

Inter-University Exchange Project
: Building upon generations of
collaboration between
University of Zambia and Hokkaido University for
the future of Africa – Japan relations

International Veterinary and Conservation Medicine Education Program [IVCMEP]



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Education Program [IVCMEP]

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Human Resource Development for Conservation Medicine

The concept of "conservation medicine" is a new academic field that has spread rapidly around the world since the beginning of the year 2000. Environmental changes caused by human activities and the associated health problems caused by infectious diseases and pollutants are issues that must be solved worldwide. Conservation medicine is based on the concept of One Health, which considers health not only of humans, but also of animals, ecosystems, society, and, more broadly, the entire planet. The promotion of conservation medicine requires multidisciplinary collaboration that transcends the boundaries of the humanities and sciences, including medicine, ecology, veterinary medicine, engineering, agriculture, economics, earth sciences, informatics, literature, and anthropology. We have established a curriculum that allows students from various fields to participate.

Program name & concepts

The acronym "IVCMEP" stands for International Veterinary and Conservation Medicine Education Program. IVCMEP reads as "I've come up". This is based on the concept of a cycle of knowledge in which human resources raised through exchange between the University of Zambia (UNZA) and Hokkaido University (HU) return to their home countries and lead the next generation in their respective countries. A logo is designed to represent the concept of One Health, in which various fields are interrelated and the health of the entire planet is considered, and the other is shaped in green, the base color of the national flags of Hokkaido University and the Republic of Zambia.



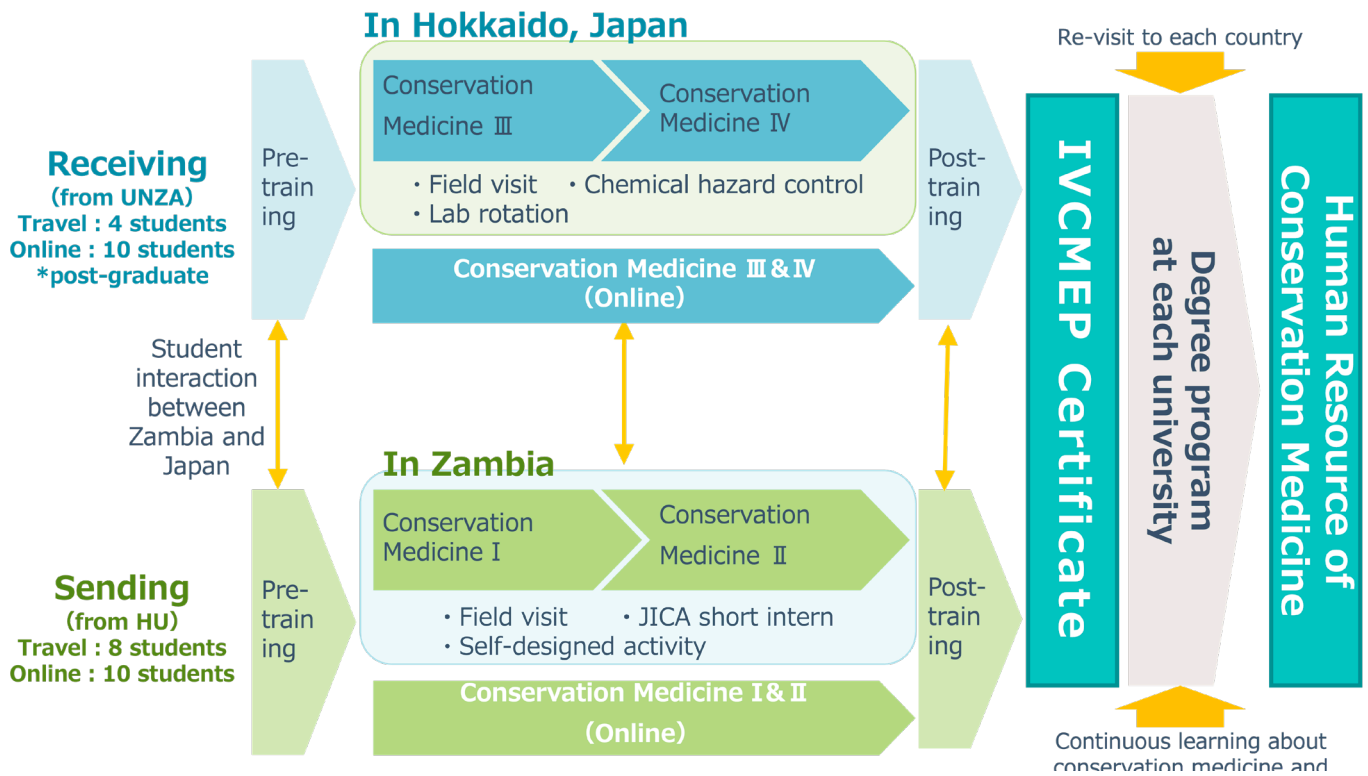
HOKKAIDO x ZAMBIA

IVCMEP

I've come up

International Veterinary and
Conservation Medicine
Education Program

Course Outline

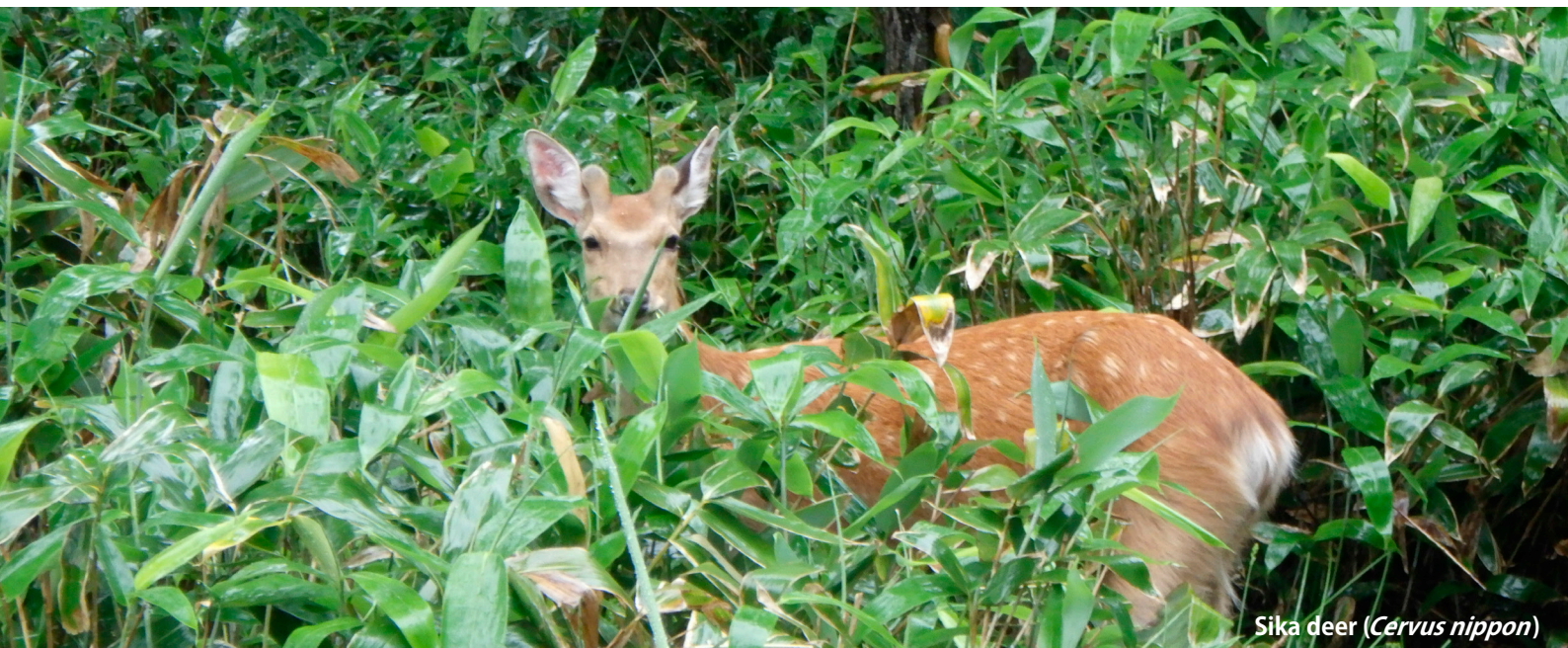


Evaluation based on Competency and Rubric

Competency is used as an evaluation index of achievement that specifically indicates the knowledge, skills, and behaviors that can be summarized in a chart called Rubric when students achieve each goal. Students who are evaluated can understand "what behavioral characteristics were evaluated" and "which behavioral characteristics were inadequate," very clearly when they refer to the assessment sheet. It can greatly help students with their motivations to study. This year, we have created and implemented a rubric with five levels as shown in the table.

Rubric set for IVCMEP 2022

	A	B	C	D	E
1. Understanding of One Health	Able to explain a concept and knowledge of One Health both to experts and general public and discuss social issues related to conservation medicine.	Able to explain a concept and knowledge of One Health both to experts and general public.	Acquired exhaustive knowledge of One Health and understand the concept of One Health.	Acquired practical knowledge of One Health	Not aware of the concept/knowledge of One Health
2. Interdisciplinary Sense	Able to collaborate with people in various related fields and build networks.	Able to collect information and knowledge from other related fields and utilize them for one's problem solving.	Able to collect information from various related fields and organize them for one's problem solving.	Able to collect information from related fields.	Not able to gather information nor knowledge outside of my expertise.
3. Intercultural diversity and international attitude	Able to collaborate with people from different cultures and build networks.	Able to have a discussion on a particular topic with people from different cultures and backgrounds.	Able to communicate ideas to people from different cultures smoothly and achieve mutual understanding.	Able to understand ideas of people from different culture.	Barely interacted with people from different culture.
4. Problem-Solving Skills	Able to solve social issues related to the field of my expertise.	Able to discuss and suggest solutions for social issues related to the field of my expertise.	Able to understand social issues related to the field of my expertise and explain their causes.	Able to name multiple social issues related to the field of my expertise.	Not able to identify social issues.
5. Foreign Language	Able to discuss topics related to One Health in Japanese	Able to explain his/her field of expertise in Japanese	Able to respond to daily conversation in Japanese	Able to greet people in Japanese	Cannot understand Japanese language at all

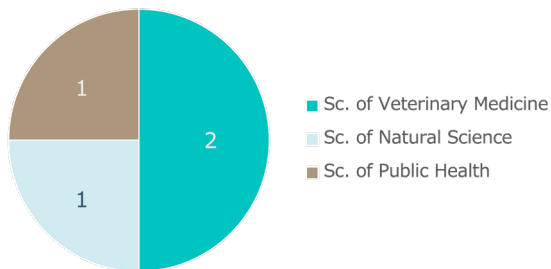


Sika deer (*Cervus nippon*)

