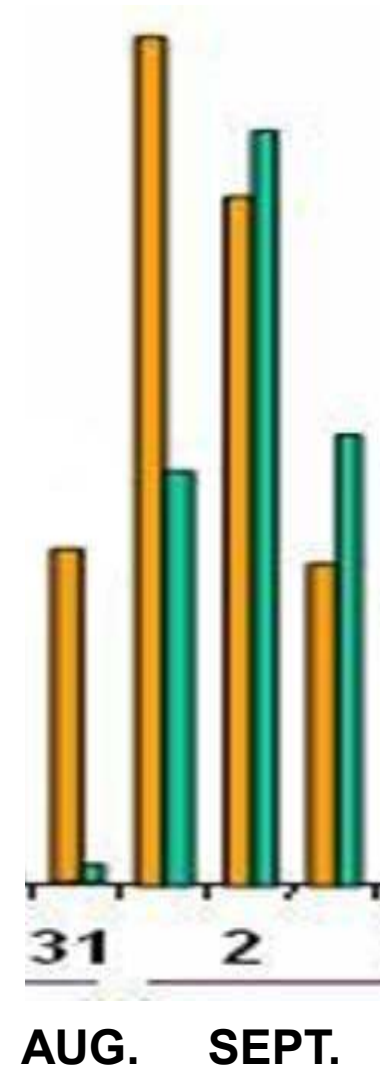


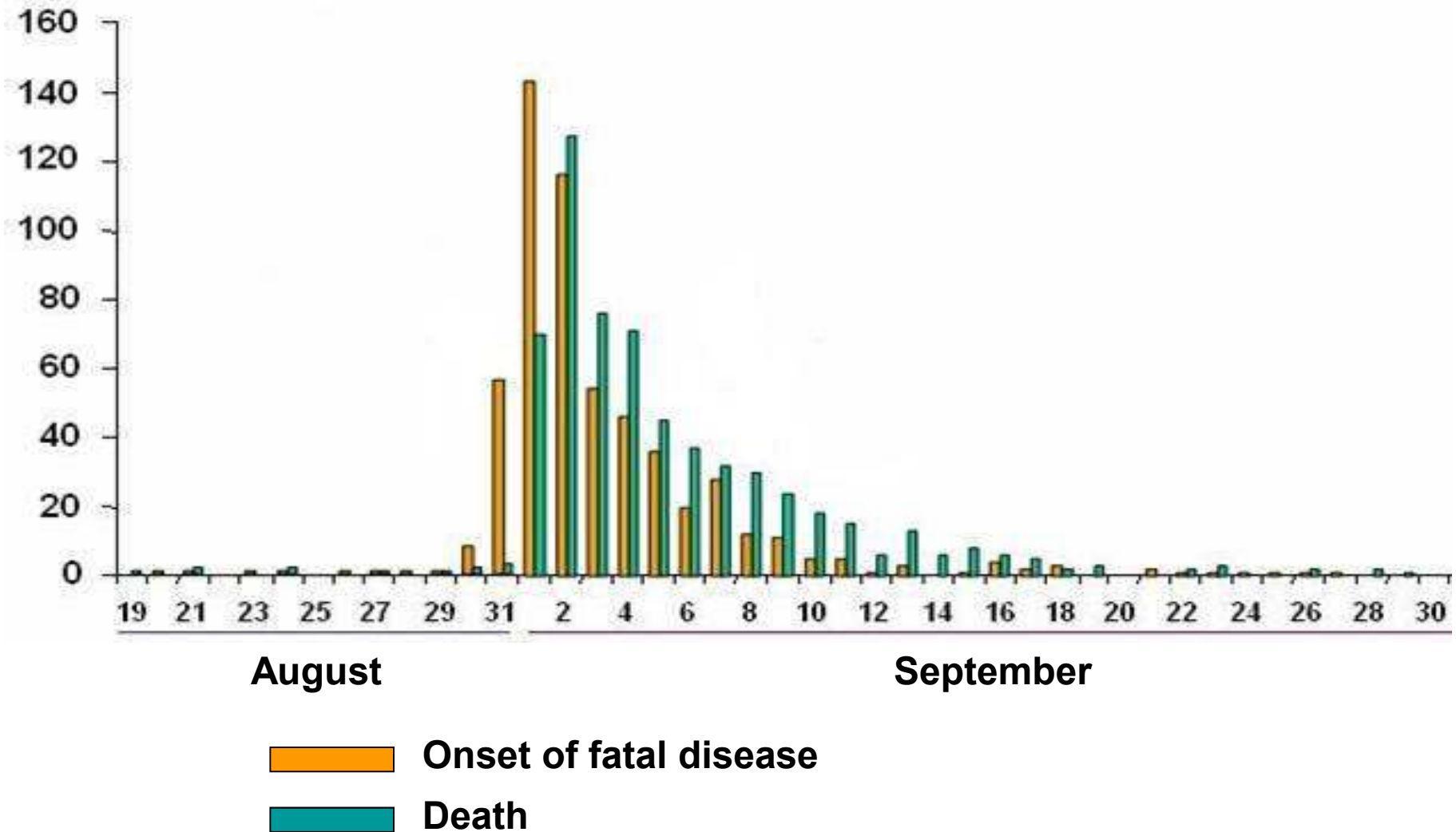
# General epidemiology of communicable diseases

