities of each project were given and judged by the external evaluation committee. Each committee member assessed the respective project presentations on a four-point scale (4: excellent, 3: good, 2: somewhat insufficient, 1: insufficient). The total points for research results and public relations activities from all 4 committee members was used as the project evaluation score (maximum score 32 points). Evaluation scores ranged from 16 to 28 for the 14 projects. The committee also conducted oral and written evaluations of each presentation regarding how the project could proceed smoothly in the future. Further, in order to reflect these evaluations in the 2018 research plan, the committee also evaluated the scheduled 2018 research plan and public relations activities for each project with a similar points system (4: exceptional progress is expected, 3: progress is expected, 2: little progress is expected, 1: almost no progress is expected). As mentioned above, the results of the external evaluation will be incorporated into the PDCA cycle within the school and will be reflected in the project execution plan for next year and onward.</p>
<p>⑤ Status of 2017 Subsidy Use</p>	<p>To achieve the objectives of this project, we established 3 themes and performed a total of 14 projects across all themes. Research funds were primarily disbursed for personnel expenses, equipment (laboratory instruments, analysis devices, etc.), and supplies (laboratory materials, reagents, etc.). Funds were also spent on fees for public relations activities for the purpose of publicizing the project both inside and outside the university, including advertising fees (newspapers), fees for creating posters, leaflets, etc., and various expenses for the science fair.</p>