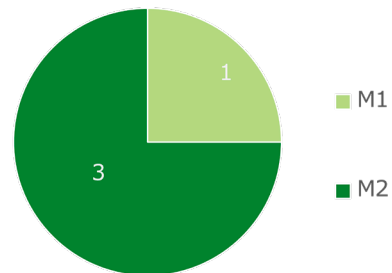
Outline of the Program in 2022

Receiving students from Zambia Participants from the University of Zambia

Students' affiliation



Academic year



Activities in Hokkaido, Japan

Pre-training [June - July]

- Online learning on Japanese culture and language
- Preparation for Lab Rotation

Visiting Hokkaido [Jul. 17 - 29]

- Intensive course for chemical hazard control
- Field visit for environmental management at a mining site
- Field study at Shiretoko National Park
- Lab rotation

Post-training [August - October]

- Activity report presentation
- Report writing
- Lab rotation follow-up

OUTLINE

- General guidance to this class
International Veterinary and Conservation Medicine Education Program to foster the next generation of human resources to bridge between Africa and Japan: Japanese culture
- Japanese culture & society
- Quick language training



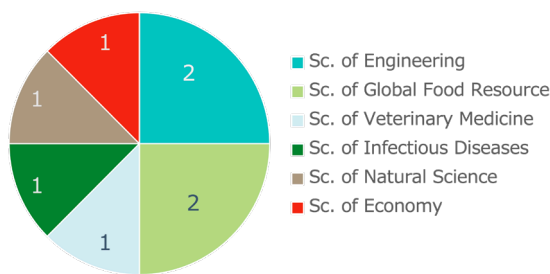
Lab Rotation at Hokkaido University

In order to achieve One Health, the ability to identify/solve issues that are occurring in society today and the ability to communicate across disciplines and cultures are indispensable. Therefore, we set at least two days during the stay in Japan for students to visit laboratories at Hokkaido University according to their interests and expertise, and for students to take the initiative in their activities. This year, students visited laboratories in the School of Veterinary Medicine; lab of parasitology, toxicology, and hygiene. The students coordinated the contents with the host faculty as a preliminary study, and after actually traveling to Japan, they trained in field sampling and experimental techniques during the Lab Rotation period, reported their results in the form of presentations on the last day of their stay, and wrote reports after returning home. Presentation materials and reports are also included in this booklet.

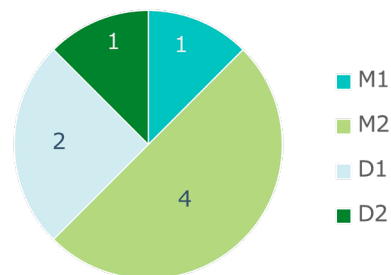


Sending students to Zambia Participatns from Hokkaido Univeristy

Students' affiliation



Academic year



Activities in Zambia

Pre-training [June - July]

- Academic English
- Overseas risk management seminar
- JICA Zambia online seminar
- Preparation for self-designed activities



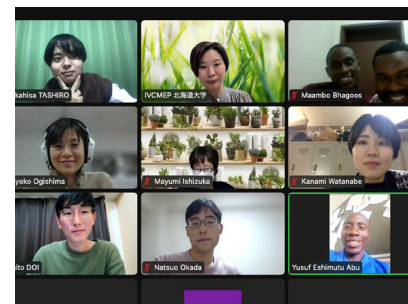
Visiting Zambia [Aug. 19 ~ Sep. 3]

- Lower Zambezi Naional Park
- JICA short intern
- Lubambe copper mine / Konkala c opper smelting
- Self-designed activities



Post-training [September - October]

- Activity report presentation (connected to UNZA via virtual meeting system)
- Report submission



Online Courses

Number of participants : 10

Contents

Students selected three classes (equivalent to eight subjects per class) from a wide range of courses, including chemical hazard control, infectious disease control, environmental remediation, and took the courses on-demand using an online plat form provided by the program. After the classes, a Student Interactive Session was held, where students had a question-and-answer session with the lecturer via an online conference system, and active one-on-one discussions were exchanged.

【 Example of the classes 】

- Chemical Hazard Control
 - Field Toxicology & Risk Analysis
 - Chemical Analyses
 - Comprehensive Studies on Chemical Hazard Control
 - Environmental Remediation and Diagnostic Techniques
 - GIS and satellite remote sensing
 - Informatics
- Mechanism, Assessment and Remediation of Environmental Pollution
- Advanced and Comprehensive Studies on Zoonosis Control
- Advanced Seminar on Conservation Medicine

From the next pages, reports from students are featured.

Activity Report by UNZA Students

Graduate School of Veterinary Medicine

Student experience report

School of Veterinary Medicine M2
Maambo Bhagoos

BACKGROUND

The IVCMEP selected team started off from Lusaka to Japan on 16th July, 2022, the team board on Ethiopian airways at exactly 14:20hrs, heading to Zimbabwe Robert Mugabe international airport. From Zimbabwe the plain proceeded to Ethiopia Addis Ababa bole international airport. From Ethiopia the team got on Ethiopian airways flight ET672, at around 22:30hrs which was heading to South Korea. The whole passengers were disembarked for about 2hrs before embarking again on the same flight to Narita Tokyo Japan at around 20:30 hours.

Upon reaching Narita airport, Hokkaido University IVCMEP coordinators Rio Doya and Miyoko Ogishima received the team and proceeded to Garden Hotel Narita. Rio Doya assisted us checked in at Narita garden hotel, she briefed us about how to stay in the hotel, and she gave us 80,000 yen each. The orientation on money management was done whilst at garden hotel. On 17th July, 2022, the team checked out from garden hotel to terminal 2 Narita international airport to Haneda. The team took the train to Haneda airport at around 9:53, covering a distance of about 90km. The team arrived at Haneda airport at around 11:50, the team checked in at around 12:00 hrs to take a flight to New Chitose airport, Hokkaido region. At 13:55 the team arrived at New Chitose airport, then we took a train to Sapporo city. The team arrived at DK House at around 3:00 pm. The house manager Huriuch San gave as a brief orientation on how to stay at DK house the picture bellows shows the team at DK house in Sapporo city.

JAPANESE CULTURE

During my short stay in Hokkaido region of Japan I learnt many cultural activities, based on daily observation and interactions with my colleagues in campus and DK house i learnt the following:

Time management

Time keeping was one of the cultural activity I learnt first, I observed that everyone keeps time during their daily activities and during classes. I had to adjust and fit the Japan style of keeping time not the Zambia way of keeping time and I changed for the better. Time keeping is one way of achieving goals and objectives.

Hardworking

The working culture changed the moment we reached South Korea and Narita Japan, people are hardworking and they helped the team. The Japanese work culture is so good. There is no idol standing everyone is busy and committed to work, working hard is the goal for national development.

Conservative

Culture has been preserved in Japan, the dress code is so unique, food, road designs especially tunnels in mountains, bridges, farms and forest conservation.

Food

I enjoyed cooking and eating variety of Japanese food, our coordinators helped us to choose the favourite meals in all restaurants. The pictures below show the best Japanese meals I ever enjoyed whilst in Japan.



Preparing Okonomiyaki during a welcoming party

Onsen Hot Spring bath at Parco Hotel in Kushiro

This was another wonderful experience I enjoyed at Paco hotel in Kushiro city of Hokkaido region, the Japanese way of harvesting hot spring water in a traditional way

and make ponds for bathing is so nice. In Zambia there are many hot springs but the water is not preserved like in Japan. The picture below shows me in a Japanese dress after Onsen Hot spring bath at Parco Hotel.

Cultural Observation

- One of the most interesting cultures I found interesting was sleeping on a Japanese traditional bed, it shows how culture is preserved in Japan despite the country being a super power the olden days are remembered.
- The system of removing shoes whenever you enter the house, it helps to maintain houses and hotels clean.
- The most cultural practice that I appreciated after visiting Japan was respecting elders in everything and also leaving way and space for old aged. Not only that the culture of keeping time changed me and I embraced it (keeping time is the only way to national development).
- The spirit of working hard always is another cultural practice that I appreciated its similarly to my southern culture where we are always encouraged to work extremely hard.

█ CLASSES AT HOKKAIDO UNIVERSITY

Chemical Hazard Control Class

On 19th July, 2022, we had a lecturer on Chemical Hazard Control given by Dr. Yared Bayene, during this class the following topics were covered in the first session of the lecture.

Topics Covered

- Basic concept on eco toxicology and environmental toxicology
- Environmental chemicals and biochemical effects.
- Organic chemical pollutants and trace elements.
- Bio monitoring and risk assessments.

[Second Session on Environmental pollution]

The second session of the class covered major topics on Environmental pollution and pesticides

- Pesticides such DDT, PCBs, PPCPS.
- Heavy metals and trace elements.

There is need to include public health awareness and sensitization in both developed and developing countries like Zambia where pesticides and insecticide are widely used to control insects in the agriculture sector but the effects are not known but the general public especially farmers. There is need to establish effective research

centers on chemical pollutants in small rivers in Zambia where mostly farming activities are done in order to ensure that chemical levels are monitored.

The afternoon session was done by Dr. Collins Nimako and the following topics were covered

- Food toxicology
- Meaning of food toxicology
- Types and sources of food contaminants and toxins
- Risk assessments strategies of food contaminants
- Regulatory agencies of food safety.

On 20th July, 2022 we had class on Hazard for Animals given by Dr. Aki Tanaka, during this class the following topics were covered.

Part one

- Shelter medicine
- Herd medicine for companion animals
- Shelter epidemiology
- Disaster veterinary medicine

Part two

- Veterinary forensic
- Animal abuse
- Diagnosis

This was so informative in that some of these practices done in Japan are not being done in Zambia, shelter medicine helps to control the spread of diseases like rabies which is so common in Zambia where neglected animals are just moving in homes. Disaster veterinary medicine concept should also be promoted in other countries like Zambia, where animal rights are espoused. During disasters like floods in Zambia there is high wildlife and domestic interface in areas near national parks and this leads to the spread of diseases, and ticks from wild animals and domesticated animals.

In the afternoon Session, the following topics were covered

- Natural Toxins and its Pharmacological Aspects
- Toxins and Medicine
- Plant Toxins Phyto Toxins

On 21st July, 2022, we had class on Ecology and Wildlife given by Dr. Toshio Tsubota, during this class we had covered the following topics.

- Topics that were covered
- Environmental [climate changes, chemical pollutions]
- Conservation medicine
- Animal health
- Human health

- Ecosystem health
- Ecology

In ecology the following topics were covered the food chains and food webs in terrestrial ecosystem and marine ecosystem. In both marine and terrestrial ecosystem Hokkaido brown bears play a pivotal roles in nutrient circulation. These brown bears make forest of Shiretoko National Park rich in nutrients, by carrying plant seeds in their droppings and restoring sea nutrition derived from salmons.

