Field Study on True Bugs (Heteroptera) and leafhoppers (Auchenorrhyncha) in the Environs of the Nuclear Power Plant Fukushima Daiichi

Prefecture Fukushima, Japan

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Cornelia Hesse-Honegger

Field Study on True Bugs (Heteroptera) and leafhoppers (Auchenorrhyncha) in the Environs of the Nuclear Power Plant Fukushima Daiichi Prefectures Gifu and Fukushima, Japan September/October 2016

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Preface

I was invited to give the opening speech at the 6th Citizen-Scientist International Symposium on Radiation Protection, October 7 - 10, 2016 in Nihonmatsu, Japan. At the same time, I was invited to show my work at the Fukushima Art Biennale also in Nihonmatsu.
I therefore decided to take this opportunity to collect true bugs (Heteroptera) in irradiated areas around the damaged nuclear power plant Fukushima Daiichi.

My first stop was Takayama, a town 225 km south-west of the nuclear power plant Fukushima Daiichi, which according to official radiation maps was at the most southern tip of the nuclear cloud, and either received no or very low radiation from the Fukushima accident March 2011. Collecting first in a non-irradiated area allowes for a comparison with the groups of insects collected in irradiated areas. Except for the research point Kawauchi, all are located outside the exclusion zone. I was more interested in how the insects fared in areas where people still have to live rather than within the exclusion zone where people have been evacuated.

Even though official science does not believe in harmful effects caused by low doses of man-made radioactivity, they still demand research in a 'reference biotope', which means research in a 'clean' area. Hence a field study of true bugs should contain a collection of insects from not contaminated areas as well as from contaminated areas. In my case, one not contaminated area seemed sufficient, because I had ample comparisons, having in the last 30 years already collected 17'500 insects at 22 research sites in Europe USA and Vietnam. (See page 46)

Unfortunately, ever since the first nuclear bomb tests in 1945, our world is more or less irradiated. Today it is not possible to identify a completely 'clean' reference biotope without chemical and radiological examination. Personally, I do not believe a reference biotope on this planet can easily be found, because we do not know whether a research area has been irradiated or not. Artificial radiation might be so low that apparatuses cannot measure them. This is why Nature for me is a more precise measurig station.

As an artist, I started collecting true bugs in 1969. Not systematically, but because I found them beautiful to paint. I also learned about the prevalence of species and their host plants.

Since the accident at the Chernobyl nuclear power plant in April 1986 I have collected, including the ones in Prefecture Fukushima, 18,000 true bugs, cicada (Auchenorrhyncha) and some ladybird beetles (Coccinellidae).
I made epidemiological field studies in areas with nuclear power plants, nuclear reprocessing plants, nuclear test areas and the nuclear factories at Hanford in the USA. After collecting the true bugs, I examine them and paint some of them with the help of my binocular microscope. With my watercolors I show the abnormalities. With the help of maps, I can demonstrate the percentage of disturbances.

My field studies are based on true bugs (Heteroptera). These insects belong to the phylum Arthropoda and are a suborder of Hemiptera.
Most true bugs feed on plants. If the plants are irradiated, the radiation will get into their bodies. True bugs live over generations at the same spot and fly only short distances. They belong to the group of 'Hemimetabola' insects, they do not pupate. This means that after hatching they immediately incorporate radioactivity by sucking the liquid of plants with their trunk-like

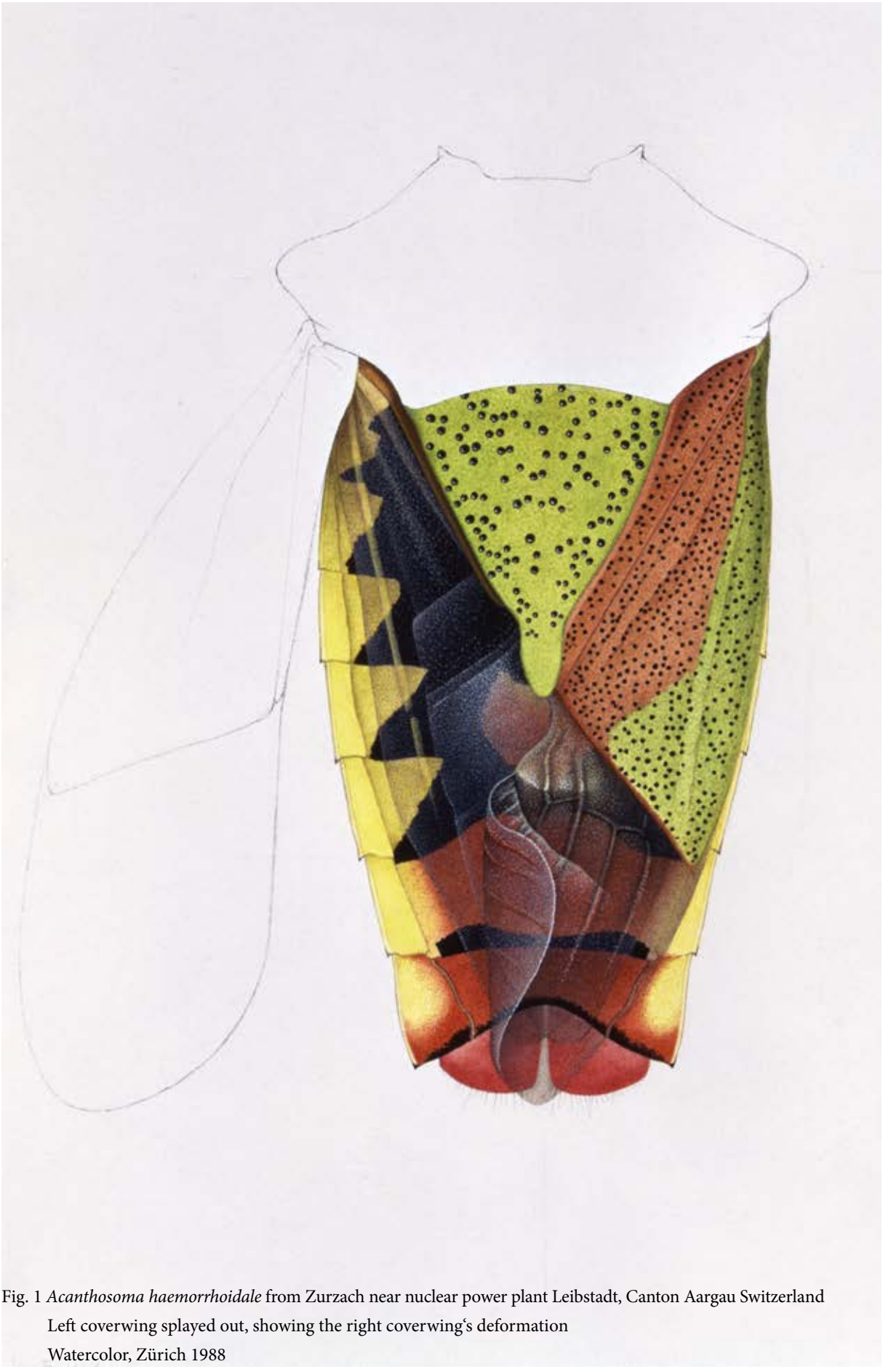


Fig. 1 *Acanthosoma haemorrhoidale* from Zurzach near nuclear power plant Leibstadt, Canton Aargau Switzerland
Left coverwing splayed out, showing the right coverwing's deformation
Watercolor, Zürich 1988

suctorial mouthpiece. They react distinctly even to the lowest doses of ionizing radiation with disturbances of their bodies.
If I cannot find enough true bugs, I also collect cicada, leafhoppers (Auchenorrhyncha, Homoptera) as well as some ladybird beetles (Coccinellidae). Lady bird beetles are second in the food chain and feed on aphids, which also suck liquid from plants. Leafhoppers belong to the same order Hemiptera as the true bugs with a similar development. In highly irradiated areas like the ones I describe in this article, leafhoppers survive better than true bugs, and I dare to make the assertion that a reduced number of true bugs is an indication of damaging radiation. It confirms my assumptions which started with my first research in the surroundings of nuclear power plants in 1988.

During all my studies I have learned how important winds are. In the case of nuclear power plants, one can observe wind frequencies starting from the area of the nuclear power plants. These frequencies give a pattern which is nearly the same year after year.
In the case of an accident in a nuclear power plant, it is important to know how the wind was blowing at the time of heavy emissions.

Unfortunately, because of the earthquake Tōhoku most of the data, measurements of radioactivity were destroyed. But there are some interesting reconstructions.

The winds from Fukushima Daiichi are usually north-east, which means they go to the Pacific Ocean. Data from Itate (40 km away), Tamura (45 km away) and Onahama (50 km away) have been saved. The prevailing wind March 15, 2011, the date when block Nr. 2 was damaged and block Nr. 3 exploded, could be analyzed. This very day the highest dose of I-131 was emitted, one quarter of the entire amount. The prevailing wind was north-west to south-west or west which means they went inland in the direction of Fukushima City. Mostly affected were Fukushima City, Koriyama and Iwaki. March 16 it seems the wind went to the ocean.

According to Tepco, Fukushima City and Iwaki received 20 to 25 micro Sievert per hour. Unfortunately, I-131 was measured between March 12 and 18 only very near the nuclear power plant and not in other areas where people still lived.

Three organizations measured on their own initiative: The Atom Agency JAEA 110 km south, KEK 150 km southeast and CTBT 217 km southwest.

Model calculations by Hirayama Hidoe of KEK figured that district Koyodaira in Fukushima City had the highest dose of I-131 on March 15 at 5- 6 pm with 19‘100 Bq/m3. The amount of 3‘650 Bq/m3 lasted up to March 16 at 4 am.

It means that an adult inhaled I-131, 54‘750 Bq/per day and a child 27‘375 Bq/per day.