## A case-study from London

- A present and recurring illness in the population
- 56 fatal (eventually) cases registered on 31<sup>st</sup> of August, and 143 on 1<sup>st</sup> Sept, 116 on 2<sup>nd</sup> and 54 on 3<sup>rd</sup>
- Actual deaths on the above days were 3, 70, 127 and 76 persons respectively.
- Symptoms include profuse diarrhea and rapid dehydration, which often leads to death within 24-48 hrs.
- There is no cure available



# Time course of onset of fatal cases and deaths



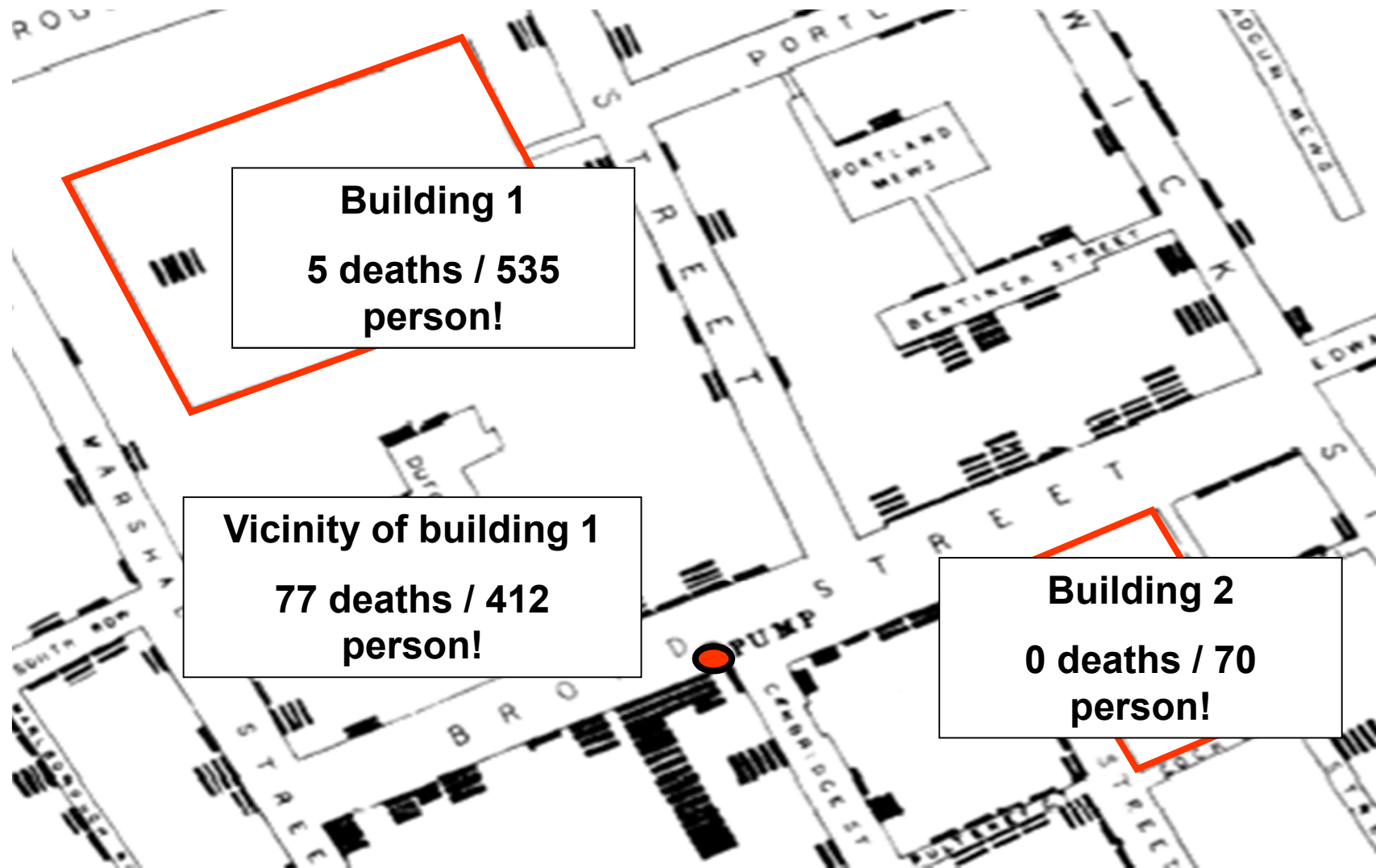
# Geographic distribution of cases



# Geographic distribution of water sources



# Exceptions



# Exceptions



## Other evidence supporting the role of water

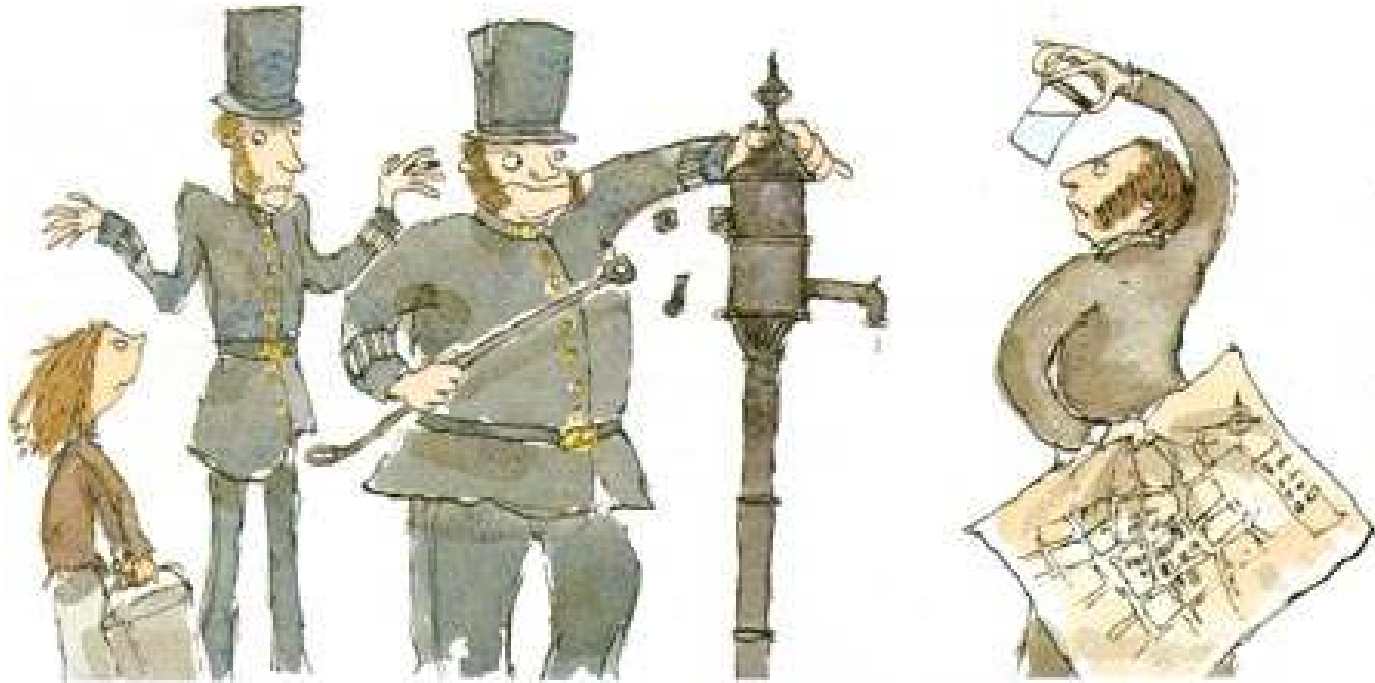
|                                 | <b>Houses</b> | <b>Cholera deaths</b> | <b>Cholera deaths/10 000 houses</b> |
|---------------------------------|---------------|-----------------------|-------------------------------------|
| <b>Southwark &amp; Vauxhall</b> | <b>40046</b>  | <b>1263</b>           | <b>315</b>                          |
| <b>Lambeth</b>                  | <b>26107</b>  | <b>98</b>             | <b>37</b>                           |
| <b>London</b>                   | <b>256423</b> | <b>1422</b>           | <b>59</b>                           |