- Food chains/ food webs [networks] in the ecosystem

There is need to include climate change education in all fields to promote the concept of one health in the process of understanding zoonotic diseases. Temperature has effect on tick distribution. Ecosystem health need to promoted for it supports both human and animal health.

Advanced Seminar on Analytical Machines (LCMS)

On 25th July 2022 we had a lecture on advanced laboratory machines by Prof. Ikenaka Yoshinori, during this lecture the following topics were covered.

- LC/MC and GC/MS
- Extraction of neonicotinoid from beverages and urine.
- The benefits of Liquid Chromatography (LC) and Mass Spectrometry (MS).
- SKILLS ACQUIRED
- Analysis of Organic compound while using LC/MS
- Liquid or liquid soluble compounds (non-polar, volatile compound by GC, GC/MS)
- Food Product analysis: nutrition, pesticides, veterinary drugs, toxin
- Environmental analysis of chemical in environment pesticides.



The team during laboratory work with Prof Ikenaka

In the afternoon we had another class given by Dr. Collins Nimako on pesticide pollution and health in chemical

hazard control. On 26th July,2022 we had a class on chemical hazard control on endocrine disruption chemical in wildlife and humans by Dr. Ana Sausa. On 27th July, 2022 we had a lecture on chemical hazard control heavy metals toxicity by Dr. Yared Beyene.

Shiretoko National Park

On 24th July 2022 we had a tour to Shiretoko National Park and took a nature guide tour by the tour guide master, with Prof Michoto Shimozuru. Prior to the tour, the team had a mini lecturer by the tour guide on the safety and defensive mechanism about bears (*Ursus arctos*).

Activities that took place were:

- The role of deers in the forest ecosystem
- Environmental forest protection of Shiretoko national park
- Lake viewing of all five Shiretoko lakes.
- Importance of wild grapes to bears food web.
- The importance of keystone species like woodpecker in forest decomposition
- The tour was concluded by watching a movie title THE LIMIT at Shiretoko national park.



*Left: Bear viewing with a binoculars
Right: Brown bear*



*Left: Nature walk in Shiretoko National Park. The tour guide explained how the forest management conserve the place.
Right: Forest succession*

Lab Experience

Basic Toxicology

This lab was conducted by Professor Yoshinori Ikenaka, the main objective was to analyse DNA .

- This lab was done by taking tiny hair from the route, following the prescribed instruction in order to determine alcohol intake tolerance.
- In summary if the results show that DNA is wild type then tolerance to alcohol is high but if the DNA is mutant then the tolerance to alcohol intake

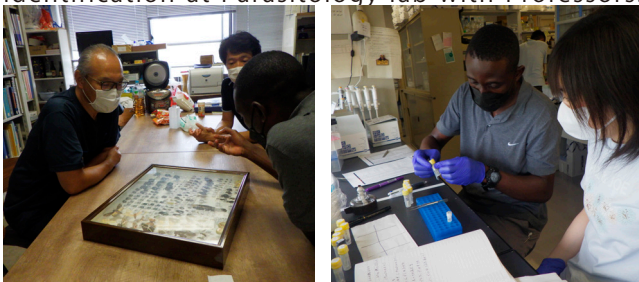
is low.

Environmental Toxicology

This lab was conducted by Professor Yoshinori Ikenaka the main aim of this lab was extraction of neonicotinoid from beverages and urine while using LC/MS in urine and food beverages. Liquid soluble compounds (non-polar, volatile compound by GC, GC/MS) this machines helps to in food product analysis: nutrition, pesticides, veterinary drugs, toxin and environmental analysis of chemical in environment pesticides. The results of this lab showed that some urine samples had high content of chemicals which comes from food and body lotion.

Parasitology Lab

Insect identification was done by Prof Ryo Nakao at parasitology lab, the main aim was to identify African / Zambia insects at Hokkaido University. The ecosystem role of these insects was discussed during this interaction and major sites in Zambia were circled on a Zambian map. Tick DNA extraction was done to identify samples from Australia the results of this lab come out perfect. The pictures below show the lab process and insect identification at Parasitology lab with Professors.



Left: African or Zambian insect identification at parasitology laboratory, insects were identified and classified according to their species and ecosystem roles in nature.

Right: Tick Australian samples being prepared for DNA extraction at parasitology laboratory DNA tick results come out perfect during this lab.

TOYOHA MINEWATER AND WASTE TRETMENT

For many years Toyoha mine Co, Ltd JX Nippon Mining and Metal group had played an important role to produce and supply metals such as Zinc, Lead, Copper Silver and Indium which are essential for improvement of industry and livelihood. Since 1914 when the company Toyoha mine started production the volume of ores produced volume of Indium which is used for LCD TVs and solar photovoltaic panels boasted was the largest in the world (Motoyama hand manual, 2022). Toyoha mine contributed to the Japanese economic development as stable supply source of minerals resources. However, in March 2006 the operation was stopped due to depletion of ores. After the closure of the mine, this site was changed to a Mine Water

and Waste Water Treatment Plant.

Motoyama Plant

The Minewater is collected in 3 pits, no.5 shaft which is about 136m level shaft number 3 is about 90 m level and shaft number 6 is about 136 m level.

- Shaft number five 136m

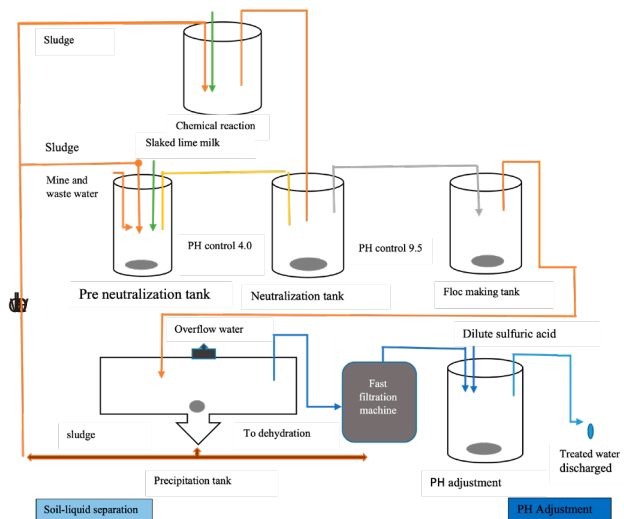
According to the site manager the water quality of this shaft is better than that of low quality because this point is close to the seeped ground surface water flows. The water is pumped up from this point until mine water is improved.

- Shaft Number three 90m

The water comes from the upper area and water quality is not bad

- Shaft number six 136m

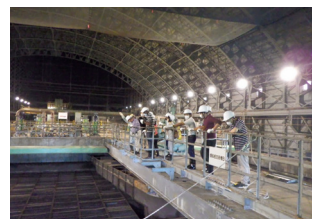
The mine water in this shaft is being pumped out till the water quality improves, as shown in this figure



The diagram above was redesigned by Maambo Bhagoos which shows the process of water treatment at Motoyama waste water treatment plant before it is discharged to the river. Source (Motoyama Mine Hand manual, 2022)

Main Activities During Mine Visit

- The site manager gave a brief background of Toyoha Minewater and Waste Treatment.
- The site manager gave us permission to visit the water treatment plant, we toured all stages in water treatment.
- Some solid particles that remain in the process are used to make slim dams on the western side of the plant.



Left: Filtration section



Right: Purified water

Environmental Conservation at Toyoha Mine Site

Environmental conservation of the site should be managed not only during operation period but also after stop of operation. Mine water upwelled from inside a mine and wastewater discharged from mine sites such as impoundments contains heavy metals ions, thus water treatment is required permanently to prevent from contaminating the surrounding rivers and communities. The table below shows the comparison of Environmental Conservation after mine operation in Zambia and Japan a case of Toyoha and Kabwe lead mine.

Table 1: Japan mine remediation vs Zambia mine reclamation

Japan Toyoha Mine	Zambia Kabwe Lead Mine
The mine site was turned to be a water treatment plant to treat minewaste water	The mine site is not protected, and underground water is not treated.
Underground water is treated and purified before discharged to the river.	Underground water is polluted but not treated to remove heavy metals
No homes are allowed near the old mine site	More homes near the old mine site
The mine site is protected	The old mine site is not protected, and there are a high cases of lead pollution in Kabwe Zambia

Skills Acquired During this Field Trip

- Environmental Restoration
- Mine rehabilitation and land reclamation.
- Wastewater treatment
- Slim dam making

Toyoha mine is making efforts to revitalize the natural environment and biodiversity which had been damaged during mine operation period through the activities such as removal of disused facilities covering Oshidori-sawa tailing dam. This is very important in environmental restoration this strategy is very helpful in restoring biodiversity but that is not the case with most developing countries like Zambia, most of old mine sites are left without land reclamation a case of Kabwe district, Chingola and Mufulila.

█ Kushiro Institute for Bird Raptor Biomedical Japan

On 23rd July, 2022 we visited Kushirosuitsugen wildlife center which is a paradise for birds in Hokkaido region, the pictures below shows main activities done whilst at Kushirosuitsugen bird institute main activities at this institute of bird nature are:

- Protection propagation programme bird blood test
- Helping injured birds
- Treat and rehabilitate birds
- Back to nature theory applies when the treated

birds are released.

Common bird species at Kushiro bird raptor centre are:

- Blackston fish owl (Ketupa Blackistoni)
- Stella sea eagle (Haliaeetus Pelagicus)
- White tailed eagle (Haliaeetus Albicilla)

Challenges Faced by Kushiro Bird Raptor

- Wind power generators tend to capture many birds as they fly.
- Train accidents fast moving trains tend to injure many birds.
- Bird lead poisoning from lead bullets used to hunt deers in Hokkaido

Solutions to the above challenges

In order to mitigate the above mentioned challenges the institute of bird raptor is doing the following in order to protect birds.

- Redesigning major roads that they produce sound in places where there are more birds to avoid accidents.
- Put poles near the bridge, that birds can avoid flying low to avoid accidents.
- Putting insulated stands in all powerlines to avoid electricution of birds.
- Burning the sue of lead bullets.
- The pictures below shows Kushirosuitsugen wildlife center in Kushiro Hokkaido region



Left: Discussion with Dr. Ogasawara
Right: Raptor clinic

█ Shiretoko World Heritage

Nature Cruise & Nature Center (Museum) in Rausu

Along the way we saw a brown bear Dr Shimozuru took time to explain how the government of Japan is trying to control the population of bears in Hokkaido for there is a serious wildlife conflict. After a long drive to Shiretoko from Kushiro we arrived at Shiretoko port.

Main activities in Shiretoko

We had brief lectures on marine species that are common in the Rausu area.