Professor Tokonami Shinji from the University of Hirosaki claims that the highest dose for an adult of I-131 was 1‘500 Bq. He assumes a 4-hour exposure on March 15. Kawata Masaharu disagrees and because there are no exact dates a dispute is inevitable.

During all my investigation into the health of true bugs I had ample opportunity to study wind directions and correlate them to my findings of abnormalities in insects. Coming to a new

country, a new research place it is quite difficult to identify the prevailing winds in the short time I stay in the area. In the case of my Fukushima study on the distribution of radioactivity, I could find several sources. One has to admit though that there is not one true and reliable source, and one can find many different interpretations.

It is interesting to see that the ratio of true bugs to leafhoppers varies according to the distance to the nuclear power plant Fukushima Daiichi and the amount of radiation the receive.

In Minamikunugimori there was a nice mix of species to be found, although it took three people and several hours to collect 60 insects. In the vicinity to the 20 km exclusion zone the number of true bugs dropped dramatically. In Yamakiya and Kawauchi it was nearly impossible to find any true bugs at all and the number of abnormalities among leafhoppers was almost 50%. In Ochiai Katsurao, at the border to the 20 km exclusion zone, it was nearly impossible to find any insects. In Fukushima City it was difficult to find a good biotope and the one available had only two species of true bugs Megacopta puctatissima and Lygaeidae Nysius sp and no leafhoppers at all.
I conclude that the leafhopper Cicadella viridis is the major survivor (I did not study Coleoptera) even though there are plenty of abnormalities, and in most individuals the pigmentation has vanished to a pale opaque light blue. The closer I got to the exclusion zone or to heavily irradiated zones, Bothrogonia ferruginea had also disappeared.

It was the most shocking experience I had in an irradiated area.

Fig 2. Number of true bugs and leafhoppers in Fukushima Prefecture in relation to amount of irradiation

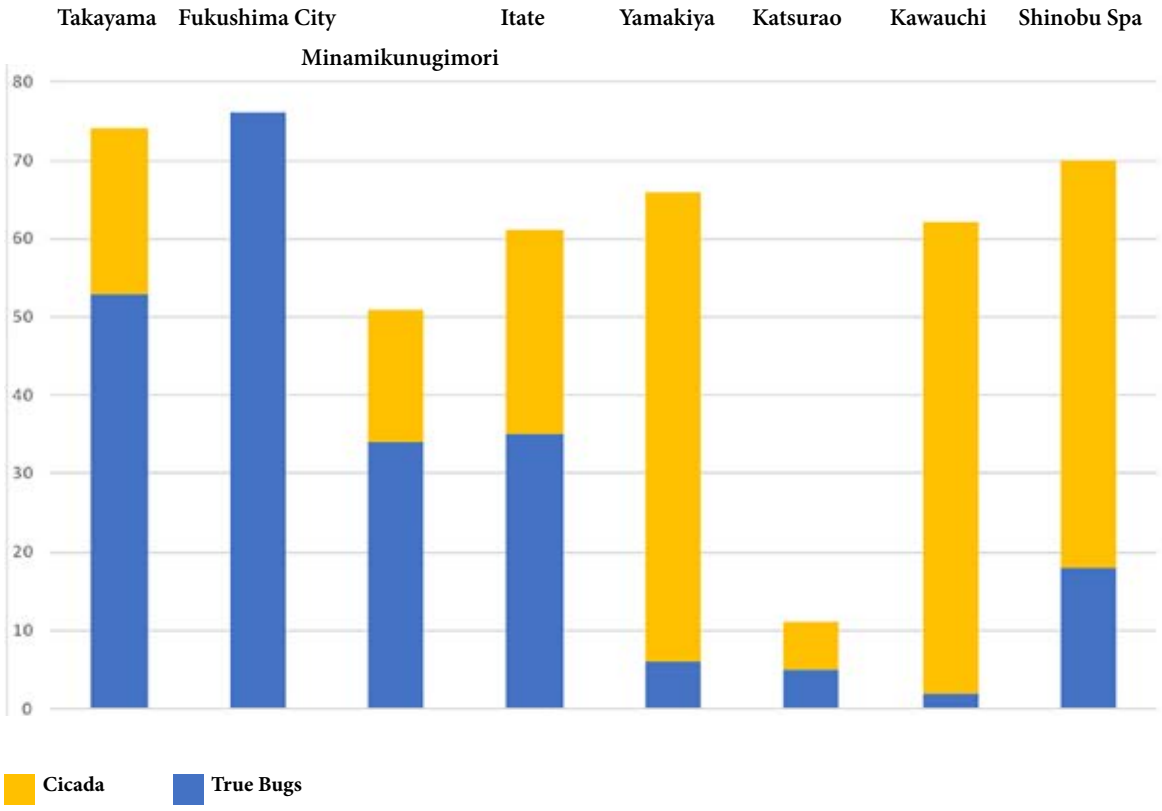
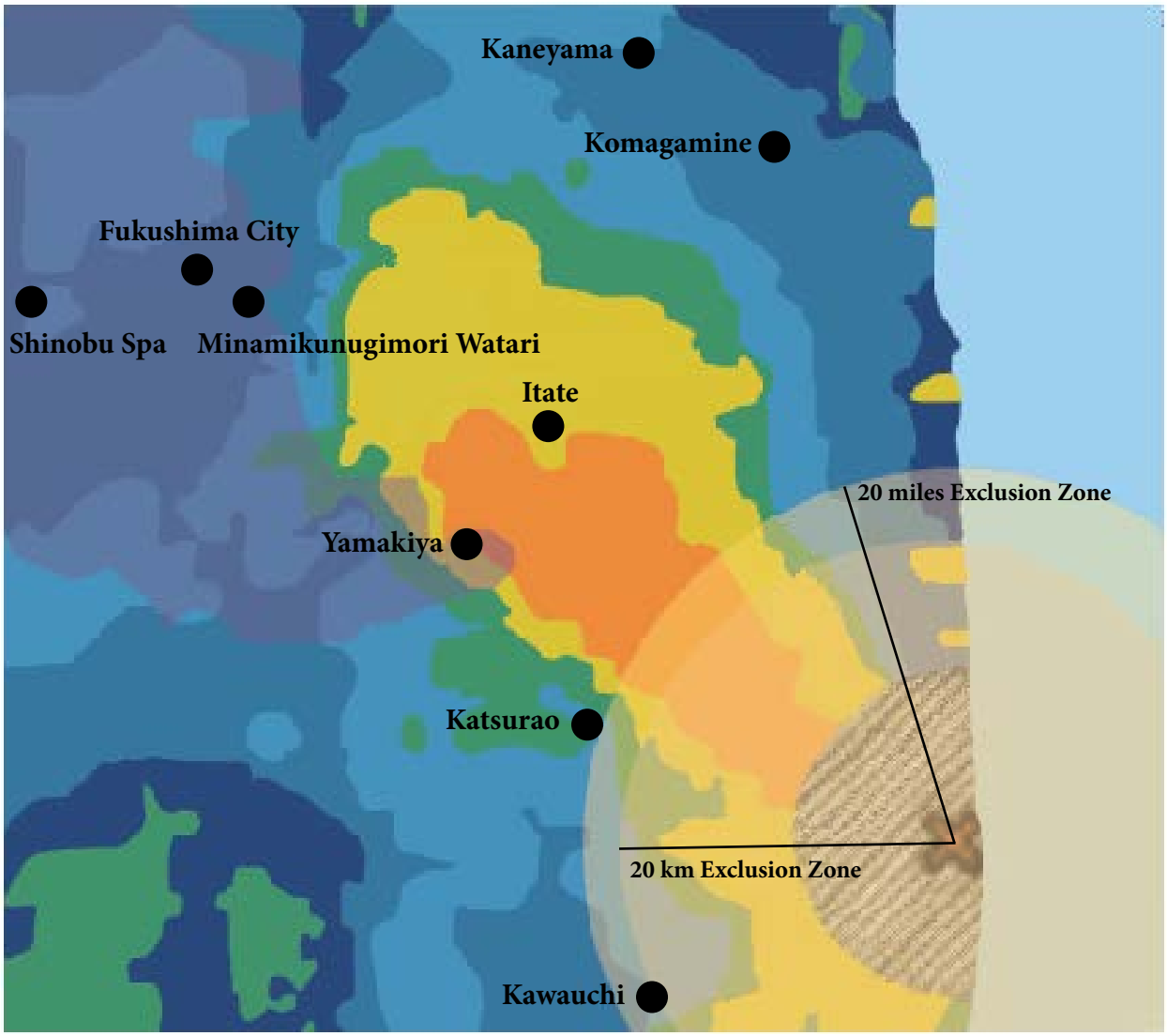


Fig. 3 Radiation Map with Research Areas



19.0	–	91	>12.5			mR/h
9.5	–	µSv/h	2.17	–	12.05	mR/h
3.8	–	µSv/h	1.19	–	2.17	mR/h
1.9	–	µSv/h	0.25	–	1.19	mR/h
1.0	–	µSv/h	0.03	–	0.25	mR/h
<1.0	–	µSv/h	<0.03			mR/h
3.5	–	4.3 µSv/h	Excerpt from UNSCEAR 2013			

Source: NNSA National Nuclear Security Administration, Areal monitoring, March 30 – April 03 2011

map: original data from joint aircraft survey undertaken by the Japanese Ministry of Science and Technology and US. Department of Energy, Ground Level Dose in µSv/h normalized to April 29, 2011