# John Snow and London Cholera epidemics in the mid-19<sup>th</sup> century



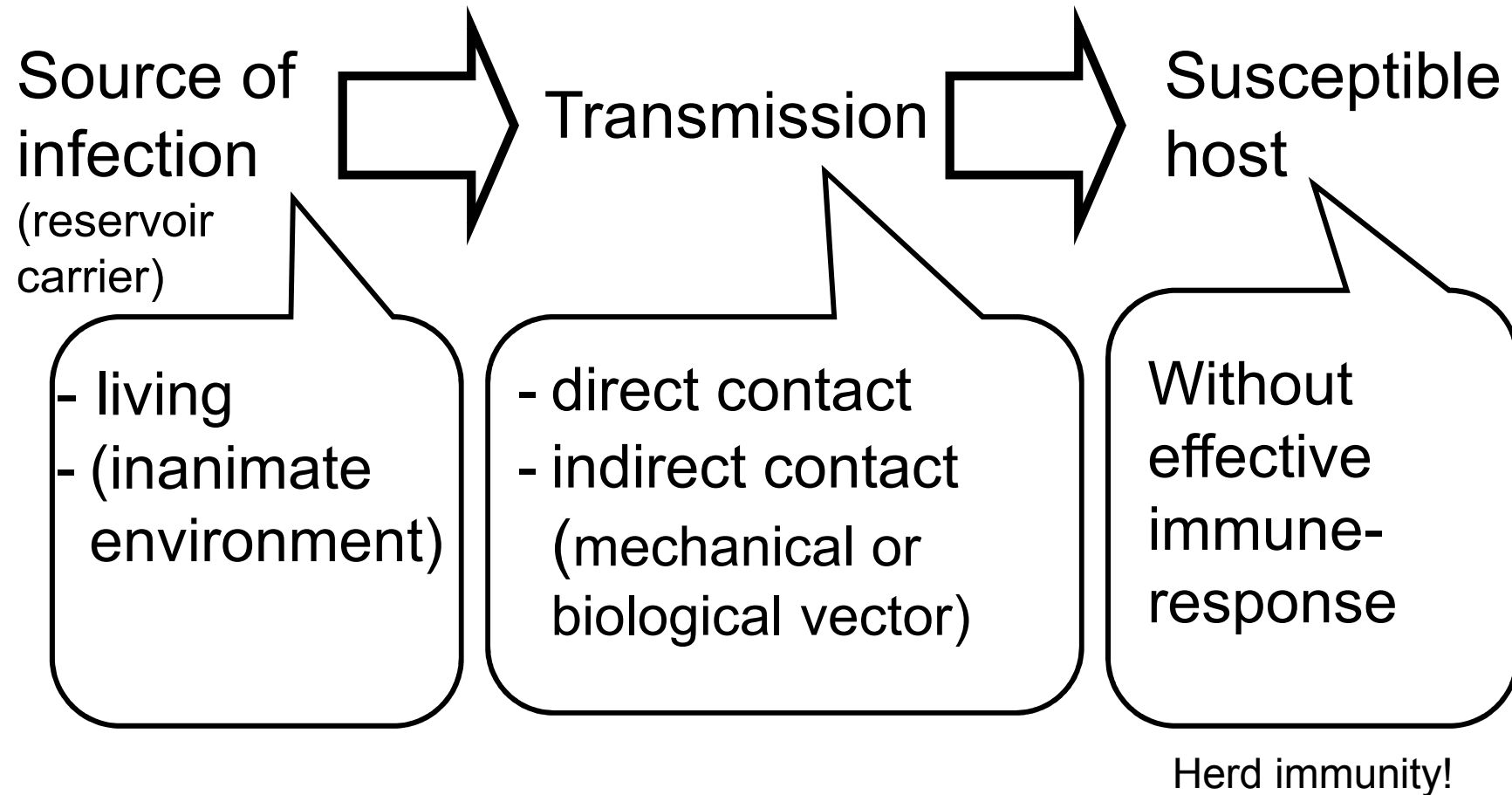
# John Snow and London Cholera epidemics in the mid-19<sup>th</sup> century