The picture below shows the brief ship marine species class by the tour guide.

- Common bird species in Pacific Ocean that are important in the food chain cycle in Rausu area.

- The ecological role of keystone species in marine ecosystem balance of species in Rausu area.

Ecological Role of Bears

Bears play a pivotal roles in circulating nutrients between Marine ecosystem and Terrestrial Ecosystem in Rausu region in Hokkaido. Brown bears (*Ursus arctos horribilis*) make forest of Shiretoko National Park rich in nutrients, by carrying plant seeds in their droppings and restoring sea nutrition derived from salmons. If they are completely eliminated from Shiretoko many living things would be affected. It is imperative to say that brown bears are bridges between Marine and Terrestrial Ecosystem in Nature balance. The pictures below shows brown bears in a museum in Rausu.

Utoro Natrue Center

Utoro research bear center has the main aim of protecting the general public from brown bear attack by providing security when there is a bear jam. The center has data base for all bear species found in Hokkaido region and educate the general public on how they can avoid bear attack when they are moving or driving in bear hot spot areas. Utoro research center helps to resolve discord between humans and brown bears.

Skills Acquired

- The importance of keeping wild animals records especially for dangerous animals like brown bear of Tyson bears.
- The importance of mapping hot spots areas in order to help the general public against wild animals. This is not the case in Zambia where there is high worldlife human conflict especially lions and elephants, Utoro bear monitoring system helps in preventing worldlife conflict.
- Annual data records help in determining effective measures that can help to reduce wildlife human conflict.

▀ NOPPORO FOREST PARK TICK SAMPLING

This field trip to Nopporo Forest Park (NFP) was conducted to monitor the distribution of ticks in Nopporo forest park. The trip comprised of four Hokkaido University PhD students and one master student from the University of Zambia school of veterinary medicine department of disease control, pursuing master of science in Ecological Public Health student under IVCEMP student exchange programme. The picture below shows the sampling team

at Nopporo Forest Park.

The main purpose of this field trip was to gain practical knowledge on tick distribution and diversity in Nopporo Forest Park. The team learned the techniques of tick field collection using a tick drag method using a tick blanket under the supervision of Professor Ryo Nakao from parasitology lab. The team also checked and replaced memory cards and inspected batteries in surveillance cameras in all monitoring sites.

A field trip is an excellent opportunity to every student outdoor etiquette skill that they can use all of their lives and pass on to their own family's children and the country at large. During this field trip I learnt how to inspect surveillance cameras and how to collect ticks in all monitoring sites. This field trip gave me a practical skill on how tick distribution and abundance can be monitored while using a camera to monitor the number of small and large mammals in Nopporo catchment area. I managed to catch a good number of ticks about 56 in Nopporo site B. Tick monitoring in Nopporo forest area is very important because many people use the place as a refreshment zone where they are vulnerable to tick bite which can cause tick borne (zoonotic) diseases. Thus, the site should be left in its natural form as possible so that future visitors will be able to enjoy the areas rich natural ecological vegetation, wildlife and beauty. The picture below shows actual tick sampling.



Tick sampling at Nopporo Park with members of Parasitology lab

▀ Challenges faced during Japan Experience

Below are the challenges/problems that we encountered along the way and whilst in Japan.

- Delayed checking in at Kenneth Kaunda International Airport due to internal system failure.
- One of our colleague was changed the flight from Ethiopian airways to Bangkok Thailand instead of Narita we were psychologically disturbed.

- The other challenge that I had was the my sos app failing to register on my android phone nevertheless when we reached Narita airport staff helped me to register.
- Time limitation we had no time to move around campus and meet students from others schools all days were parked with learning activities

ARIGATO GOZAIMASU (JAPANESE)

THANK YOU VERY MUCH (ENGLISH)

TWALUMBA KAPATI (TONGA)

ACTIVITY AND LEARNING REPORT

School of Veterinary Medicine M2

Nachimata Nambela

INTRODUCTION

The trip to Japan Sapporo from Lusaka took place on 16 July 2022. Arrived at Narita international airport on 18 July 2022 because I was deviated to Bangkok Thailand route instead of Korea route, which my colleagues used. Met my colleagues in Narita and took a train to Haneda airport for domestic flight to new chitose airport, Hokkaido. We took a train to Sapporo where the University is.

Our travel and learning schedule was as follows.

Travel and learning schedule of IVCMEP2022

7/16/2022		Leave Lusaka Airport
7/17/2022		Arrive at Narita International Airport Stay 1 night near the airport *One of our staff will be waiting for you at the airport.
7/18/2022		Take train to Haneda airport for domestic flight Flight to New Chitose Airport, Hokkaido. Take train to Sapporo where our university is. A brief orientation about life & culture in Japan will be given.
7/19/2022	8:45-12:00	Lecture on Chemical Hazard Control @Hokkaido University
	12:0-13:00	Lunch(welcome party)
	13:00-16:15	Lecture on Chemical Hazard Control @Hokkaido University
	16:30	Dean Courtesy Call
7/20/2022	8:45-12:00	Lecture on Chemical Hazard Control @Hokkaido University
	12:0-13:00	Lunch
	13:00-16:15	Lecture on Chemical Hazard Control @Hokkaido University
7/21/2022	8:45-10:15	Lecture on Chemical Hazard Control @Hokkaido University
	11:30-16:00	Field trip to Toyoha Mine
7/22/2022	8:00	Come to the Vet Faculty
	14:00-17:00	Institute for Rapture Biomedicine Japan(IRBJ), Kushiro *Drive will be long(4-5 hours). Stay at Kushiro
7/23/2022	8:00	Drive to Rausu area in Shiretoko National Park
	13:00-16:00	Take an ocean ship cruise to observe marine mammals Drive to Utoro area Stay at Utoro area
7/24/2022	8:20-11:20	Take a nature guide tour in the National Park Drive to Sapporo *Again the drive will be long (7-8 hours)
2022/7/25	-28	Lecture on Chemical Hazard Control @Hokkaido University And/or Lab visit *See below for details
7/29/2022		Flight to Haneda airport, take train to Narita Airport Leave Narita Airport
7/30/2022		Arrive at Lusaka

CLASS AT HOKKAIDO UNIVERSITY

The three classes I was most interested in include Environmental Toxicology, Food Toxicology and hazards for Animals.

Environmental Toxicology by Dr. Yared Beyene (PhD)

We learned that as a beginning the universe we are in offer us a lot of beauty. Everything including fresh air, clean water and a visual feast of nature are the beauties that offer us. However, the damages we cause to the universe are quite high. These damages are environment pollution. Pollution or environmental pollution is the contamination of air, water and soil or land by solid, liquid, gaseous substances or any forms of energy like heat, sound and radioactivity which adverse or harmful effects on human beings, animals or plants our environment.

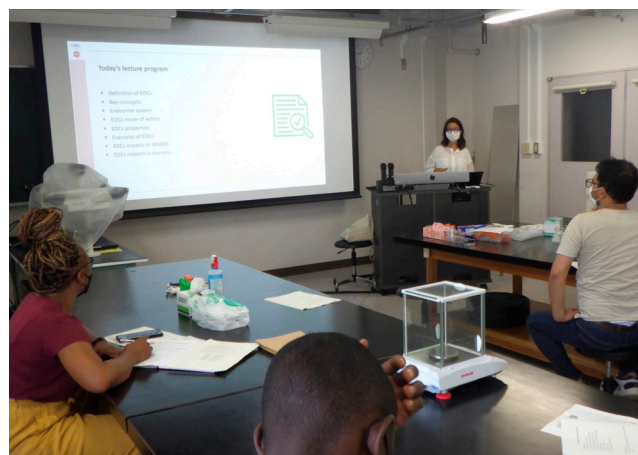
Types of pollution include thermal pollution, air pollution, water pollution, soil pollution, etc. We learnt that Xenobiotics ae defined as chemicals found but not produced in organisms or the environment.

We also learnt about the regulations that governs the use of chemicals. The regulations include Stockholm convection (POPs), Minamata convection (mercury), Basel convention (hazardous waste), Rotterdam convention (regard to trade in hazardous chemicals), Montreal protocols (substances that deplete ozone layer) and UNECE LRTAP convention (long range transboundary Air pollution). Some chemicals were highlighted to cause diseases; Itai-itai disease caused by cadmium in rice, skin lesion/cancer caused by arsenic seeps in sediment, mad hatter disease, minamata disease.

Food Toxicology Dr. Collins Nimako (PhD)

The objectives of the course are meaning of food toxicology, types and sources of food contaminants and toxins, risk assessment strategies of food contaminants and regulatory agencies of food safety.

Food toxicology deals with the substances found in food



Class for Chemical Hazard Control

that when consumed may cause harm to the consumers. It involves studying of the environment, properties, effects, and exposure of toxic substances in food and their illness form in humans. Practices of food toxicology involves detecting toxic substances in food and characterizing their properties. Topics that were learnt include microbiological contamination, environmental contamination, changes during cooking or proceeding, packaging migration, industrial pollution, radiation fallout, irradiation, criminal adulteration, genetically modified foods, novel foods and nano-materials, natural toxins, abnormal conditions of the animal of the animal or plant used for food, mineral-binding agents etc.

Hazards for Animals Prof Aki Tanaka (DVM, MPVM, PhD)

Hazards are a source or a situation with the potential for harm in terms of human injury or ill health, damage to property, damage to the environment, or a combination of these. It also deteriorate animal health, animal welfare, human health, environmental health, community safety. The topics in this course include shelter medicine, herd medicine for companion animals, shelter epidemiology, and disaster veterinary medicine.

FIELD ACTIVITIES

Toyoha Mining Site)

A trip to Toyoha mining site was on 21 July 2022. When we arrived at the site, we had a class before the tour in the wastewater treatment plant of the mine. At Toyoha mining site we learnt that the mining site is now used for mine water and wastewater treatment. It was reviewed that for the past 100 years, the Toyoha mines co., Ltd contributed to economic development as a leading mine in Japan. We learnt that for many years, Toyoha mines had played an important role to produce and supply those metals such as zinc, lead, copper, silver and indium, which are essential for the improvement of industry and livelihood. We learnt that since the mine closed it has been doing environmental conservation and environmental restoration. We went around the mine to learn the treatment of contaminated water.

Institute for Raptors Biomedical Japan, Kushiro

We visited the institute for raptors on 22 July 2022 after approximately a 5-hour drive from the Vet faculty Hokkaido. At the centre we had a class and the tour the centre on how the raptors are rescued and preserved. The rescue process include transportation, treatment/determination of causes, pre-release training returning to

the world. We also learnt that some raptors were never be released because their physical damages were beyond repair.