Table 1. Comprehensive view of all insects collected

Research location	**Takayama**	**Kaneyama**	**Fukushima City**	**Shinobu Spa**
	Reference Biotope	Reference Biotope	Irradiated Biotope	Irradiated Biotope
Distance to Fukushima-Daiichi Coordinates	**364 km/225 miles 36° 8‘46.05“N 137°15‘7.82“E**	**56 km/35 miles 37°53‘39.40“N 140°48‘12.24“E**	**63 km/39 miles 37°46‘24.13“N 140°28‘31.95“E**	**71 km/44 miles 37°44‘52.65“N 140°20‘26.34“E**
Total number of Insects	**84**	**25**	**76**	**71**
Hemiptera Heteroptera	**53**	**8**	**76**	**18**
Pentatomidae	2 (2 species)			1 (1 species)
Miridae	31 (4 species)			4 (3 species)
Coreidae	4 (1 species)			
Lygaeidae	7 (3 species)	2 (1 species)	2 (1 speices)	13 (1 species)
Reduviidae	8 (1species)			
Alydidae		1 (1 species		
Rhopalidae		5 (1 species)		
Nabidae				
Anthocoridae	1 (1 species)			
Beritidae				
Tingidae				
Plataspididae			74 (1 species)	
Hemiptera Auchenorrhyncha	**21**	**14**	**0**	**52**
Aphrophoridae	4 (2 species)			
Cicadellidae	16 (2 species)	14 (2 speices)		52
Coleoptera	10 (4 species)	3 (1 species)		1 (1 species)
Diptera / Lepidoptera		1 (1 species)		
Heteroptera morphological abnormalities	3		4	5
Heteroptera pigment/structure abnormalities				
Total number abnormalities	**3**		**4**	**5**
Auchenorrhyncha morphological abnormalities		2		18
Auchenorrhyncha pigment/ structure abnormalities		3		5
Cidadella viridis pale coloring*				14
Total number abnormalities	**0**	**5**		**37**

Minamikunugimori Watari	**Itate**	**Yamakiya Sakai**	**Ochiai Katsurao**	**Kawauchi**
Irradiated Biotope	Irradiated Biotope	Irradiated Biotope	Irradiated Biotope	Irradiated Biotope
58 km/37 miles 37°44‘49.63“N 140°30‘30.70“E	**38 km/23 miles 37°40‘35.20“N 140°44‘3.01“E**	**38 km/23 miles 37°36‘3.33“N 140°40‘27.55“E**	**25 km/15 miles 37°29‘57.47“N 140°45‘49.90“E**	**21 km/13 miles 37°20‘2.97“N 140°48‘39.26“E**
60	**63**	**67**	**11**	**63**
34	**35**	**6**	**5**	**2**
3 (2 species)	2 (2 species)	4 (3 species)	2 (1 species)	2 (2 species)
10 (4 species)	22 (5 species)		1 (1 species)	
1 (1 species)	1 (1 species)	1 (1 species)		
12 (1 species)	6 (2 species)		2 (1 species)	
3 (1 species)				
		1 (species)		
1 (1 species)				
4 (1 species)	4 (1 species)			
17	**26**	**60**	**6**	**60**
1 (1 species)	3 (2 species)	1 Membracidae		
16 (4 species)	23 (2 species)	59 (3 species)	6 (2 species)	60 (2 species)
7 (4 species)	2 (5 species)	1 (1 species)		
2 (1Moth species)				1 (1 species)
	4			
9	2		1	2
9	**6**	**0**	**1**	**2**
2	3	12	1	6
2	1	6	1	4
	8	29	2	24
4	**12**	**47**	**4**	**34**

* per insect only one deformation is counted

Presentation of research sites and watercolors

Takayama, September 23 – 25, 2016

84 insects collected
3 abnormalities
● 21 cicada (Auchenorrhyncha) ● 53 true bugs (Heteroptera) ● 10 beetles (Coleoptera)

Takayama was chosen as a reference biotope. The site is below Hotel Associa in Takayama. There I found a nice variety of true bugs and cicadas - even rare families like Assassin bugs (Reduviidae) were among them. Some deformations were found, e.g. one feeler with only three sections, or a deformation of the abdomen, see image page 30. The little scintillator which a friend had borrowed me measured radioactivity in „Röntgen per hour“, a unit still used in the USA.
10 microRöntgen per hour as displayed here are roughly the equivalent of 0,1microSievert per hour.

Hotel Associa, Takayama

Biotope below the Hotel Associa, Takayama

Scintillator at biotope Hotel Associa, Takayama

Fukushima City, Mt. Shinobu, September 26, 2016

76 insects collected
4 abnormalities
- 74 Megacopta puctatissima and 2 Lygaeidae Nysius sp. collected

There is a lot of green ground around the art museum, but the biotopes were very poor. Finally I chose the edge of the forest next to a platform from where the city can be viewed. Only two species could be found at this place, Megacopta punctatissima and Lygaeidae Nysius sp. The abnormalities were quite heavy and all affected the insects‘ legs.
I also found plant leaves showing abnormalities, see p. 46

View from the platform over the town of Fukushima

Research area at Mt. Shinobu

Working table in the hotel room in Fukushima City

Minamikunugimori Watari, September 27, 2016

60 insects collected
12 with abnormalites

- 17 cicada (Auchenorrhyncha)
- 34 true bugs, (Heteroptera)
- 7 beetles (Coleoptera)
- 2 Lepidoptera

The biotope was very good - we even saw a frog - but it was quite difficult to find insects. I collected a nice variety of true bugs and cicadas. The abnormalities found were quite heavy and comparable to those I would expect around a nuclear power plant.

Research biotope with Sebastian Pflugbeil and Mrs. Sato

Plastic wrapped radioacitive waste dropped haphazardly

Scintillator at Minamikunugimori Watari

Itate, September 29, 2016

63 insects collected collected
18 with abnormalites
● 26 cicada (Auchenorrhyncha) ● 35 true bugs (Heteroptera) ● 2 beetles (Coleoptera)

On the day of collection it was raining. Many abandoned houses, where plants started to overgrow everything. The biotope was very nice, but I could find only a few true bugs, which were mostly Lygaeidae Nysius sp. Most of the other insects were leafhoppers - Cicadella viridis and Bothrogonia ferruginea. Some showed heavy abnormalities, see image page 38. Many of the Cicadella viridis were pale and lacked color.

Biotope and empty houses in Itate

Cornelia at research point Itate in front of an empty house and with radioactive waste wrapped in green plastic in the background

Scintillator at Itate

Yamakiya Sakai, October 1, 2016

67 insects collected
44 with abnormalites
● 60 cicada (Auchenorrhyncha) ● 6 true bugs (Heteroptera ● 1 beetle (Coleoptera)

This site was a very nice biotope near the border of the exclusion zone. While it was very difficult to find ture bugs, it was easy to collect all the cicadas. The species most found was Cicadella viridis. There were some heavy abnormalities and many of the insects‘ feelers were wavy or turned downward. Many of the Cicadella viridis lacked color. See image page 40.

Biotope in Yamakiya Sakai

Entrance to the exclusion zone around the nuclear power plant Fukushima Daiichi near Yamakiya Sakai

Scintillator at Yamakiya Sakai

Ochiai Katsurao, October 1, 2016

11 insects collected
5 with abnormalites
● 6 cicada (Auchenorrhyncha ● 5 true bugs (Heteroptera)

The biotope was close to the border of the exclusion zone in a remote valley and very beautiful. It was difficult to find any insects at all! In more than an hour‘s search my Japanese assistant, Mrs. Sato, and I found only two Pentatomidae, one Miridae, two Nysius and the rest (6) were cicadas.
The entire population of the village was evacuated by government order by May 2011. In March 2013, the government divided the village into three zones, with the majority of the village area cleared for unrestricted return of its inhabitants by spring of 2014, a smaller area cleared for daylight return only, and a larger area in which the existing restrictions against entry would be maintained until at least 2017 (Katsurao, Tomioka, Namie to be reclassified into 3 zones“, Fukushima Minpo News, March 8, 2013.)

Biotope in Ochiai Katsurao

Entrance to the exclusion zone around the nuclear power plant Fukushima Daiichi

Measuring Staion at Ochiai Katsurao

Kawauchi, October 3, 2016

63 collected
36 with abnormalites
● 60 cicada (Auchenorrhyncha) ● 2 true bugs (Heteroptera) ● 1 Drosophila fly (Diptera)

The biotope was very nice, however, except for 2 Bothrogonia ferruginea only Cicadella viridis could be found. The Cicadella viridis were pale, had lost all their usually bright colors. Sometimes the head was nearly white and lacked stripes. The chitin - the main substance of insects‘ bodies - was brittle. Some also showed dark patches. One of the true bugs (Pentatomidae) showed a ‘blown up’ abdomen, a phenomenon I had encountered in individuals near nuclear power plants.

Biotope at Kawauchi, border to the exclusion zone of the nuclear power plant Fukushima-Daiichi

Sign at the entrance to the excluison zone around the nuclear power plant Fukushima Daiichi

Scintillator at Kawauchi

Shinobu Spa Fukushima, October 4, 2016

71 insects collected
42 with abnormalites
● 52 cicada (Auchenorrhyncha) ● 18 true bugs (Heteroptera)

The biotope was next to the street in a sunny section of a remote area. It was difficult to collect all the insects. The variety of species was extremely reduced. There were only two cicadas Bothrogonia ferruginea, one tree bug (Pentatomidae), three soft bugs (Miridae) and 13 Lygaeidae Nysius sp. and one ladybird beetle. The rest were Cicadella viridis, which had lost their original coloring too and were very pale. Some showed a white transparent layer over their wings and thorax.* I painted one of this pale leafhoppers as an example. It could have stemmed from another biotope in this fieldstudy. Interesting note: My scintillator measured ver little radioacitivity, comparable to Takayama. But the area had been irradiated during the accident, as radiation maps show.
Questions: Had there been a dangerous radionuclide characterized by a quick half-live period? Is the paleness a genetical mutation?
* I also observed this phenomenon near Paul Scherrer Institute for Nuclear Research at Villigen Canton Aargau, Switzerland.

See images pages 38 and 39.