The 1854 cholera outbreak claimed 616 lives. Although no one believed Snow (that the reason of the epidemic was the drinking water) they took the handle off. After that no cases appeared.



# Primary factors of epidemic process



# Herd immunity

Spread of disease is limited by percent of population immune – previously exposed or vaccinated

- Pertussis (whopping cough) 92%-94%
- Measles/Rubella 83%-94%
- Small pox (historical) 80%-85%
- Mumps 75%-85%



[Herd immunity - animation](#)

# Primary factors of epidemic process

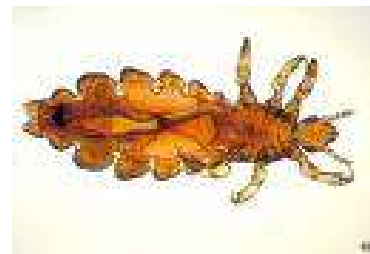
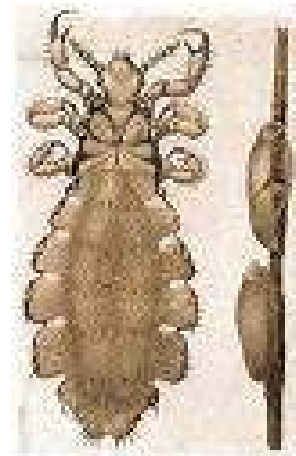


FIGURE 34—Typhus fever patient on U.S.A. Typhus Coxiella  
day of disease, the eruption is clearly evident on

# Secondary factors of epidemic process

- Natural factors:
  - hydrometeorological disasters
  - other natural disasters
  - human made...

## **A. Social factors**

Increased fertility  
poverty  
Under-education  
Poor sanitation  
Conflicts/war

