

### The Survey of Rodent-Borne Infectious Diseases in Orchid Island, 2019

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#### Abstract

Orchid Island, located in the southeastern sea region of Taiwan, is a subtropical climate island, suitable for propagating a variety of rodent-borne pathogens, resulting in many scrub typhus cases each year. For the purpose of epidemic surveillance and public health concern, we carried out the rodent-borne infectious diseases survey in this region in April 2019. We conducted mice trapping in the field, collected rodent's serum, tissue, urine and ectoparasites. Latex agglutination (LA) test, indirect immunofluorescence analysis (IFA) and polymerase chain reaction (PCR) were used to detect *Yersinia pestis*, *Orientia tsutsugamushi*, Q fever pathogen, and Leptospire in our laboratory. The mouse capture rate was 16.0% (41/262), the tissue pathologic lesion rate was 56% (23/41), the leptomitridium mite ectoparasitic rate was 100% (41/41) and the leptomitridium mite index was 202 (8,300/41) in this study. The collected murine sera were assayed for presenting antibody to Q-fever (3%, or 1/29) and to *Orientia tsutsugamushi* (76%, or 31/41). PCR assay positive rates were 10% (1/10), 40% (4/10), and 66% (27/41) for pathogens of Q-fever, Leptospire and *Orientia tsutsugamushi*, respectively. Our results indicated that Q-fever, Leptospire and *Orientia tsutsugamushi*

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were found in Orchid Island. This result of investigation could be a worthy reference for the public health department to determine strategies of epidemic prevention, such as rodent control, travel health guidance, and educating people to protect from infection during outdoor field activity and seek for a doctor if suspected symptoms develop.

**Keywords:** Orchid Island, *Yersinia pestis*, Q fever pathogen, Leptospire, *Orientia tsutsugamushi*

week 16–17( Apr. 18–May. 1, 2021)

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Weekly Data of Notifiable Infectious Diseases (by week of diagnosis)

Case diagnosis year		Week 16★		Week 1-16			
Classification	Disease Diagnosed	2021	2020	2021		2020	
				Total cases★	Imported cases	Total cases★	Imported cases
Category I	Plague	0	0	0	0	0	0
	Rabies	0	0	0	0	0	0
	SARS	0	0	0	0	0	0
	Smallpox	0	0	0	0	0	0
Category II	Acute Flaccid Paralysis	0	3	11	0	11	0
	Acute Viral Hepatitis type A	5	0	24	0	28	7
	Amoebiasis	5	5	72	28	78	43
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	0	1	1	2	2
	Cholera	0	0	0	0	0	0
	Dengue Fever	1	0	5	5	55	55
	Diphtheria	0	0	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	0	0	0	0	0
	Epidemic Typhus Fever	0	0	0	0	0	0
	Hantavirus Pulmonary Syndrome	0	0	0	0	0	0
	Hemorrhagic Fever with Renal Syndrome	0	0	4	0	3	0
	Malaria	0	0	1	1	1	1
	Measles	0	0	0	0	2	2
	Meningococcal Meningitis	0	0	0	0	3	0
	Paratyphoid Fever	0	0	1	0	0	0
	Poliomyelitis	0	0	0	0	0	0
Rubella	0	0	0	0	0	0	
Shigellosis	4	3	65	0	55	21	
Typhoid fever	0	0	1	0	5	3	
West Nile Fever	0	0	0	0	0	0	
Zika virus infection	0	0	0	0	2	2	
Category III	Acute Viral Hepatitis type B	4	1	42	1	28	2
	Acute Viral Hepatitis type C	12	16	202	0	201	2
	Acute Viral Hepatitis type D	0	0	0	0	0	0
	Acute Viral Hepatitis type E	0	0	4	0	5	0
	Congenital Syphilis	0	0	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	1	0	7	0
	Haemophilus Influenza type b Infection	0	1	1	0	2	0
	Japanese Encephalitis	0	0	0	0	0	0
	Legionnaires' Disease	5	7	104	0	77	7
	Mumps	8	4	149	1	138	6
	Neonatal Tetanus	0	0	0	0	0	0
Pertussis	0	0	0	0	8	0	
Tetanus	0	1	2	0	4	0	
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	4	0	18	0	16	0
	Endemic Typhus Fever	1	0	9	0	3	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Influenza Case with Severe Complications	0	0	1	0	546	6
	Invasive Pneumococcal Disease	4	1	101	0	130	0
	Leptospirosis	0	1	11	0	13	0
	Listeriosis	6	0	56	0	34	0
	Lyme Disease	0	0	0	0	0	0
	Melioidosis	1	1	6	0	4	1
	Q Fever	0	0	0	0	1	0
	Scrub Typhus	4	0	58	0	60	1
Toxoplasmosis	1	0	6	0	0	0	
Tularemia	0	0	0	0	0	0	
Category V	Ebola Virus Disease	0	0	0	0	0	0
	Lassa Fever	0	0	0	0	0	0
	Marburg Hemorrhagic Fever	0	0	0	0	0	0
	Middle East Respiratory Syndrome	0	0	0	0	0	0
	Coronavirus Infections	0	0	0	0	0	0
	Novel Influenza A Virus Infections	0	0	0	0	0	0
	Rift Valley Fever	0	0	0	0	0	0
Severe Pneumonia with Novel Pathogens	25	13	289	267	398	343	
Yellow Fever	0	0	0	0	0	0	

- ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.
- MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen's Disease and Creutzfeldt-Jakob Disease are excluded from the table.
- Numbers of mumps and tetanus cases are summed up by the week of report.
- Since 2020/1/15, "Severe Pneumonia with Novel Pathogens" was listed as a Notifiable Infectious Disease.

## Suspected Clusters

- Twenty-two clusters related to diarrhea (13), varicella (5), tuberculosis (3) and enterovirus (1) were reported during week 16.

## Imported Infectious Diseases

- There were 20 imported cases from 7 countries during week 16.

Diseases	Countries							Total
	Philippines	Indonesia	India	Slovakia	Kazakhstan	USA	Belgium	
Severe Pneumonia with Novel Pathogens	9	4	2	1	1	1	1	19
Dengue Fever		1						1
Total	9	5	2	1	1	1	1	20

- During week 1-16, there were 302 imported cases from 42 countries. The top three countries are Philippines (86), the Indonesia (78), and USA (37).
- During week 1-16, the three notifiable diseases with the highest number of imported cases are Severe Pneumonia with Novel Pathogens (266), Amoebiasis (28), and Dengue Fever (5).

## Summary of Epidemic

- **Severe Pneumonia with Novel Pathogens** : COVID-19 cases among the pilots were reported, and the event is under investigation. The global COVID-19 pandemic continues to be critical. The locally-acquired and imported cases might increase.