Biotope at Shinobu Spa and view on Fukushima City

Taxi Driver Mr. Sato

Scintillator at Shinobu Spa

Komagamine, 6 October 2016

5 insects collected
3 abnormality found
● cicada (Auchenorrhyncha) ● 2 true bugs (Heteroptera)

This biotope near the sea, the vista very beautiful. The radiation map showed that this area was rather clean of radioactivity, but actually it was not. I chose to drive to this place up north and east of Fukushima City in search for another reference biotope. Unfortunately there was a heavy wind on that day, a typhoon was coming along. So I could not find more than two true bugs, as these insects hide when wind is strong. All collected individuals looked fine, and the variety of species was fine. I even found a Reduviidae assassin bug, which I consider endangered at least in Switzerland.
Because of the strong wind I only spent little time here and, unfortunately, I forgot to measure radioactivity. I therefore can only show the measurements I made in the car before arriving at Sōma. It was rather higher than I expected from official radiation maps.

Biotope at Komagamine

Bay near research point Soma

scintillator near Soma

Kaneyama near Mt. Karohzan, 6 October 2016

25 insects collected
5 disturbed
● 14 cicada (Auchenorrhyncha) ● true bugs (Heteroptera) ● 3 beetles (Coleoptera)

On the way back to Fukushima City I again wanted to collect insects in an area that, according to official radiation map, had been very little irradiation after the accident at Fukushima Dai-ichi nuclear power plant. The biotope at Kaneyama near Mt. Karohzan was fine, but the strong wind made it very difficult to find true bugs. Mainly there were leafhopper Cicadella viridis to be found. However, two scentless palant bugs, Rhopalidae, a family which I had not encountered at my previous collection sites in Japan, were among the collected insects. They looked quite fine with only some dark spots on the wings. Of course - I left a mantis on its sunny spot.

Biotope at Kaneyama

Mantis, a good sign for a healthy biotope

Scintillator at Kaneyama

Squash bug (Coreidae) from Takayama near Hotel Associa.
Abnormalitiy: The right feeler is lacjs a section and is deformed

Watercolor, Zürich, October 28, 2018

Abdomen of assassin bug (Reduviidae) from Takayama near Hotel Associa.
Abnormalitiy: The adomen is asymmetrical, the right side is malformed

Colorsketch, Fukushima City, September 28, 2016

Head of cicada Bothrogonia ferruginea from Itate, Prefecture Fukushima near nuclear power plant Fukushima-Daiichi
Abnormality: malformation on the right side of the thorax

Colorsketch, Fukushima City, October 30, 2016

Head of a Cicadella viridis from Yamakiya Sakai, Prefecture Fukushima, near the nuclear power plant Fukushim Daiichi

Abnormalities: There is an indentation on th right side of the head and the head is without its normal color yellow.

Colorsketch, Fukushima City, October 2, 2016

Cicadella viridis from Shinobu Spa, Prefecture Fukushima near Fukushima City

Abnormality: Both wings, scutellum, and head lack normal pigmentation

Watercolor, Zürich March 2017

Left side: Cicadella viridis from Shinobu Spa, near Fukushima City

Abnormality: two feelers on the left side. The coloring is the one of a healthy cicada.

Right side: Cicadella viridis from Shinobu Spa, near Fukushima City

Abnormalities: a growth on the thorax, the coloring is of a healthy cicada; the left feeler is broken and shorter, the insect is very small

Watercolor, Zürich April 2017

Abnormal plant leaf from Mt. Shinobu, Fukushima, September 26, 2016

Plastic storage for radioacitve waste near Yamakiya Sakai

Epilogue

In this very low irradiated area in Takayma there was a nice variety of true bugs and cicadas with three disturbances, the kind I would find around Swiss nuclear power plants. As I concentrate my studies mostly on true bugs, I collect as well leafhoppers, as they are related to each other. On most field studies I collected 50 or 65 indivduals per research site.

In highly irradiated areas next to the exclusion zone the variety was extremely poor, and I mostly had to collect Cicadella viridis, which seemed to be almost the only survivors after the true bug Lygaeidae Nysius sp. Just a few individuals of Bothrogonia ferruginea could be found in highly irradiated areas and sometimes there were none at all. It seems that Bothrogonia ferruginea is more sensitive to radiation from the nuclear accident at Fukushim Daiichi. Shocking is the observation of the pale coloring on Cicadella viridis. This is a completely new phenomenon for me. I have not encountered anything like it in any of my previous field studies. White feathers on swallows have been observed in the Chernobyl area by Timothy Mousseau.

Another observation that surprised me was that I could find disturbed plant leaves only in Takayama, Fukushima City and Shinobu Spa. At all the other field study points the plants looked fine or more or less fine, but I could not detect distinct malformations as I had observed after the Chernobyl accident (April 26, 1986) in Sweden and Switzerland in summer 1987. I observed a recovery to normal shapes in the Ticino in the south of Switzerland already in 1988. Heavily disturbed plant leaves can be observed in the environs of nuclear power plants as the radiation is emitted chronically day and night and over decades.

I am not a botanist, but during my studies I always collected plants after the Chernobyl accident, in Chernobyl as well as near reprocessing plants and nuclear bomb areas in the USA. The observations I made during 30 years of collecting plant leaves seem important to me, and I still have the herbarium with all the collected plants.

To me there are many puzzles and questions concerning the radiation in the Fukushima area but the biggest is at Shinobu Spa. The area had been irradiated after the accident. My scintillator showed nearly no radioactivity five years after the accident. It seems though that the leafhoppers have not recovered. They are still very pale and have morphological disturbances. Could it be from a dangerous radionuclide with a very short half life, leaving a mutation?

The dispersion of radionuclides from a nuclear power plant are emitted day and night at a constant level, except for the peaks when fuel rods are exchanged. They correlate with the prevailing wind frequencies. During a nuclear accident however, the radionuclides are dispersed randomly. It is therefore difficult to identify the areas which are irradiated.
My field study gives an impression of the damage done to insects.
It is most alarming how terribly reduced the variety of species have become compared to the nearly clean Takayama.

Annexe

Places where Cornelia Hesse-Honegger realized her previous field studies:

1987 Sweden and Ticino, Switzerland Chernobly fallout areas

1988 Environs of Swiss nuclear power plants and Paul Scherrer Institute

1989 Nuclear reprocessing plant Sellafield UK

1990–1996 Münstertal, Canton of Grisons, Switzerland, Chernobyl fallout area

1990 Environs nuclear power plant Chernobyl, Ukraine

1991 Nuclear power plants Three Mile Island and Peach Bottom Plant, Pennsylvania, USA,

1992–1997 Isérables, Canton Wallis, Weggis Canton, Lucerne, Switzerland,

Mouans Sartoux und Correns, France, reference biotopes

1992–2003 Environs Paul Scherrer Institute, Canton Aargau, Switzerland

1993–1999 Environs Swiss nuclear power plants. Gösgen, Beznau und Leibstadt,

1995 Environs nuclear power plants Krümmel and Stade, Germany

1997 Environs nuclear test area Nevada and Utah, USA

1998 Environs Plutoniumfactories Hanford, Washington USA

1999 Nuclear reprocessing plant La Hagu, France

2002–2004, Environs nuclear power plant Gundremmingen, Germany

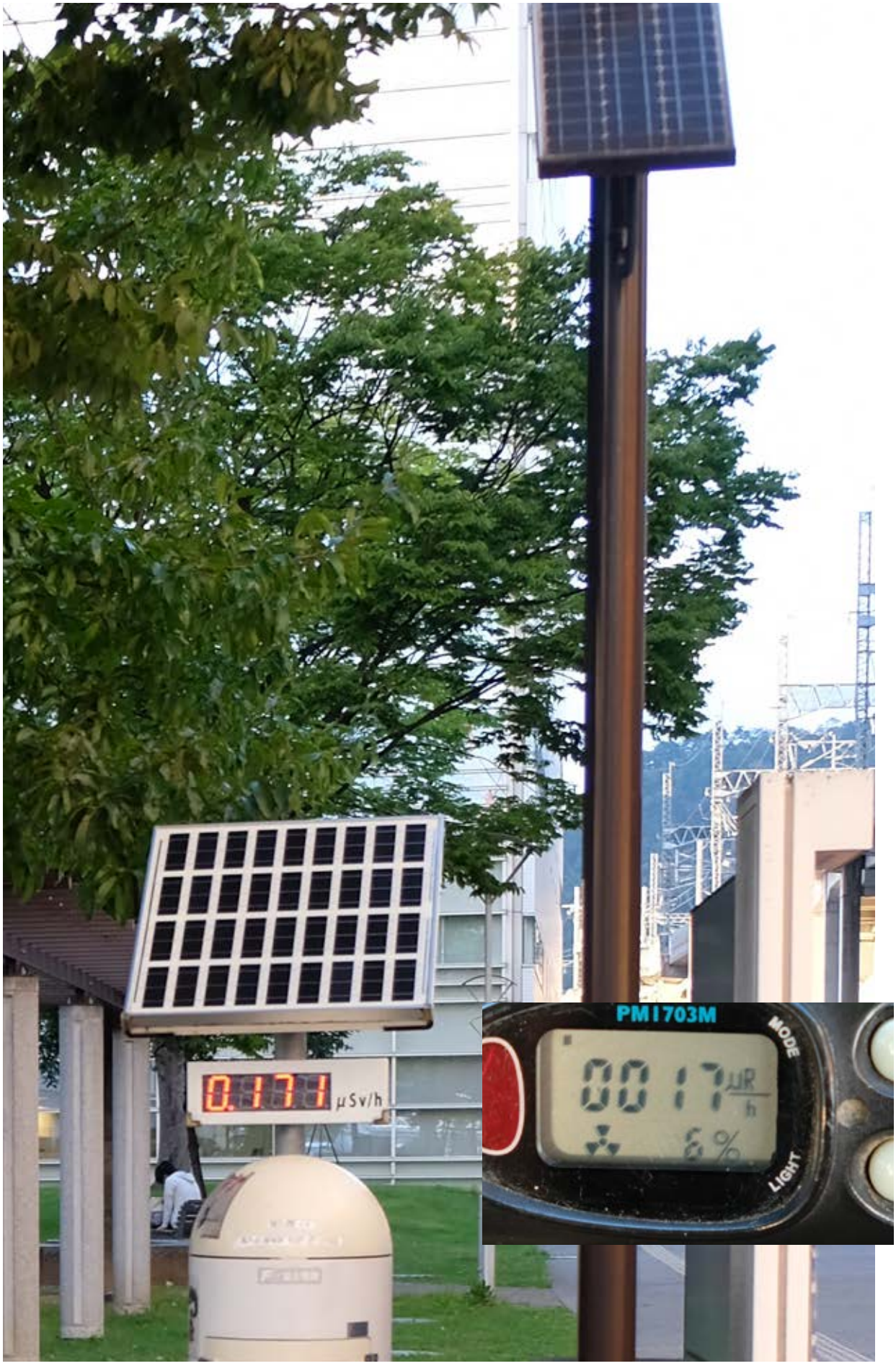
2004 spray areas Agent Orange South Vietnam

2006–2015 Entlebuch, Canton Lucerne, environs Swiss nuclear installations

2010 Nivå, Danmark, reference biotope

2016 Environs outside the 20 kilometer exclusion zone, nuclear power plant Fukushima-Daiichi

http://www.ucsusa.org/nuclear-power/nuclear-power-accidents/fukushima-faq#.