Nature Cruise & Nature Centre (Museum) Rausu

On 23 July 2022 we drove to Rausu area in Shiretoko National Park. This was after a stay at the hotel in Kushiro. While there, we even had an opportunity to experience the traditional hot stream Bath (onsen). During the drive in the Shiretoko National Park, we saw the brown bear in one of the fields.

During the boat cruise, we saw dolphins, sea birds, etc. it was a wonderful experience though I had seasickness. In the afternoon, we drove to Utoro and we spend the night there.

Short Visit at the Park Management Office, Utoro

In the evening, we had a short visit at park management office in Utoro where the research for bears is done. We had the chance to know the population of bears is estimated and they like to walk along the trail in Goko (Five Lakes), Utoro.



Listening to a park management officer

Walk along the trail in Goko (five lakes) Utoro

On the 24th July 2022 we visited Shiretoko national park and took a nature guide tour by the tour guide master, with Dr. Michoto Shimozuru from the wildlife laboratory at Hokkaido University.

Prior to the tour, we had a mini lecture by the tour guide on the safety and defensive mechanism about bears.

Activities that took place where;

- The role of deers in the forest ecosystem
- Environmental forest protection of Shiretoko national park
- Lake viewing of all five Shiretoko lakes.
- Importance of wild grapes to beers food web
- The importance of keystone species

We had a privilege of watching a movie title THE LIMIT at Shiretoko national park

LAB VISIT AT HOKKAIDO UNIVERSITY

Brief Introduction of the Lab

Toxicology lab at Veterinary school

Participated in the DNA extraction by isohair on Monday 25 July and continued to Tuesday 26 July, 2022.

This was done by taking tiny hair from the route by following prescribed instruction in order to determine alcohol intake tolerance.

In summary if the results show that DNA is wild type, then tolerance to alcohol is high but if the DNA is mutant then the tolerance to alcohol intake is low.

CULTURAL OBSERVATION

The three culture practices of Japan I found interesting include eating with chopsticks, the love for seafoods and the respectfulness. The hot spring was amazing.

The language despite knowing the basics was a challenge but I overcame the challenge by installing a language translator on my cellphone. Getting lost in the city of Sapporo was also another challenge but it was adventurous.



Eating Japanese food with chopsticks

TRIP TO HOKKAIDO UNIVERSITY

-JAPAN

School of Natural Science
Katakala Muyoba Siakavuba

INTRODUCTION

The trip to Japan Sapporo from Lusaka took place on 16 July 2022. Arrived at Narita international airport on 17th July 2022. Met Rio and Miyoko in Narita and took a train to Haneda airport for domestic flight to New Chitose airport, Hokkaido. We took a train to Sapporo where the University is.

In Narita, Rio [program staff] gave me 80,000 yen that I was supposed to use during my stay in Japan. This

included transport, accommodation, refund on Covid, entry into the parks and food during our stay. Accounting for such funds was rather difficult because we had to also use it for our day to day life.

The most difficult part was the walking that I was subjected to just when we reached Japan. The most common mode of transport I observed was the train and to get to the train station, one had to walk. There were taxis but not sure why we were told we could only walk to the train stations. In the process of the walking, my bag got spoiled.

LECTURES

Environmental Toxicology by Dr Yared Beyene (PhD)

At the beginning of the lecture, he explained how the universe we are in offered us a lot of beauty. Everything including fresh air, clean water and a visual feast of nature are the beauties that offer us. However, the damages we cause to the universe are quite high. These damages are environmental pollution. He gave a definition of pollution during the lecture and also common terms used in environmental toxicology.

He also explained the structural similarities between endogenous hormones and POPs. Estradiol and the methoxychlor metabolite HPTE share a phenolic structure (blue) that facilitates the binding of HPTE to human estrogen receptor 1 (ESR1). The HPTE directly inhibits the catalytic activity of cholesterol side chain cleavage in cultured rat ovarian cells.

Pollution or environmental pollution is the contamination of air, water and soil or land by solid, liquid, gaseous substances or any forms of energy like heat, sound and radioactivity which have adverse or harmful effects on human beings, animals or plants or our environment.

The course content in environmental toxicology was almost the same as Food Toxicology by Dr Collins. Dr Yared also emphasized on the metals that cause environmental pollution. Mercury was one metal discussed during the lecture. It is the only common metal which is liquid at ordinary temperatures. It rarely occurs free in nature and is found commonly in cinnabar ores. He also explained that it alloys easily with many metals such as gold, silver and tin. The alloys are called amalgams. He also gave a brief description of the Minamata disease which Dr Collins further explained on. This will be discussed in the next lesson.

A research Dr. Yared was carrying out in Zambia was on

Lead which he strongly emphasized on. He explained what it was and its toxic effects. He explained how the capital of Central province in Zambia is amongst the top 10 most polluted towns in the country. He explained the past studies that were done in the previous years on lead and cadmium contamination in cattle, vegetables and chickens. Cadmium is ubiquitous in the environment and exists mostly in the earth's crust in the form of Cadmium Chloride, oxide or sulfide. It was interesting to know that it came into the limelight for the first time in 1946 from the inhabitants of the Jinju River Basin of the North- West Japan got severely afflicted with the itai-itai disease which they also called the ouch ouch disease.

Food Toxicology (Dr Collins Nimako PhD)

This was my most interesting lecture I attended at the university. Dr Collins found a way of making the lecture interesting and actually made me rethink my specialization. He gave a brief description of the terms used in food toxicology and the objectives of the course which were very well explained. His emphasis was on pathogenic foods, he said " by far the most important hazards of significance in food are those from biological agents: pathogenic bacteria, viruses, fungi and a few toxic seafoods. The most important pathogens were clostridium botulinum, Staphylococcus aureus, salmonella species and clostridium perfringens." He also gave reasons for the increasing rates of foodborne illness which were new and emerging pathogens, changes in the food supply (including more intensive animal husbandry and longer shelf life of fresh and chilled products), aging populations and a greater proportion of food eaten away from home (Takeaways).

He also explained the risk assessment strategies of food contaminants and regulatory agencies of food safety across the world. He explained the way food gets polluted through the environment, through changes in cooking or processing and also in packaging.

What we learnt included contamination through microbes, through the environment and contamination through changes whilst cooking or proceeding, packaging migration, industrial pollution, radiation fallout, etc.

Contamination through the environment included heavy metals and minerals. Mercury was identified to be one of the heavy metals that contaminates the food especially in the food. Fish contain 10-1500mg/kg of organic mercury and even higher levels when mercury wastes are released into the lake waters. He explained the serious poisonings

from mercury that occurred in Japan with the famous one being in Minamata Bay. Another example in Iraq in 1971 as a result of bread made from wheat treated with mercury based pesticides. Cadmium was also discussed as a heavy metal that causes environmental contamination of food. This element accumulates in biological systems thorough chronic exposure at excessive rates which results in chronic kidney failure. Plants readily take up cadmium from the soil and there has been a slow increase in the cesium levels in soil due to the use of phosphate fertilizers and the affect of air and water pollution.

He also touched on the changes of food properties during cooking or processing of food. He explained on the fact that food is exposed to high temperatures during cooking. In roasting and frying, localized areas of food may be subjected to high temperatures that lead to carbonization and under these circumstances any organic substance is likely to give rise in carcinogens.

Heavy metals toxicity by Dr Yared Beyene (PhD)

He explained that heavy metals are natural components of the earth's crust and explained how they enter our bodies through the food we eat, the water we drink and the air we breathe. Trace elements include, copper, selenium, zinc are essential to maintain the metabolism of the human body.

However, at higher concentrations, they lead to poisoning. He also explained the top 20 hazardous substances which are lead, arsenic and mercury. With lead being identified in Zambia.

In this lecture, it showed the connection between Food Toxicology and Environmental Toxicology. The link was the heavy metals course which gave a detailed description of the metals involved in the contamination and pollution of food and environment. Metals discussed were Mercury, Lead, Arsenic and Cadmium that have already been talked about in the previous paragraphs. So I will not dwell much on this course. I just loved how the connection was great and really revealing.

▀ FIELD TRIP

Toyoha Mining Site

A trip to Toyoha mining site was on 21 July 2022. Before the trip, we had lunch with other students were a few taught me how to use chopsticks which is the Japanese tradition. When we arrived at the site, we had a class before the the tour in the wastewater treatment plant of the mine. Learning; was an old mining site which is now

being used as a treatment for waste water.

In detail, we went to the Motoyama Plant where the collection and purification of the water is done. The mine water is collected in 3 pits. The first pit being with a water level of 136m, 2nd pit -90m level and the 3rd being -136m level. The first level has water quality better than that at the lower level because the level is close to where the seeped ground water surface is. The second level contains water that came from the upper area and water quality is not as bad. The 3rd level contains water that is pumped to the next level to ensure that the water quality is good.

We also visited the underground pump station that contains the mine water collected in the 3 pits which is gathered in intake pits at -121m and pumped up to the above ground mine water.

The pumped mine water is discharged to the raw water tank in the mine water treatment plant. The mine water is neutralised with high density sludge process. Clarified water after filtration by sand filter and pH adjustment by dilute sulfuric acid is discharged to Shirai river.

We also visited the dam where the sludge is deposited to prevent contamination of the environment.

Institute for Raptors Biomedical Japan, Kushiro

We visited the institute for raptors on 22 July which was a 5-hour drive. At the centre we had a class and the tour the centre on how the raptors are rescued and preserved. A raptor from as old as 20 years ago was being stored in their mortuary.

A few raptures are not returned because they are unable to fly or they have a few deformalities.

They explained how upon receiving reports of injured, sick or dead birds, they retrieve and transport the patient to the Kushiroshitugen Wildlife Centre (WLC). Since they service the entire island of Hokkaido, individuals are sometimes transported by a relay system. Some patients may receive treatments when transported by the custom made ambulance.

The treatment/determination of causes is done through a medical examination and autopsy that help determine the causes of illness or injury. These causes guide their conservation efforts.

After recovery from injury or sickness, the birds expected to be released have to commit to the pre-lease training of hunting and flying.

Ocean Ship Cruise to observe marine animals.

We travelled to the ocean shore after spending a night in Kushiro area. We observed a few animals found on the

ocean, a few dolphins and a few ocean birds.

Before driving to the ocean shore, we observed a bear that was walking in the field. Not many animals were observed during this trip however as per tradition, we collected many photos and also collected water from the ocean.

During the ship cruise, it was windy and cold, the challenge faced was that it was difficult to actually observe the marine animals in detail because it was windy, cold and raining. A few animals were observed. Some birds and a few dolphins.

Visit at the Park Management Office, Utoro

This was the call centre for people that observe bears close to their houses or areas of interest. The team had a lot of energy drinks to keep them hydrated and awake. It was here where they gave me an energy drink. We watched videos on how they treat bears that are on the street. They explained that the bears are not bullies, they mind their own business and only attack if they are exposed to loud noise. It's with the loud noise that the team uses to chase the bears away from human environments.