### Weekly Data of Notifiable Infectious Diseases (by week of diagnosis)

Case diagnosis year		Week 17★		Week 1-17			
Classification	Disease Diagnosed	2021	2020	2021		2020	
				Total cases★	Imported cases	Total cases★	Imported cases
Category I	Plague	0	0	0	0	0	0
	Rabies	0	0	0	0	0	0
	SARS	0	0	0	0	0	0
	Smallpox	0	0	0	0	0	0
Category II	Acute Flaccid Paralysis	0	1	11	0	12	0
	Acute Viral Hepatitis type A	1	0	25	0	28	7
	Amoebiasis	8	5	80	31	83	46
	Anthrax	0	0	0	0	0	0
	Chikungunya Fever	0	0	1	1	2	2
	Cholera	0	0	0	0	0	0
	Dengue Fever	0	0	5	5	55	55
	Diphtheria	0	0	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	0	0	0	0	0
	Epidemic Typhus Fever	0	0	0	0	0	0
	Hantavirus Pulmonary Syndrome	0	0	0	0	0	0
	Hemorrhagic Fever with Renal Syndrome	0	0	4	0	3	0
	Malaria	0	0	1	1	1	1
	Measles	0	0	0	0	2	2
	Meningococcal Meningitis	0	1	0	0	4	0
	Paratyphoid Fever	0	0	1	0	0	0
	Poliomyelitis	0	0	0	0	0	0
Rubella	0	0	0	0	0	0	
Shigellosis	2	5	67	0	60	21	
Typhoid fever	0	0	1	0	5	3	
West Nile Fever	0	0	0	0	0	0	
Zika virus infection	0	0	0	0	2	2	
Category III	Acute Viral Hepatitis type B	9	2	51	2	30	2
	Acute Viral Hepatitis type C	8	6	210	0	207	2
	Acute Viral Hepatitis type D	0	0	0	0	0	0
	Acute Viral Hepatitis type E	0	1	4	0	6	0
	Congenital Syphilis	0	0	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	1	0	7	0
	Haemophilus Influenza type b Infection	0	0	1	0	2	0
	Japanese Encephalitis	0	0	0	0	0	0
	Legionnaires' Disease	8	6	112	0	83	7
	Mumps	12	6	161	1	144	6
	Neonatal Tetanus	0	0	0	0	0	0
	Pertussis	0	0	0	0	8	0
Tetanus	0	0	2	0	4	0	
Category IV	Botulism	0	0	0	0	0	0
	Brucellosis	0	0	0	0	0	0
	Complicated Varicella	4	0	22	0	16	0
	Endemic Typhus Fever	0	0	9	0	3	0
	Herpesvirus B Infection	0	0	0	0	0	0
	Influenza Case with Severe Complications	0	0	1	0	546	6
	Invasive Pneumococcal Disease	6	4	107	0	134	0
	Leptospirosis	2	2	13	0	15	0
	Listeriosis	6	3	62	0	37	0
	Lyme Disease	0	0	0	0	0	0
	Melioidosis	0	0	6	0	4	1
	Q Fever	5	1	5	0	2	0
	Scrub Typhus	3	7	61	0	67	1
Toxoplasmosis	0	0	6	0	0	0	
Tularemia	0	0	0	0	0	0	
Category V	Ebola Virus Disease	0	0	0	0	0	0
	Lassa Fever	0	0	0	0	0	0
	Marburg Hemorrhagic Fever	0	0	0	0	0	0
	Middle East Respiratory Syndrome	0	0	0	0	0	0
	Coronavirus Infections	0	0	0	0	0	0
	Novel Influenza A Virus Infections	0	0	0	0	0	0
	Rift Valley Fever	0	0	0	0	0	0
Severe Pneumonia with Novel Pathogens	35	31	324	292	429	374	
Yellow Fever	0	0	0	0	0	0	

1. ★The weekly and cumulative total numbers include indigenous and imported cases of notifiable infectious diseases.  
2. MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen's Disease and Creutzfeldt-Jakob Disease are excluded from the table.  
3. Numbers of mumps and tetanus cases are summed up by the week of report.  
4. Since 2020/1/15, "Severe Pneumonia with Novel Pathogens" was listed as a Notifiable Infectious Disease.

## Suspected Clusters

- Sixteen clusters related to diarrhea (9), tuberculosis (4), varicella (2) and upper respiratory tract infection (1) were reported during week 17.

## Imported Infectious Diseases

- There were 28 imported cases from 10 countries during week 17.

Diseases	Countries										
	Indonesia	Philippines	Netherlands	India	Uzbek	Egypt	USA	Kazakhstan	Canada	Vietnam	Total
Severe Pneumonia with Novel Pathogens	7	8	2	2	1	1	1	1	1		24
Amoebiasis	3										3
Acute Hepatitis B										1	1
Total	10	8	2	2	1	1	1	1	1	1	28

- During week 1-17, there were 330 imported cases from 43 countries. The top three countries are the Philippines (94), Indonesia (88), and USA (38).
- During week 1-17, the three notifiable diseases with the highest number of imported cases are Severe Pneumonia with Novel Pathogens (290), Amoebiasis (31), and Dengue Fever (5).

## Summary of Epidemic

- **Severe Pneumonia with Novel Pathogens** : There have been new cases linked to the airline company COVID-19 cluster. It is worrisome that some cases have visited public spaces while they were infectious. The situation of global COVID-19 pandemic continues to be critical. The risk of acquiring SARS-CoV-2 infection in Taiwan is expected to raise.

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