Measuringstation in Fukushima City near Fukushima railroad station October 5, 2016
scintillator October 5, 2016

The 6th Citizen-Science international Symposium on Radiation Protection

October 7 to October 10 2016

CSRP publishes the "Conclusion" of the 6th Citizen-Scientist International Symposium on Radiation Protection and "The Nihonmatsu Declaration on the Risks of Exposure to Low Doses of Ionizing Radiation"

Six years after the accident at the Fukushima Daiichi Nuclear Power Station, thyroid cancer, low dose radiation, the refuge policy and the decision to reopen a part of the evacuation zone in this context have become an issue of concern mainly for the residents of Fukushima but also for all who are living in contaminating area outside this Prefecture.

The Citizen-Scientist International Symposium on Radiation Protection (CSRP), a non-profit organization based in Tokyo, has published two recommendations reports signed by international experts belonging to scientific organizations from all over the world (Finland, France, Switzerland, Ukraine, Australia, Germany, Taiwan, Japan) addressed to Japanese administrative authorities in charge of risk communication and radiation protection measures in the area affected by radioactive materials released from the Fukushima Daiichi Nuclear Power Plant.

Fourteen independent experts from inside and outside of Japan participated at the 6th Citizen-Scientist International Symposium on Radiation Protection, held from October 7 to October 10, 2016, in Nihonmatsu, Fukushima prefecture, in order to present their latest research. Over three days, they exchanged opinions on the themes of "Epidemiology of low-dose radiation" and "Discourses, laws and ethics after the nuclear power plant accident." They compiled their propositions in two recommendations text they signed, based on discussions they had during the symposium, but also on findings and numerous study reports published after Chernobyl and Fukushima.

The first recommendation agreement, "Conclusion" of the 6th CSRP, take a critical look at risk communication currently conducted by the Japanese authorities, and listed up 6 recommendations deemed indispensable from the victims' viewpoint.

The second recommendation agreement, entitled "The Nihonmatsu Declaration on the Risks of Exposure to Low Doses of Ionizing Radiation," uses the "linear non-threshold (LNT) model" based on the latest scientific findings demonstrating scientific impertinence and lack of political wisdom of the present return policy for the evacuees to areas below 20 millisievert per year.

The Japanese version of these two recommendation reports were published in the March 2016 issue of Science Magazine "Kagaku (Science)," and the electronic English version on its special website.

CSRP has transmitted these recommendations agreement to Minister of the Environment, Director General of Reconstruction Agency, Chairman of Nuclear Regulation Authority and the Governor of Fukushima Prefecture, and held press conferences for Japanese journalists and foreign correspondents in Japan.

Literature

Prof. Timothy A. Mousseau and Ander Pape Moller
http://www.fukushima-is-still-news.com/article-tim-mousseau-radiation-wildlife-in-chernobyl-and-fukushi

http://www.infiniteunknown.net/2016/12/06/dr-timothy-mousseau-consequences-of-fukushima-chernobyl//

Atsuki Hiyama, Chiyo Nohara, Seira Kinjo, Wataru Taira, Shinichi Gima, Joji M. Otaki. The biological impacts of the Fukushima nuclear accident on the pale grass blue butterfly The BCPH Unit of Molecular Physiology, Department of Chemistry, Biology and Marine Science, Faculty of Science, Instrmental, Research Center, University of the Ryukyus, Nishihara, Okinawa 903-0213, Japan.

Cornelia Hesse-Honegger and Peter Wallimann Malformation on True Bug (Heteroptera): a Phenotype Field Study on the Possible Influence of Artificial Low-Level Radioactivity, Chemistry Biodiversity, 2008, 5, 499 - 539

Cornelia Hesse-Honegger, Heteroptera The Beautiful and the Other or Images of a Mutating World, Scalo Zürich, ISBN 3 – 908247 – 31 4, 2002, www.scalo.com

The 6th Citizen-Science international Symposium on Radiation Protection: https://www.iwanami.co.jp/kagaku/eKagaku_201703_CSRP.pdf

Masao Fukumoto, Strahlentelex Nr. 765 November 2018

Protocols

Takayama, Prefecture Gifu

Date	Nr.	Name Latin	Name	ok	Condition
23.09.2016	1	Bothrogonia ferruginea	Cicada	ok	
23.09.2016	2	Bothrogonia ferruginea	Cicada	ok	
23.09.2016	3	Bothrogonia ferruginea	Cicada	ok	
23.09.2016	4	Bothrogonia ferruginea	Cicada	ok	
23.09.2016	5	Aphrophoa stictica	Cicada	ok	
23.09.2016	6	Cicadella viridis	Cicada	ok	
23.09.2016	7	Coleoptera	Beetle	ok	
23.09.2016	8	Urochela luteovaria	Tree bug	ok	
23.09.2016	9	Lygaeidae Nysius sp.	Seed bug	ok	
23.09.2016	10	Bothrogonia ferruginea	Cicada	ok	
23.09.2016	11	Miridae	Soft bug	ok	
23.09.2016	12	Lygaeidae Nysius sp.	Seed bug	ok	
23.09.2016	13	Coleoptera	Beetle	ok	
23.09.2016	14	Coleoptera	Beetle	ok	
23.09.2016	15	Coleoptera	Beetle	ok	
23.09.2016	16	Bothrogonia ferruginea	Cicada	ok	
23.09.2016	17	Cicadella viridis	Cicada	ok	
23.09.2016	18	Miridae	Soft bug	ok	
23.09.2016	19	Miridae	Soft bug	ok	
23.09.2016	20	Miridae	Soft bug	ok	
23.09.2016	21	Cicadella viridis	Cicada	ok	
23.09.2016	22	Bothrogonia ferruginea	Cicada	ok	
23.09.2016	23	Bothrogonia ferruginea	Cicada	ok	
23.09.2016	24	Coleoptera	Beetle	ok	
23.09.2016	25	Homoeocerus dilatatus	Squash bug	ok	
23.09.2016	26	Aphrophoa stictica	Cicada	ok	
23.09.2016	27	Reduviidae	Assassin bug larva		abdomen anormal left side
23.09.2016	28	Coleoptera	Beetle	ok	
23.09.2016	29	Coleoptera	Beetle	ok	
23.09.2016	30	Miridae	Soft bug	ok	
23.09.2016	31	Homoeocerus dilatatus	Squash bug		left antenna one segment missing
23.09.2016	32	Miridae	Soft bug	ok	
23.09.2016	33	Bothrogonia ferruginea	Cicada	ok	
23.09.2016	34	Miridae	Soft bug	ok	
23.09.2016	35	Miridae	Soft bug	ok	
23.09.2016	36	Miridae	Soft bug	ok	
23.09.2016	37	Miridae	Soft bug	ok	
23.09.2016	38	Miridae	Soft bug	ok	
23.09.2016	39	Miridae	Soft bug	ok	
23.09.2016	40	Miridae	Soft bug	ok	
23.09.2016	41	Miridae	Soft bug	ok	

23.09.2016	42	Miridae	Soft bug	ok	
23.09.2016	43	Anthocoridae	Minute pirate bug	ok	
23.09.2016	44	Aphrophoa stictica	Cicada	ok	
23.09.2016	45	Miridae	Soft bug	ok	
23.09.2016	46	Bothrogonia ferruginea	Cicada	ok	
23.09.2016	47	Coccinellidae	Ladybird beetle	ok	
23.09.2016	48	Miridae	Soft bug	ok	
23.09.2016	49	Miridae	Soft bug	ok	
23.09.2016	50	Miridae	Soft bug	ok	
23.09.2016	51	Miridae	Soft bug	ok	
23.09.2016	52	Miridae	Soft bug	ok	
23.09.2016	53	Pentatomidae	Treebug larva	ok	
23.09.2016	54	Miridae	Soft bug	ok	
23.09.2016	55	Miridae	Soft bug	ok	
23.09.2016	56	Miridae	Soft bug	ok	
23.09.2016	57	Miridae	Soft bug	ok	
23.09.2016	58	Miridae	Soft bug		left antenna point to sharp
23.09.2016	59	Aphrophoa stictica	Cicada	ok	
23.09.2016	60	Miridae	Soft bug	ok	
23.09.2016	61	Reduviidae	Assassin bug larva	ok	
23.09.2016	62	Reduviidae	Assassin bug larva	ok	
23.09.2016	63	Miridae	Soft bug	ok	
23.09.2016	64	Miridae	Soft bug	ok	
23.09.2016	65	Homoptera	Cicada	ok	
23.09.2016	66	Geocoris proteus	Seed bug	ok	
23.09.2016	67	Geocoris proteus	Seed bug	ok	
23.09.2016	68	Lygaeidae	Seed bug	ok	
23.09.2016	69	Miridae	Soft bug	ok	
23.09.2016	70	Miridae	Soft bug	ok	
23.09.2016	71	Bothrogonia ferruginea	Cicada	ok	
23.09.2016	72	Bothrogonia ferruginea	Cicada	ok	
23.09.2016	73	Lygaeidae Nysius sp.	Seed bug	ok	
23.09.2016	74	Homoeocerus dilatatus	Squash bug larva	ok	
23.09.2016	75	Bothrogonia ferruginea	Cicada	ok	
23.09.2016	76	Geocoris proteus	Seed bug	ok	
23.09.2016	77	Coleoptera	Beetle	ok	
23.09.2016	78	Coleoptera	Beetle	ok	
23.09.2016	79	Reduviidae	Assassin bug larva	ok	
23.09.2016	80	Reduviidae	Assassin bug larva	ok	
23.09.2016	81	Homoeocerus dilatatus	Squash bug	ok	
23.09.2016	82	Reduviidae	Assassin bug larva	ok	
23.09.2016	83	Reduviidae	Assassin bug larva	ok	
23.09.2016	84	Reduviidae	Assassin bug larva	ok	
	84	total number individuals		81	normal
				3	abnormal