Visit to Shiretoko National Park.

A nature guide tour by the tour guide master. Before the tour, we had a lecturer by the tour guide on the safety and defensive mechanism and how to behave when you see a bear in the park. Most importantly, we were told to walk quietly, avoid making a lot of noise.



Dr. Shimozuru explaining during the nature walk

We went to the museum and watched an interesting movie "The Limit" with the barrier being language again. Although there was a lot of talk about Bears, no bears were observed in the park. Probably because we were chasing them with the clapping because that was the safety mechanism for us.

▀ LAB VISIT

I was exposed to the microbiology lab with Prof Sakoda

where we looked at the the Overview of the lab and CSF [classical swine fever] outbreaks in Japan, HPAIV [high pathogenic avian influenza] in wild birds and the overview of glycosylation research.

I also went to the International Institute for Zoonosis control Division of Collaboration and education where I looked at the microbiology lab of the institute.



Working with Dr. Yared at Toxicology Lab

▼ JAPANESE CULTURE

Three cultural practices of Japan I found interesting.

- Eating with chopsticks.
- Always saying thank you for everything and the humbleness and respectfulness.
- The hot spring was a very good culture I appreciated.

The food was completely different from what we eat in Zambia. On some occasions, we shared our food. Water is something everyone is given before you order food, which is great. When you order a beer, a free snack is given, something worth sharing and being proud.



Japanese food



Eating with chopsticks

Cultural Difficulties experienced

- Language Barrier.
- Road Network and Traffic Lights
- Walking Culture
- No eating in public places.
- No eating and walking.
- No talking in public transport.

Culture appreciation after visiting Japan.

A few things I would love to copy from Japan include

honking on the road, the road restrictions, cross only when the signal allows you to, talking in public places.

The old people, pregnant people are respected without any challenges.

Also, I found a new bunch of friends that I can gladly call my family.

▼ Overall Experience

My stay in Japan exposed me to a lifestyle that is very simple but elegant. Education is highly considered and all including PhD students are treated with respect and the same. Dr Collins was one that was a doctor, but was working closely with us in the lab, this is a very different case as compared to Zambian Doctors or associate professors.

Also, the PhD students I was exposed to in the microbiology section was very interesting, the fact that they have reviews every weeks concerning the progress of the students was interesting. I met Hew Yik Him who I closely worked with in the laboratory of microbiology. He is from Malaysia and we got along very well too.

IVCMEP2022 Comprehensive report

School of Public Health M1

Madalitso Tembo

▼ INTRODUCTION

The student exchange program between Hokkaido University (HU), and the University of Zambia (UNZA) was introduced some years ago. However, due to COVID-19, the program was conducted online.

In 2022 March, the University of Zambia through the office of Public relations advertised on behalf of IVCMEP the HU exchange program, and the prerequisite was master's and doctoral students of the University of Zambia (in any academic field of humanities or sciences). I applied for consideration as a Master's student from the University of Zambia, Ridgeway campus in the School of Public Health. My application was under the type A category.

In 2022 May, I was privileged to be selected to be among the four (4) students to travel to Japan ? HU for ten (10) days to attend Advanced Comprehensive Studies on Chemical Hazard Control (CHCE).

The main aim of the CHCE was derived as a result of man's production activities, hazards from chemicals discharged into the environment threaten human/animal health and ecosystems. People living today's modern lifestyles of convenience have to pass safe living environments on to

future generations.

Health hazards from chemicals are often activated at the interface between humans and animals, only manifesting themselves after they have gradually spread. To protect our environment from hazards and realize the one world ? one health ideal, it is imperative to detect minute changes and abnormalities at this interface so that appropriate preventive measures can be taken.

This course was aimed at fostering experts who can capture the essence of chemical hazards and their effects on human/animal and ecosystems and exercise leadership in promoting research and education in their respective areas and controlling hazards with the abilities to gain an overview of problems from a global perspective, under the concept of One Health.

On 2022 July 16, at 3 pm I traveled to Japan using the Ethiopian aero plane flight ticket # ET672 and arrived on 2022 July 17 in Narita Tokyo at 9:50 pm. The following day, together with a team I traveled from Narita to Haneda airport using a train, covering a total of about 96km. The train arrived at Haneda airport at around 11:50 am, then checked in for a flight to New Chitose airport Sapporo - Hokkaido using local flight ANA. At around 2 pm, together with the team, I arrived at DK's House on 2022 July 18.

The main objective of the International Veterinary and Conservation Medicine Education Program (IVCMEP) are: -

- Promotion of Conservation Medicine
- Open for all fields of students
- Advanced learning of conservation medicine
- Promoting cross-cultural understanding and collaboration

The IVCMEP activities in Japan-HU started on 2022 July 19. The details of all activities are highlighted in the next chapter of this report.



First day arrival at HU

Activities at Hokkaido University

During my stay in Japan, Hokkaido University, I attended/participated in a total of nine (9) lectures on Advanced and Comprehensive Studies on Chemical Hazards (CHCE).

Table 1 Lectures in CHCE

Date	Session	Topic
19/07/2022	Morning	Environmental Toxicology and Pollution
	Afternoon	Food Toxicology
20/07/2022	Morning	Veterinary Forensic
	Afternoon	Pharmacology
21/07/2022	Morning	Chemical Toxicology
	Afternoon	Ecology and Wildlife
22/07/2022	Morning	Pesticide Pollution and Health
	Afternoon	Endocrine disrupting chemicals in Wild Life and Human
22/07/2022	Morning	Heavy Metals Poisoning
	Afternoon	

Further, I did participate in four (4) laboratory experiments namely: -

- DNA extraction ? ISOHAIR EASY
- Analysis of Neonicotinoids in Beverage and Urine
- Extraction procedure from Poisonous Food
- Bacterial Contamination Testing Methods for Meat and Food

Additionally, I had visited the field / recreational activity in following places; -

- Toyoha Mining Site in Sapporo
- Institute for Raptor Biomedical Japan in Kushiro
- Nature Cruise & Nature Center (Museum) in Rausu
- Short visit at the park management office in Utoro
- Walk along the trail in Goko (Five Lakes) in Utoro

Classes at Hokkaido University

Table 2 below gives an overview on the three (3) Lectures that were directly related and provided knowledge on my research project as a problem solving.

Additional to classes at HU, I attended the Journal presentation by one the post-graduate student, below are the topics that were presented:

- Trio-binned genomes of the woodrats *Neotoma bryanti* and *Neotoma lepida* reveal novel gene islands and rapid copy number evolution of xenobiotic metabolizing genes
- Retained duplications and deletions of CYP2C genes among primates
- The first high-quality reference genome of sika deer provides insights for high-tannin adaptation

Laboratory Practical's Hokkaido University

From the four (4) Lab. Practical's that I participated, I singled out one laboratory visit that was more directly

related to my research project.

[Title] Bacterial Contamination Testing Methods for Meat and Food

[Introduction]

Bacterial count is one of the most powerful indicators of the degree of microbial contamination of food, as they are used to test all kinds of food and environmental materials (containers, utensils, etc). At the same time, the number of bacteria can be used to estimate to some extent the presence or absence of food spoilage or alteration, and the risk of food poisoning. There are two types of tests: viable bacterial count, which measures live bacteria, and total bacterial count, which measures the number of dead bacteria as well.

The number of viable bacteria can be divided into two methods: one is to measure the number of bacterial communities formed on the agar plate medium, and the other is to estimate the number of bacteria contained in the liquid medium. The former is generally applied when the number of bacteria is estimated to be high, while the latter is applied when the number of bacteria is estimated to be low. Normally, viable bacterial count refers to the number of medium-temperature aerobic bacteria that develop under certain conditions, and is the most representative indicator of the degree of microbial contamination status of food product and the

environment in which they are manufactured and processed in general, and can also be used for overall evaluation and judgement of food safety, preservation, and hygienic handling. In general, it is calculated from the number of settlements found after mixing the sample with standard agar medium in a petri dish incubating at 35+/-1.0c for 48+/-3 hours under aerobic conditions.



Left: Agar preparation

Right: Chicken meat from local retail store, purchased for Lab experiment

[Procedure]

Test for viable bacteria count

1. 20g of sample was weighed as sterilely as possible in a petri dish (sample was taken from different location to make 20g) and was placed in a filter bag for stomacher
2. 180ml of sterile solution was added using a sterile graduation cylinder
3. Stomaching was set at 200 rpm for 30 seconds
4. 30ml of the sample that had passed through the filter was collected into 50ml sterile test tube (also used for the isolation of Salmonella and Campylobacter spp)

Table 2 Lectures related to the personal research interest

Date	Speaker	Topic	Content	Application of Knowledge to my Research Project
19/07	Yared Beyene (PhD)	Environmental Toxicology	<ul style="list-style-type: none"> Basic Concept on (eco)toxicology and environmental toxicology ✓ Environmental Chemicals and Biochemical Effects, use specific chemicals (organic pollutants & trace elements) to illustrate fundamental knowledge of toxicology hazards ✓ Biomonitoring and Risk assessment 	<p>Harmful effects of such chemical and biological agents as toxicants from pollutants, insecticides, pesticides, and fertilizers can affect an organism and its community by reducing its species diversity and abundance. Such changes in population dynamics affect the ecosystem by reducing its productivity and stability. The knowledge acquired will be applied to my current research project, as one of the component am looking at is the toxicology in dried cassava products. This will assist me to come up with well-informed document that will be a solution to all readers.</p>
20/07	Collins Nimako (PhD)	Food Toxicology	<ul style="list-style-type: none"> Meaning of food toxicology ✓ Types and Sources of food contamination ✓ Risk Assessment strategy of food contaminations ✓ Regulatory agencies of food safety 	<p>Food safety is one important area for 'One Health' collaborations which is a well-recognized by the medical community. Unfortunately, emphasis on food safety has historically overwhelmingly been placed on food-borne pathogens with little attention given to food-borne toxicants. In Zambia most Food companies compromise on the safety measure, the knowledge that I acquired on this subject will benefit me to spread the information and be part of problem solving on matters of food safety.</p>
21/07	Toshio Tsubota (PhD)	Ecology and Wildlife	<ul style="list-style-type: none"> ✓ Environment (Climate changes, Chemical pollution) ✓ Conservation Medicine 	<p>Co-existing of Human life, Wildlife and Nature. Conservation medicine comprise of Human health, Animal health & Ecosystem health. This has to be in harmony of each other in order to achieve a goal of One Health. My research project identifies gaps on the safety of food that is consumed by the majority of Zambian. Learning conservation medicine, broaden my scope of knowledge and understanding.</p>

5. Sample solution (10-1)
6. 1ml of sample solution (10-1) was added to a medium test tube containing 9 ml of sterile saline solution and diluted 10 times to make 10-2 to 10-5 dilutions.
7. 1ml of the 10-2 to 10-5 dilutions to a sterile Petri dish (n=1)
8. 20ml of standard agar medium (200ml triangular flask) was kept at 50°C and mixed well (it was observed to strictly medium not to touch the top cover when mixing)
9. When the agar got hardened, about 5ml of standard agar medium was added (200ml triangular flask) was kept at 50°C (to prevent the growth of migratory bacteria on the agar surface)
10. Agar surface was dried in an incubator (about 10minutes)
11. Incubation was set at 35-±10°C for 48 hrs.
12. The number of colonies were counted on a plate with 30 to 300 colonies and calculated the number of bacteria per gram of the sample.