Fukushima City

Date	Nr.	Name Latin	Name	ok	Condtion
26.09.2016	1	Megacopta punctatissima	Shield bug	ok	
26.09.2016	2	Megacopta punctatissima	Shield bug	ok	
26.09.2016	3	Megacopta punctatissima	Shield bug	ok	
26.09.2016	4	Megacopta punctatissima	Shield bug	ok	
26.09.2016	5	Megacopta punctatissima	Shield bug	ok	
26.09.2016	6	Megacopta punctatissima	Shield bug	ok	
26.09.2016	7	Megacopta punctatissima	Shield bug	ok	
26.09.2016	8	Megacopta punctatissima	Shield bug	ok	
26.09.2016	9	Megacopta punctatissima	Shield bug	ok	
26.09.2016	10	Megacopta punctatissima	Shield bug	ok	
26.09.2016	11	Megacopta punctatissima	Shield bug	ok	
26.09.2016	12	Megacopta punctatissima	Shield bug	ok	
26.09.2016	13	Megacopta punctatissima	Shield bug	ok	
26.09.2016	14	Megacopta punctatissima	Shield bug	ok	
26.09.2016	15	Megacopta punctatissima	Shield bug	ok	
26.09.2016	16	Megacopta punctatissima	Shield bug	ok	
26.09.2016	17	Megacopta punctatissima	Shield bug	ok	
26.09.2016	18	Megacopta punctatissima	Shield bug	ok	
26.09.2016	19	Megacopta punctatissima	Shield bug	ok	
26.09.2016	20	Megacopta punctatissima	Shield bug	ok	
26.09.2016	21	Megacopta punctatissima	Shield bug	ok	
26.09.2016	22	Megacopta punctatissima	Shield bug	ok	
26.09.2016	23	Megacopta punctatissima	Shield bug	ok	
26.09.2016	24	Megacopta punctatissima	Shield bug	ok	
26.09.2016	25	Megacopta punctatissima	Shield bug	ok	
26.09.2016	26	Megacopta punctatissima	Shield bug	ok	
26.09.2016	27	Megacopta punctatissima	Shield bug	ok	
26.09.2016	28	Megacopta punctatissima	Shield bug	ok	
26.09.2016	29	Lygaeidae Nysius sp.	Seed bug	ok	
26.09.2016	30	Lygaeidae Nysius sp.	Seed bug	ok	
26.09.2016	31	Megacopta punctatissima	Shield bug	ok	
26.09.2016	32	Megacopta punctatissima	Shield bug		middle leg right side round with protrusion
26.09.2016	33	Megacopta punctatissima	Shield bug	ok	
26.09.2016	34	Megacopta punctatissima	Shield bug	ok	
26.09.2016	35	Megacopta punctatissima	Shield bug	ok	
26.09.2016	36	Megacopta punctatissima	Shield bug	ok	
26.09.2016	37	Megacopta punctatissima	Shield bug	ok	
26.09.2016	38	Megacopta punctatissima	Shield bug	ok	
26.09.2016	39	Megacopta punctatissima	Shield bug	ok	
26.09.2016	40	Megacopta punctatissima	Shield bug	ok	
26.09.2016	41	Megacopta punctatissima	Shield bug		Femur hind leg to short, Tibia stump
26.09.2016	42	Megacopta punctatissima	Shield bug	ok	

26.09.2016	43	Megacopta punctatissima	Shield bug	ok	
26.09.2016	44	Megacopta punctatissima	Shield bug	ok	
26.09.2016	45	Megacopta punctatissima	Shield bug	ok	
26.09.2016	46	Megacopta punctatissima	Shield bug	ok	
26.09.2016	47	Megacopta punctatissima	Shield bug	ok	
26.09.2016	48	Megacopta punctatissima	Shield bug	ok	
26.09.2016	49	Megacopta punctatissima	Shield bug	ok	
26.09.2016	50	Megacopta punctatissima	Shield bug		left hind leg short
26.09.2016	51	Megacopta punctatissima	Shield bug	ok	
26.09.2016	52	Megacopta punctatissima	Shield bug	ok	
26.09.2016	53	Megacopta punctatissima	Shield bug	ok	
26.09.2016	54	Megacopta punctatissima	Shield bug	ok	
26.09.2016	55	Megacopta punctatissima	Shield bug	ok	
26.09.2016	56	Megacopta punctatissima	Shield bug	ok	
26.09.2016	57	Megacopta punctatissima	Shield bug	ok	
26.09.2016	58	Megacopta punctatissima	Shield bug	ok	
26.09.2016	59	Megacopta punctatissima	Shield bug	ok	
26.09.2016	60	Megacopta punctatissima	Shield bug	ok	
26.09.2016	61	Megacopta punctatissima	Shield bug	ok	
26.09.2016	62	Megacopta punctatissima	Shield bug	ok	
26.09.2016	63	Megacopta punctatissima	Shield bug	ok	
26.09.2016	64	Megacopta punctatissima	Shield bug	ok	
26.09.2016	65	Megacopta punctatissima	Shield bug	ok	
26.09.2016	66	Megacopta punctatissima	Shield bug	ok	
26.09.2016	67	Megacopta punctatissima	Shield bug	ok	
26.09.2016	68	Megacopta punctatissima	Shield bug	ok	
26.09.2016	69	Megacopta punctatissima	Shield bug		middle leg short and round
26.09.2016	70	Megacopta punctatissima	Shield bug	ok	
26.09.2016	71	Megacopta punctatissima	Shield bug	ok	
26.09.2016	72	Megacopta punctatissima	Shield bug	ok	
26.09.2016	73	Megacopta punctatissima	Shield bug	ok	
26.09.2016	74	Megacopta punctatissima	Shield bug	ok	
26.09.2016	75	Megacopta punctatissima	Shield bug	ok	
26.09.2016	76	Megacopta punctatissima	Shield bug	ok	
	76	total number individuals		72	normal
				4	abnormal

Minamikunugimori Watari

Date	Nr.	Name Latin	Name	ok	Condition
27.09.2016	1	Miridae	Soft bug	ok	
27.09.2016	2	Aphrophora stictica	Cicada		dark patch on right wing
27.09.2016	3	Miridae	Soft bug	ok	
27.09.2016	4	Cicadella viridis	Cicada	ok	
27.09.2016	5	Cicadella viridis	Cicada	ok	
27.09.2016	6	Bothrogonia ferruginea	Cicada	ok	
27.09.2016	7	Cicadella viridis	Cicada	ok	
27.09.2016	8	Miridae	Soft bug	ok	
27.09.2016	9	Bothrogonia ferruginea	Cicada	ok	
27. 09.2016	10	Bothrogonia ferruginea	Cicada		left feeler bent
27. 09.2016	11	Lygaeidae Nysius sp.	Seed bug	ok	
27. 09.2016	12	Lygaeidae Nysius sp.	Seed bug	ok	
27. 09.2016	13	Lygaeidae Nysius sp.	Seed bug	ok	
27. 09.2016	14	Lygaeidae Nysius sp.	Seed bug	ok	
27. 09.2016	15	Miridae	Soft bug	ok	
27. 09.2016	16	Bothrogonia ferruginea	Cicada	ok	
27. 09.2016	17	Miridae	Soft bug		right feeler waved
27. 09.2016	18	Coreidae	Squash bug	ok	
27. 09.2016	19	Bothrogonia ferruginea	Cicada	ok	
27. 09.2016	20	Cicadella viridis	Cicada		left antenna shorter, point waved, blue dots on wings
27. 09.2016	21	Lepidoptera	Moth	ok	
27. 09.2016	22	Coccinellidae	Ladybird beetle	ok	
27. 09.2016	23	Cicadella viridis	Cicada	ok	
27. 09.2016	24	Coccinellidae	Ladybird beetle	ok	
27. 09.2016	25	Lygaeidae Nysius sp.	Seed bug		antenna right side 3. and 4. section short, thorax abnormal
27. 09.2016	26	Lygaeidae Nysius sp.	Seed bug	ok	
27. 09.2016	27	Bothrogonia ferruginea	Cicada	ok	
28.09.2016	28	Lygaeidae Nysius sp.	Seed bug	ok	
27. 09.2016	29	Bothrogonia ferruginea	Cicada	ok	
27. 09.2016	30	Miridae	Soft bug		right feeler knotted
27. 09.2016	31	Lygaeidae Nysius sp.	Seed bug	ok	
27. 09.2016	32	Lygaeidae Nysius sp.	Seed bug	ok	
27. 09.2016	33	Lygaeidae Nysius sp.	Seed bug	ok	
27. 09.2016	34	Bothrogonia ferruginea	Cicada	ok	
27. 09.2016	35	Miridae	Soft bug	ok	
27. 09.2016	36	Miridae	Soft bug	ok	
27. 09.2016	37	Miridae	Soft bug		feeler knotted
27. 09.2016	38	Lygaeidae Nysius sp.	Seed bug	ok	
27. 09.2016	39	Beritdae	Stilt bug	ok	
27. 09.2016	40	Homoptera	Cicada larva	ok	