[Results and Discussion]

Results for *Salmonella spp.* after 24 hours

The *salmonella spp.*, isolated was counted and found to be $2.2 \times 10^6/g$ which was within the recommended WHO range of less than 10^7 cfu/g.

Results for *Campylobacter spp* after 72hrs

C. jejuni from sample A was isolated. And the species was determined of isolates using Multi-Plex PCR and Biotyper, which can determine bacteria at species level using Matrix-Assisted Laser Desorption/ionization Time-of-flight Mass Spectrometry (MALDI-TOF-MASS). Additionally, antibiotic resistant test for *c. spp* was done including the isolate using E-test.

The isolate was found to be resistant to tetracycline (TC) and fluoroquinolones (CI).

[Conclusion]

The chicken meat was found to be safe for consumption, the contamination was insignificant.

Field Activities Experience

Table 3 Below gives an overview of the Field activities experience during my stay in Japan.

Table 3 Summary of field activities

Activity	Zambia Situation
Toyoha Mining Site	It was amazing to see how Toyoma mining management handled the post-mine activities even after they closed due to the depletion of ores in May 2006. The mine site operation was changed into the water treatment plant, and they monitored that water before being discharged into the environment was fully treated, to avoid contamination and pollution to aquatic life and human life. This is different from how most Zambian mines are being handled. We have been having cases of water contamination from mine activities, that eventually affect aquatic life and human life.
Institute for Raptor Biomedical Japan, Kushiro	A debrief lecture by the site manager Kohei Ogasawara sensei on how we can restore nature with raptures was given. The main activities of the institute are Protection and propagation program, Recovering of injured and dead birds, Treatment and Rehabilitation, Back to nature, Autopsy, and main three types of rapture, Black stain fish owl, Stellar sea eagle, and White-tailed eagle. In Zambia we don't have a rehabilitation center for bird species.
Nature Cruise & Nature Center(Museum), Rausu	After a long drive to Shiretoko from Kushiro, we arrived at Shiretoko port, and <i>the main activities</i> were, a debrief on the marine species that are common in the area. Common bird species in the Pacific Ocean are important in the food chain cycle. The ecological role of keystone species in marine ecosystem balance of species.
Short visit at the park management office, Utoro	I was inspired by how the team was active in emergency response and data management/record keeping on bears. The current situation in Zambia is that there are no proper records of wild animals and no impressive management.
Walk along the trail in Goko(Five Lakes), Utoro	During the walk, activities that took place were; - The role of deers in the forest ecosystem, Environmental forest protection of Shiretoko national park, Lake viewing of all five Shiretoko lakes, Importance of wild grapes to bears food web, the importance of keystone species like a woodpecker in forest decomposition, and The tour was concluded by watching a movie title THE LIMIT at Shiretoko national park. In Zambia, mostly the guided tour does not give much-needed information before a walk, however, the animals in most game parks in Zambia are tamed. This made it easy for the visitors to easily see the wild animals.
Other scenery and explanation during the trip	Along the way, was privileged to see Brown bears. The importance of the bears they make the forest of Shiretoko national park rich by carrying plant seeds in their droppings and restoring sea nutrition derived from salmons. The national park they don't eliminate bears from Shiretoko because many living things would be affected. In Zambia, when the danger species like lions escape the National park, the game rangers together with other authorities would eliminate them.

Japanese Culture

Three (3) cultural practices of Japan that I found interesting based on my observation and interactions ;

1. Time Management ? Punctual, Japanese respect time so much. : Punctuality is a personal attitude that demands a lot of work. Most African countries, Zambia inclusive they are not good, on keeping time, though not everyone. It's funny to say that some lecturers can cancel a class because attendance of students is low, and at times they would come in late for a class without any notification. We have a lot to learn from Japanese nationals.

2. Hardworking : Japanese take work so seriously, they have a lot of passion towards duty. The work culture is so amazing, if it can be incorporated into Zambians, we can be developed like Japan.

3. Gracious : Most of Japanese i have met are very approachable, courteous, welcoming, mannerly, and polite when approached. Down to earth, there's no segregation among members of teachers and students.

Japanese cultural difficulties that i experienced during my stay and how I dealt with it.

Conservative ? Japanese people they don't give direct opinion; they always leave room for one to make personal conclusion, and they don't talk loud in public places such as in public transport, restaurants etc. myself coming from a country that we can chat anywhere, I had to adjust myself to behave like Japanese people.

What made me to appreciate my culture after visiting Japan

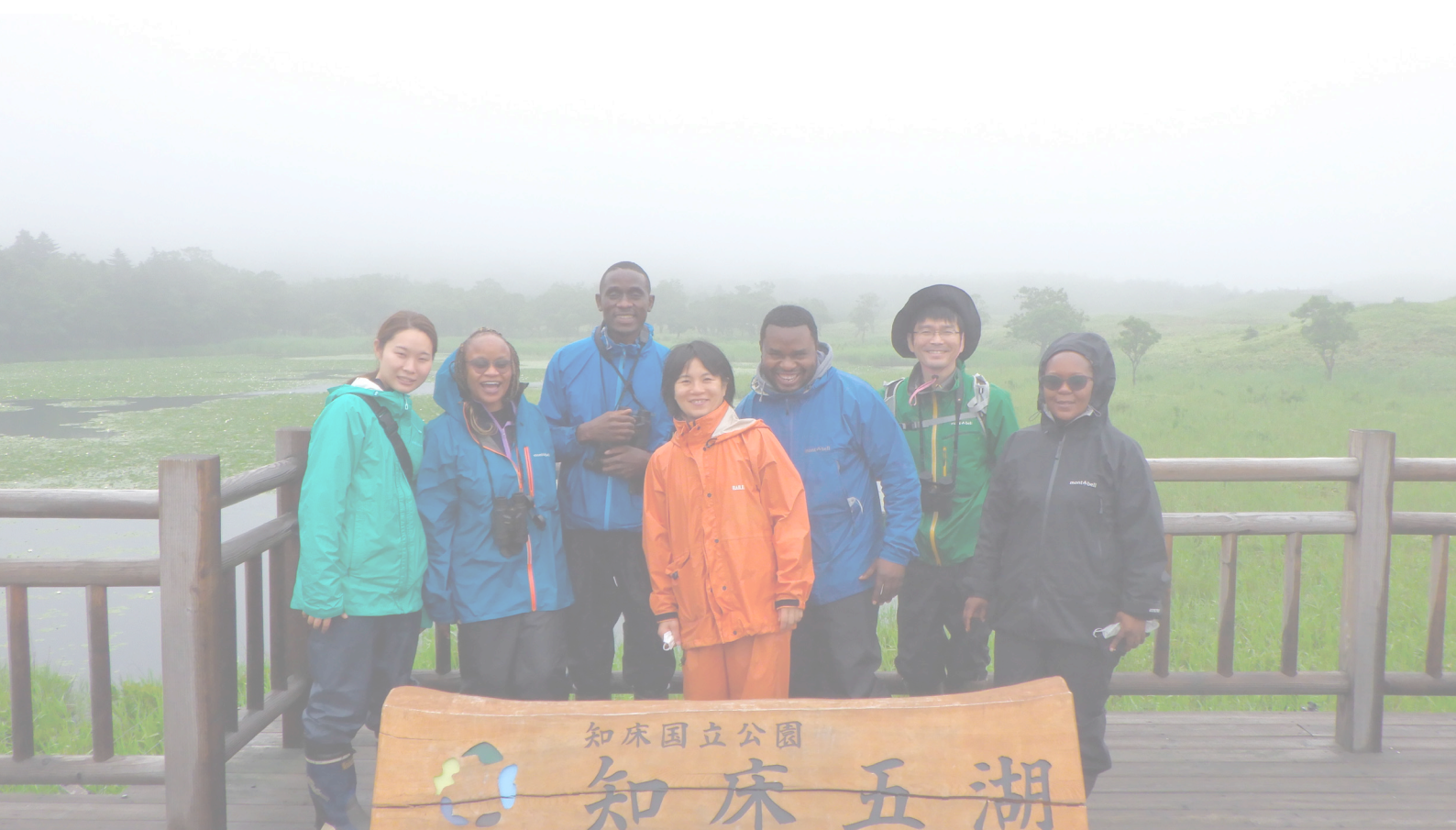
I observed that Japanese people do not greet strangers, they only greet friends, or someone who they know.

This made me to appreciate our Zambian culture, we say hi and smile to strangers. We are friendly, we can be chatting with a stranger as if we have known each other for a long time.

CONCLUSION

In conclusion, the objective of the program was achieved. Conservation medicine, which comprises of Human health, Animal health, and Ecosystem which is a concept of One health is not a new idea but it is one that has become more important in recent years, due to environmental and emergence of several new zoonotic diseases.

A collaborative multi-sectoral and transdisciplinary approach working at the local, regional, and global levels with the goal of achieving optimal health outcomes, recognizing the interconnection between people, animals, plants and their shared environment. Furthermore, am looking forward in future to do my PhD from Hokkaido University in Toxicology if chance will be given for a scholarship.



Presentation Slide Highlights

These slides were used at the final presentation session.

STUDENT EXCHANGE - HOKKAIDO UNIVERSITY EXPERIENCE



PRESENTERS:
MADALITSO TEMBO
NACHIMATA NAMBELA
KATAKALA SIKAVUBA
MAAMBO BHAGOOS



HOKKAIDO UNIVERSITY

HOKKAIDO X ZAMBIA



IVCEP

I've come up

International Veterinary and Conservation Medicine Education Program

Trip from Haneda to Chitose

- One of our colleague finally arrived, and the team was now complete. We board the train to Haneda airport at 9:53am, covering a distance of about 90km.
- We arrived at Haneda airport around 11:50am, then we checked in at around 12am, to take a flight to New Chitoshi airport, Hokkaido.
- At 2pm we arrived at New Chitoshi airport, then we took a train to DK House our lodging place.
- Horiuch San DK house manager gave as a brief orientation on how to stay at DK house.



INTRODUCTION

❑ **Flight to KKIA Zambia to Narita Japan**

- On 16th July, 2022 we board on an Ethiopian airways at exactly 14:20hrs, and heading.
- Zimbabwe Robert Mugabe international airport, then we proceeded to Ethiopia Addis Ababa bole international airport.
- From Ethiopia we got on Ethiopian airways flight ET672, at around 22:30hrs. heading to south Korea to drop other passengers
- The whole passengers were disembarked for about 2hrs before embarking again-on the same flight to Narita Tokyo japan at around 20:30 hours.

Challenges Encountered along the way

- Delayed checking at Kenneth Kaunda International Airport due to internal system failure.
- Part of the team member Nachimata san was changed the flight in Ethiopian airways to Bangkok Thailand instead of Narita.
- My SOS app failing to register however, Narita airport staff helped out
- Hectic due to moving with Luggage's throughout the city.


❑ **Arrival at Narita International Airport**

- On 17th July, 2022 we Successfully checked out and picked out our Luggage's at exactly 21:40pm.
- We were received at Narita airport by Rio Doha and Miyoko Ogushima. Rio Took as to the Garden Hotel Narita.
- While Miyoko Remained to wait for Nachimata Nambela at Narita Airport.

INSTITUTE FOR RAPTOR BIOMEDICINE

◆ On the 22nd July, 2022 we had a field trip to Institute For Rapture Biomedicine Japan (RBJ), Kushiro we had a brief lecture by the site manager Kohi Ogasawa scinsei on how we can restore nature with raptures.

- ◆ **Main activities**
- ✓ Protection and propagation program
- ✓ Recovering of injured and dead birds
- ✓ Treatment and rehabilitation
- ✓ Back to nature
- ✓ Autopsy
- ◆ **Main three types of rapture**
- ✓ Black stain fish owl
- ✓ Stellar sea eagle
- ✓ White tailed eagle




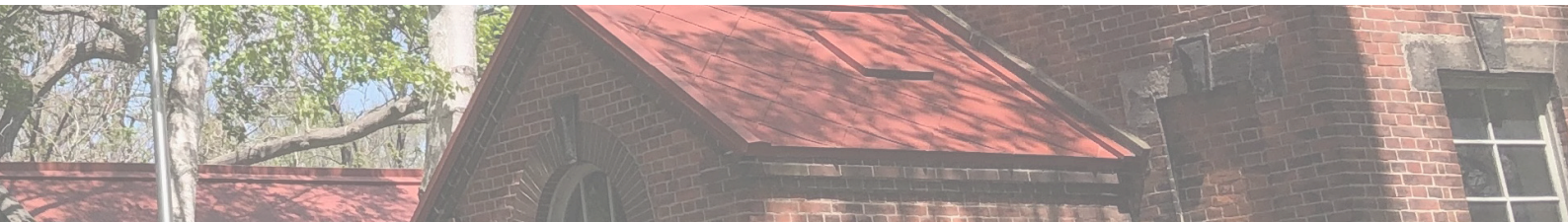
❑ **Stay 1 Night Near the Airport**

- Rio Doya assisted to have us checked in at Narita garden hotel, and she gave us a brief.
- Orientation on money management was done for the whole time during our stay in Japan.
- On 17th July, 2022, we checked out from garden hotel to terminal 2 Narita international airport to Hanenda.

MEASURING HEAVY METAL CONTENT IN HONEY

- This investigation is a very strong indicator of environmental pollution.
- The application of these methods associated with trace element concentration patterns is a useful way to characterize and classify food products according to their origin and quality.





JAPANESE CULTURE

Based on our observation and interactions

- Time management
- Hardworking
- Conservative
- Gracious
- Food
- Onsen Hot Spring bath at Parco Hotel

❖ Fourth Session - Morning

On 21st July, 2022 Class on Ecology and Wildlife by Dr Toshio Tsubota

❖ Topics that were covered

- ✓ Environmental [climate changes, chemical pollutions]
- ❖ **Conservation medicine**
- ✓ Animal health
- ✓ Human health
- ✓ Ecosystem health
- ❖ **Ecology**
- ✓ Food chains/ food webs [networks] in the ecosystem

Chemical Hazard Control Class

❖ **First Session**

Chemical Hazard Control on 19th July, 2022, by Dr. Yared Bayene

- Topics Covered
- ✓ Basic concept on eco toxicology and environmental toxicology.
- ✓ Environmental chemicals and biochemical effects
- ✓ Organic chemical pollutants and trace elements.
- ✓ Bio monitoring and risk assessments.
- ❖ **Second Session on Environmental pollution**
- ✓ Pesticides such **DDT, PCBS, PPCPS**.
- ✓ Heavy metals/ trace elements

ADVANCED SEMINAR ON ANALYTICAL MACHINES (LCMS)

❖ **Morning Session**

On 25th July 2022 we had a lecture by Prof. Ikenaka Yoshinori.

Topics covered were

- ❖ LC/MS and GC/MS
- ❖ Extraction of neonicotinoid from beverages and urine.

❖ **Afternoon Session**

In the afternoon we had another class given by Collins (PhD) on pesticide pollution and health in chemical hazard control.

On 26th July, 2022 we had a class on chemical hazard control on endocrine disruption chemical in wildlife and humans by Ana Sanas (PhD).

❖ On 27th July, 2022 we had a lecture on chemical hazard control heavy metals toxicity by Yared Bayen (PhD)

CONT'

❖ **Afternoon Session lecture by Dr Collins Nimako**

- Topics covered
- ✓ Food toxicology
- ✓ Meaning of food toxicology
- ✓ Types and sources of food contaminants and toxins
- ✓ Risk assessments strategies of food contaminants
- ✓ Regulatory agencies of food safety.

LAB EXPERIENCE IN MICROBIOLOGY – FOOD SAFETY

OBJECTIVE

Checking for **Campylobacter** and **Salmonella** bacteria in raw chicken from retail store.

The food was safe to eat because number of salmonella colonies on plate after isolation where within acceptable range.

CONT'

❖ **Third Session - Morning**

On 20th July, 2022 class Hazard for Animals by Dr. Aki Tanaka

❖ Topics covered .

- **Part one**
- ✓ Shelter medicine
- ✓ Herd medicine for companion animals
- ✓ Shelter epidemiology
- ✓ Disaster veterinary medicine
- **Part two**
- ✓ Veterinary forensic
- ✓ Animal abuse
- ✓ Diagnosis

❖ **Afternoon Session**

- Natural Toxins and its Pharmacological Aspects
- Toxins and Medicine
- Plant Toxins Phyoto Toxins

SHIRETOKO NATIONAL PARK

❖ On the 24th July 2022 we visited shiretoko national park and took a nature guide tour by the tour guide master, with Dr. Michoto Shimozuru

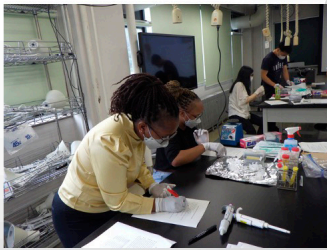
❖ Prior to the tour, we had a mini lecturer by the tour guide on the safety and defensive mechanism about bears.

❖ **Activities that took place where:-**

- ✓ The role of deers in the forest ecosystem
- ✓ Environmental forest protection of shiretoko national park
- ✓ Lake viewing of all five shiretoko lakes.
- ✓ Importance of wild grapes to bears food web
- ✓ The importance of keystone species like woodpecker in forest decomposition
- ✓ The tour was concluded by watching a movie title THE LIMIT at shiretoko national park

LAB EXPERIENCE – DNA EXTRACTION OF [ISOHAIR EASY]

- Participated in the DNA extraction of isohair on Monday 25th July and continued to Tuesday 26th July, 2022.
- This was done by taking tiny hair from the route by following prescribed instruction in order to determine alcohol intake tolerance.
- In summary if the results show that DNA is wild type then tolerance to alcohol is high but if the DNA is mutant then the tolerance to alcohol intake is low



MARINE VIEW

- INTERACTION DURING THE OCEAN TRIP



TOYOHA MINE SITE

- After the closure due to environmental pollution the mine site was changed to mine water and waste water treatment.
- Activities
 - The site manager gave a brief background main site operations.
 - We visited the water treatment plant, we showed all stages in water treatment.
 - We also visited the slim dam



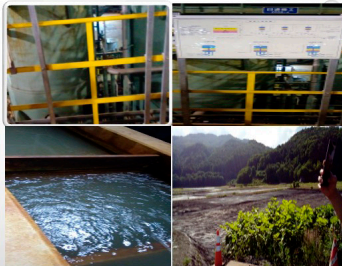
ROLE OF BEARS IN FOREST AND MARINE ECOSYSTEM

- The critical role of brown bears in circulating nutrients between marine and terrestrial ecosystem
- Brown bears make forest of Shiretoko national park rich
- By carrying plant seeds in their droppings and restoring sea nutrition derived from salmon.
- If they are eliminated from Shiretoko many living things would be affected.
- It is imperative to say that brown bears are bridges between marine and terrestrial ecosystem in nature balance
- This concept can be used in solving *one health related problems*

MINE DAM SITE

TOYOHA MINE WASTE WATER TREATMENT PLANT

- It has three main sediment tanks to purify underground water.
- The site manager explained how underground water is purified before discharged to the river.
- The water pH is monitored before it is discharged to the river this is done in line with Japan environmental regulations
- Project success the company managed to reclaim the land to its natural state after the massive mining of *nickel, zinc, lead and copper*.



CONCLUSION

- In conclusion one health is not a new idea but it is one that has become more important in recent years
- Due to environmental and emergence of several new zoonotic diseases.
- A collaborative multisectoral and transdisciplinary approach working at the local, regional national and global levels with the goal of achieving
- Optimal health outcomes recognizing the interconnection between people, animals, plants and their shared environment

BOAT CRUISE AT SHIRETOKO

- After a long drive to Shiretoko from Kushiro we arrived at Shiretoko port.
- Main activities
 - Brief classes on the marine species that are common in the area.
 - Common bird species in Pacific Ocean that are important in the food chain cycle.
 - Ecological role of keystone species in marine ecosystem balance of species.



Acknowledgements

- We are so grateful to Hokkaido University for granting us this rare opportunity of learning and doing labs to promote the concept of *One Health*.
- We also extend our gratitude to all the Hokkaido University *IVCEMP* coordinators for everything they have done to us as we will go back home and tell them about the good news.
- To our coordinators Rio Doya and Miyoko Ogishima we are so grateful for everything you have done to this team.
- Our gratitude is also extended to the University of Zambia for giving us this time to come and learn. Knowledge is power.
- Let this spirit of these two institutions continue to be strong that even the next generation should do all these things to shape our future with the view of achieving sustainable development goals.