27. 09.2016	41	Miridae	Soft bug larva	ok	
27. 09.2016	42	Tingidae	Lace bug		antennae flatened
27. 09.2016	43	Tingidae	Lace bug		left wing bent, feeler flatenend
27. 09.2016	44	Tingidae	Lace bug		left antenna point flantend
27. 09.2016	45	Tingidae	Lace bug	ok	
27. 09.2016	46	Pentatomidae	Tree bug larva	ok	
27. 09.2016	47	Pentatomidae	Tree bug		left middle leg short, right side thorax abnormal
27. 09.2016	48	Alydidye	Broad-headed bug	ok	
27. 09.2016	49	Alydidye	Broad-headed bug	ok	
27. 09.2016	50	Bothrogonia ferruginea	Cicada	ok	
27. 09.2016	51	Lygaeidae Nysius sp.	Seed bug	ok	
27. 09.2016	52	Homoptera	Cicada larva	ok	
27. 09.2016	53	Eysacoris annamita	Tree bug		right side thorax irregular, left antenna abnorml
27. 09.2016	54	Coleoptera	Beetle	ok	
27. 09.2016	55	Coleoptera	Beetle	ok	
27. 09.2016	56	Coleoptera	Beetle	ok	
27. 09.2016	57	Coleoptera	Beetle	ok	
27. 09.2016	58	Coleoptera	Beetle	ok	
27. 09.2016	59	Alydidye	Broad-headed bug	ok	
	60	Lepidoptera	Moth	ok	
	60	total number individuals		48	normal
				12	abnormal

Itate

Date	Nr.	Name Latin	Name	ok	Condition
29.09.2016	1	Cicadella viridis	Cicada	ok	
29.09.2016	2	Miridae	Soft bug	ok	
29.09.2016	3	Miridae	Soft bug	ok	
29.09.2016	4	Cicadella viridis	Cicada	ok	
29.09.2016	5	Cicadella viridis	Cicada		pale
29.09.2016	6	Miridae	Soft bug	ok	
29.09.2016	7	Coccinellidae	Ladybird beetle	ok	
29.09.2016	8	Cicadella viridis	Cicada		pale
29.09.2016	9	Cicadella viridis	Cicada	ok	
29.09.2016	10	Coreidae	Squash bug		right side thorax abnormal
29.09.2016	11	Cicadella viridis	Cicada		pale
29.09.2016	12	Miridae	Soft bug	ok	
29.09.2016	13	Lygaeidae Nysius sp.	Seed bug	ok	
29.09.2016	14	Miridae	Soft bug	ok	
29.09.2016	15	Miridae	Soft bug	ok	
29.09.2016	16	Lygaeidae Nysius sp.	Seed bug	ok	
29.09.2016	17	Tingidae	Lace bug	ok	
29.09.2016	18	Lygaeidae Nysius sp.	Seed bug	ok	
29.09.2016	19	Homoptera	Cicada		antenna waved
29.09.2016	20	Miridae	Soft bug	ok	
29.09.2016	21	Homoptera	Cicada		left anenna waved
29.09.2016	22	Miridae	Soft bug	ok	
29.09.2016	23	Lygaeidae Nysius sp.	Seed bug	ok	
29.09.2016	24	Cicadella viridis	Cicada	ok	
29.09.2016	25	Miridae	Soft bug	ok	
29.09.2016	26	Cicadella viridis	Cicada	ok	
29.09.2016	27	Bothrogonia ferruginea	Cicada		thorax right side abnormal
29.09.2016	28	Cicadella viridis	Cicada	ok	
29.09.2016	29	Cicadella viridis	Cicada		pale
29.09.2016	30	Cicadella viridis	Cicada	ok	
29.09.2016	31	Lygaeidae	Seed bug larva	ok	
29.09.2016	32	Homoptera	Cicada	ok	
29.09.2016	33	Cicadella viridis	Cicada	ok	
29.09.2016	34	Miridae	Soft bug	ok	
29.09.2016	35	Cicadella viridis	Cicada		pale, left antenna abnormal
29.09.2016	36	Pentatomidae	Stink bug	ok	
29.09.2016	37	Miridae	Soft bug		left antenna waved
29.09.2016	38	Miridae	Soft bug	ok	
29.09.2016	39	Miridae	Soft bug	ok	
29.09.2016	40	Tingidae	Lace bug larva	ok	
29.09.2016	41	Miridae	Soft bug	ok	

29.09.2016	42	Miridae	Soft bug	ok	
29.09.2016	43	Cicadella viridis	Cicada	ok	
29.09.2016	44	Miridae	Soft bug	ok	
29.09.2016	45	Tingidae	Lace bug	ok	
29.09.2016	46	Homoptera	Cicada	ok	
29.09.2016	47	Coccinellidae	Ladybird beetle	ok	
29.09.2016	48	Miridae	Soft bug	ok	
29.09.2016	49	Lygaeidae	Seed bug	ok	
29.09.2016	50	Miridae	Soft bug		white layer on wings
29.09.2016	51	Homoptera	Cicada	ok	
29.09.2016	52	Bothrogonia ferruginea	Cicada	ok	
29.09.2016	53	Cicadella viridis	Cicada		pale
29.09.2016	54	Miridae	Soft bug	ok	
29.09.2016	55	Tingidae	Lace bug larva	ok	
29.09.2016	56	Ciadella viridis	Cicada		pale
29.09.2016	57	Pentatomidae	Tree bug		top of antennae abnormal
29.09.2016	58	Miridae	Soft bug	ok	
29.09.2016	59	Cicadella viridis	Cicada		pale
29.09.2016	60	Homoptera	Cicada		dark patch on right wing
29.09.2016	61	Bothrogonia ferruginea	Cicada	ok	
29.09.2016	62	Miridae	Soft bug		pint of antennae abnormal
29.09.2016	63	Miridae	Soft bug		brown patches on right wing
	63	total number individuals		45	normal
				18	abnormal

Ochiai Katsuro					
Date	Nr.	Name Latin	Name	ok	Condition
01.10.2016	1	Bothrogonia ferruginea	Cicada		dark patch on scutellum, left wing waved right feeler bent
01.10.2016	2	Cicadella viridis	Cicada	ok	
01.10.2016	3	Lygaeidae Nysius sp.	Seed bug	ok	
01.10.2016	4	Lygaeidae Nysius sp.	Seed bug	ok	
01.10.2016	5	Pentatomidae	Tree bug larva	ok	
01.10.2016	6	Cicadella viridis	Cicada		dark patch on thorax
01.10.2016	7	Pentatomidae	Tree bug larva		antenna fourth section thick and short
01.10.2016	8	Miridae	Soft bug	ok	
01.10.2016	9	Cicadella viridis	Cicada		pale
01.10.2016	10	Cicadella viridis	Cicada	ok	
	10	total number individuals		6	normal
				4	abnormal

Kawauchi					
Date	Nr.	Name latin	Name	ok	Condition
03.10.2016	1	Cicadella viridis	Cicada		pale, abnormal right wing
03.10.2016	2	Cicadella viridis	Cicada		pale
03.10.2016	3	Cicadella viridis	Cicada		dark patches and growth
03.10.2016	4	Cicadella viridis	Cicada		dark patches
03.10.2016	5	Cicadella viridis	Cicada		pale
03.10.2016	6	Bothrogonia ferruginea	Cicada	ok	
03.10.2016	7	Cicadella viridis	Cicada	ok	
03.10.2016	8	Cicadella viridis	Cicada		pale and antenna bent
03.10.2016	9	Cicadella viridis	Cicada		pale
03.10.2016	10	Cicadella viridis	Cicada		pale
03.10.2016	11	Cicadella viridis	Cicada		pale, right antenna short
03.10.2016	12	Cicadella viridis	Cicada		pale
03.10.2016	13	Cicadella viridis	Cicada	ok	
03.10.2016	14	Cicadella viridis	Cicada		pale
03.10.2016	15	Cicadella viridis	Cicada		pale
03.10.2016	16	Cicadella viridis	Cicada		dark patch on thorax
03.10.2016	17	Cicadella viridis	Cicada	ok	
03.10.2016	18	Cicadella viridis	Cicada		pale
03.10.2016	19	Cicadella viridis	Cicada		abnormal left antenna
03.10.2016	20	Cicadella viridis	Cicada		pale, dark patches on thorax
03.10.2016	21	Cicadella viridis	Cicada	ok	
03.10.2016	22	Cicadella viridis	Cicada	ok	
03.10.2016	23	Cicadella viridis	Cicada		dark patches on both wings
03.10.2016	24	Cicadella viridis	Cicada		pale and abnormal left antenna
03.10.2016	25	Cicadella viridis	Cicada	ok	
03.10.2016	26	Cicadella viridis	Cicada	ok	
03.10.2016	27	Cicadella viridis	Cicada		pale
03.10.2016	28	Cicadella viridis	Cicada	ok	
03.10.2016	29	Cicadella viridis	Cicada	ok	
03.10.2016	30	Bothrogonia ferruginea	Cicada	ok	
03.10.2016	31	Cicadella viridis	Cicada		pale
03.10.2016	32	Cicadella viridis	Cicada		left middle leg abnormal
03.10.2016	33	Cicadella viridis	Cicada	ok	
03.10.2016	34	Cicadella viridis	Cicada	ok	
03.10.2016	35	Cicadella viridis	Cicada	ok	
03.10.2016	36	Cicadella viridis	Cicada		bent wings
03.10.2016	37	Cicadella viridis	Cicada		pale
03.10.2016	38	Cicadella viridis	Cicada		pale and abnormal pigmentation on thorax and wings
03.10.2016	39	Cicadella viridis	Cicada	ok	
03.10.2016	40	Cicadella viridis	Cicada	ok	

03.10.2016	41	Cicadella viridis	Cicada	ok	
03.10.2016	42	Cicadella viridis	Cicada	ok	
03.10.2016	43	Cicadella viridis	Cicada	ok	
03.10.2016	44	Cicadella viridis	Cicada	ok	
03.10.2016	45	Cicadella viridis	Cicada	ok	
03.10.2016	46	Cicadella viridis	Cicada		left antenna short
03.10.2016	47	Cicadella viridis	Cicada	ok	
03.10.2016	48	Cicadella viridis	Cicada	ok	
03.10.2016	49	Cicadella viridis	Cicada		pale, abnormal left antenna
03.10.2016	50	Cicadella viridis	Cicada		pale
03.10.2016	51	Cicadella viridis	Cicada		abnormal head and left eye
03.10.2016	52	Cicadella viridis	Cicada		pale
03.10.2016	53	Cicadella viridis	Cicada	ok	
03.10.2016	54	Cicadella viridis	Cicada	ok	
03.10.2016	55	Cicadella viridis	Cicada		antennae short
03.10.2016	56	Cicadella viridis	Cicada		pale
03.10.2016	57	Homoptera	Cicada larva	ok	
03.10.2016	58	Drosophilidae	Fly	ok	
03.10.2016	59	Cicadella viridis	Cicada		pale
03.10.2016	60	Pentatomidae	Tree bug		balooned, asymmetrical abdomen
03.10.2016	61	Pentatomidae	Tree bug		right antenna point blunt
03.10.2016	62	Cicadella viridis	Cicada		pale
03.10.2016	63	Cicadella viridis	Cicada		pale
	63	total number individuals		27	normal
				36	abnormal

Shinobu Spa near Fukushima City

Date	Nr.	Name Latin	Name	ok	Condition
04.10.2016	1	Cicadella viridis	Cicada		pale
04.10.2016	2	Cicadella viridis	Cicada		pale
04.10.2016	3	Cicadella viridis	Cicada		pale
04.10.2016	4	Cicadella viridis	Cicada		pale
04.10.2016	5	Cicadella viridis	Cicada		small and pale, both antennae waved
04.10.2016	6	Cicadella viridis	Cicada	ok	
04.10.2016	7	Cicadella viridis	Cicada	ok	
04.10.2016	8	Cicadella viridis	Cicada		right antenna waverd
04.10.2016	9	Cicadella viridis	Cicada		dark patch on right wing
04.10.2016	10	Miridae	Soft bug		thorax selvage anomalous
04.10.2016	11	Cicadella viridis	Cicada		right antenna pointed and bent
04.10.2016	12	Cicadella viridis	Cicada		antennae bent
04.10.2016	13	Cicadella viridis	Cicada		pale
04.10.2016	14	Cicadella viridis	Cicada		pale
04.10.2016	15	Cicadella viridis	Cicada		small, dark patch on thorax, left wing with hole
04.10.2016	16	Cicadella viridis	Cicada		white layer on left wing
04.10.2016	17	Cicadella viridis	Cicada		black stripes and growth on thorax
04.10.2016	18	Cicadella viridis	Cicada		right antenna short
04.10.2016	19	Cicadella viridis	Cicada	ok	
04.10.2016	20	Cicadella viridis	Cicada		small
04.10.2016	21	Cicadella viridis	Cicada	ok	
04.10.2016	22	Cicadella viridis	Cicada	ok	
04.10.2016	23	Miridae	Soft bug	ok	
04.10.2016	24	Cicadella viridis	Cicada		abnormal thorax, left antenna bent
04.10.2016	25	Cicadella viridis	Cicada		dark patch on right wing
04.10.2016	26	Cicadella viridis	Cicada	ok	
04.10.2016	27	Cicadella viridis	Cicada	ok	
04/10/2016	28	Cicadella viridis	Cicada	ok	
04/10/2016	29	Cicadella viridis	Cicada		left antenna waved
04/10/2016	30	Cicadella viridis	Cicada		pale
04/10/2016	31	Cicadella viridis	Cicada		left antenna waved
04/10/2016	32	Cicadella viridis	Cicada		pale, abnormal left eye
04/10/2016	33	Cicadella viridis	Cicada		small
04/10/2016	34	Cicadella viridis	Cicada		small
04/10/2016	35	Cicadella viridis	Cicada		pale and small
04/10/2016	36	Cicadella viridis	Cicada	ok	
04/10/2016	37	Cicadella viridis	Cicada	ok	
04/10/2016	38	Cicadella viridis	Cicada		pale
04/10/2016	39	Cicadella viridis	Cicada		pale and antennae bent
04/10/2016	40	Cicadella viridis	Cicada		pale
04.10.2016	41	Cicadella viridis	Cicada		pale
04.10.2016	42	Cicadella viridis	Cicada	ok	

04.10.2016	43	Miridae	Soft bug	ok	
04.10.2016	44	Cicadella viridis	Cicada	ok	
04.10.2016	45	Cicadella viridis	Cicada	ok	
04.10.2016	46	Cicadella viridis	Cicada		abnormal right wing
04.10.2016	47	Cicadella viridis	Cicada	ok	
04.10.2016	48	Cicadella viridis	Cicada		dark patches on left wing
04.10.2016	49	Cicadella viridis	Cicada		abnormal left antenna
04.10.2016	50	Cicadella viridis	Cicada		pale
04.10.2016	51	Lygaeidae Nysius sp.	Seed bug	ok	
04.10.2016	52	Lygaeidae Nysius sp.	Seed bug	ok	
04.10.2016	53	Lygaeidae Nysius sp.	Seed bug	ok	
04.10.2016	54	Lygaeidae Nysius sp.	Seed bug		abnormal left wings
04.10.2016	55	Lygaeidae Nysius sp.	Seed bug	ok	
04.10.2016	56	Lygaeidae Nysius sp.	Seed bug	ok	
04.10.2016	57	Lygaeidae Nysius sp.	Seed bug		left antenna light in color, abnormal left wing
04.10.2016	58	Lygaeidae Nysius sp.	Seed bug	ok	
04.10.2016	59	Lygaeidae Nysius sp.	Seed bug	ok	
04.10.2016	60	Lygaeidae Nysius sp.	Seed bug	ok	
04.10.2016	61	Coleoptera	Beetle	ok	
04.10.2016	62	Lygaeidae Nysius sp.	Seed bug		knotted antennae
04.10.2016	63	Lygaeidae Nysius sp.	Seed bug	ok	
04.10.2016	64	Lygaeidae Nysius sp.	Seed bug	ok	
04.10.2016	65	Cicadella viridis	Cicada		pale and dark patches on wings
04.10.2016	66	Cicadella viridis	Cicada		pale
04.10.2016	67	Cicadella viridis	Cicada		pale
04.10.2016	68	Miridae	Soft bug		abnormal left antenna
04.10.2016	69	Bothrogonia ferruginea	Cicada	ok	white layer on wings
04.10.2016	70	Bothrogonia ferruginea	Cicada	ok	
04.10.2016	71	Eurydema dominulus	Tree bug	ok	
	71	total number individuals		27	normal
				41	abnormal

Komagamine

Date	Nr.	Name Latin	Name	ok	Condition
06.10.2016	1	Dolycoris baccarum	Tree bug	ok	
06.10.2016	2	Bothrogonia ferruginea	Cicada		dark patch on thorax
06.10.2016	3	Bothrogonia ferruginea	Cicada		dark patch on thorax
06.10.2016	4	Reduviidae	Assassin Bug		dark patch on abdomen
06.10.2016	5	Bothrogonia ferruginea	Cicada	ok	
	5	total number individuals		2	normal
				3	abnormal

Kaneyama

Date	Nr.	Name Latin	Name	ok	Condition
06.10.2016	1	Cicadella viridis	Cicada		dark patch on right wing
06.10.2016	2	Cicadella viridis	Cicada	ok	
06.10.2016	3	Cicadella viridis	Cicada		dark stripe on right wing
06.10.2016	4	Cicadella viridis	Cicada	ok	
06.10.2016	5	Rhopalidae	Scentless plant bug	ok	
06.10.2016	6	Rhopalidae	Scentless plant bug larva	ok	
06.10.2016	7	Coleoptera	Beetle	ok	
06.10.2016	8	Cicadella viridis	Cicada	ok	
06.10.2016	9	Bothrogonia ferruginea	Cicada		antennae bent
06.10.2016	10	Cicadella viridis	Cicada	ok	
06.10.2016	11	Cicadella viridis	Cicada	ok	
06.10.2016	12	Coleoptera	Beetle	ok	
06.10.2016	13	Bothrogonia ferruginea	Cicada		dark patches on wings
06.10.2016	14	Cicadella viridis	Cicada	ok	
06.10.2016	15	Cicadella viridis	Cicada	ok	
06.10.2016	16	Cicadella viridis	Cicada	ok	
06.10.2016	17	Bothrogonia ferruginea	Cicada	ok	
06.10.2016	18	Rhopalidae	Scentless plant bug	ok	
06.10.2016	19	Geocoris proteus	Seed bug	ok	
06.10.2016	20	Coccinellidae	Ladybird beetle	ok	
06.10.2016	21	Alydidae	Broad headed bug	ok	
06.10.2016	22	Cicadella viridis	Cicada		right antenna abnormal
06.10.2016	23	Rhopalidae	Scentless plant bug	ok	
06.10.2016	24	Rhopalidae	Scentless plant bug	ok	
06.10.2016	25	Geocoris proteus	Seed bug	ok	
	25	total number individuals		20	normal
				5	abnormal

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