## **B. Technological factors**

transportation  
mass marketing  
mass production

## **C. Changing ecology**

Greenhouse effect  
pollutants

# Characteristics of communicable diseases 1.

## Occurrence in space

- sporadic cases
- endemic cases
- epidemics
- pandemics

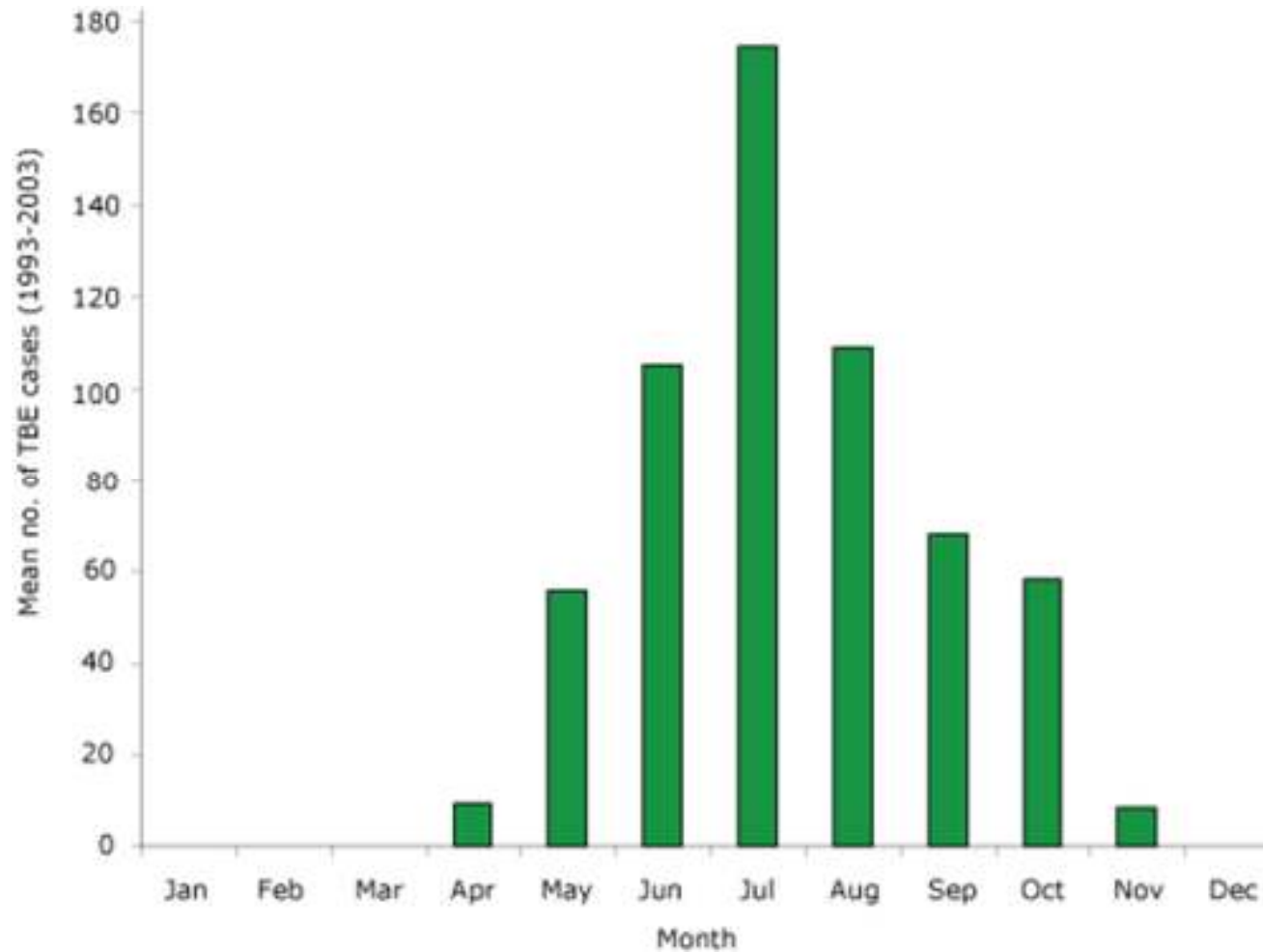
## Occurrence in time

- seasonality
- periodicity



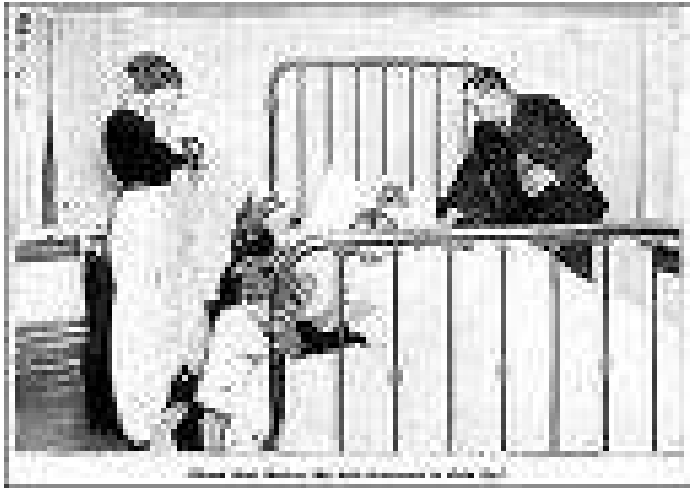
# Seasonality

(tick-borne encephalitis, Czech Republic)



# Periodicity

**Diphtheria appeared in Hungary with huge number of cases within a period of 11-13 years (in the early XX. century).**



**What can be the reason for periodicity?**

# Characteristics of communicable diseases 2.

Epidemiological, statistical indices:

- morbidity
- mortality
- case fatality ratio (lethality)
- Infectivity (the pathogen is present)
- Transmissibility (disease is transmitted)

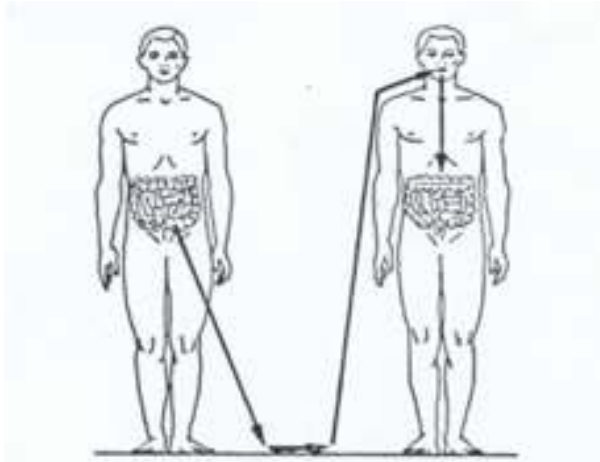
# Characteristics of communicable diseases 3.

The way of infection:

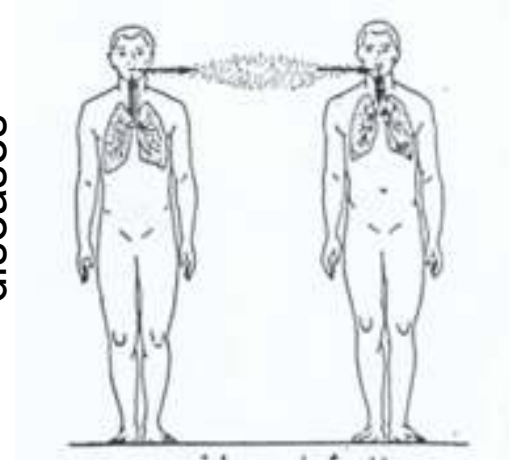
- Inapparent / aborted infection
- Incubation time
- Preclinical symptoms
- Special symptoms
- Recovery
  
- Acute /subacute / chronic infection

# Forms of communicable diseases 1.

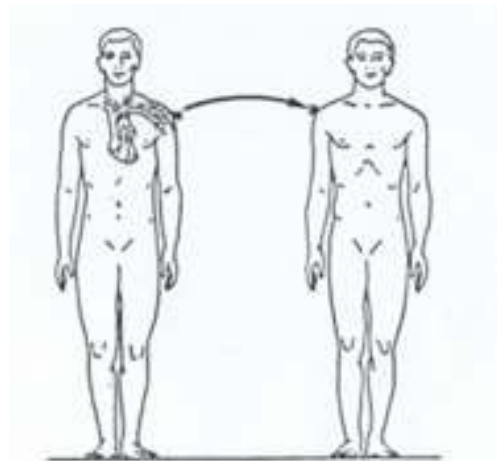
GI tract diseases



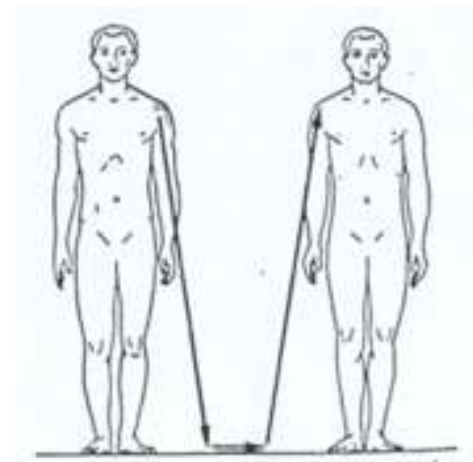
Respiratory tract diseases



Hematogenic-lymphogenic diseases



Diseases of the skin



# Forms of communicable diseases 2.

Nosocomial infection



Zoonoses



STD



# Statistics of communicable diseases (WHO yearly worldwide estimation)

| <b>Disease</b>                  | <b>No. of cases</b> | <b>No. of deaths</b> |
|---------------------------------|---------------------|----------------------|
| <b>Malaria</b>                  | <b>250 million</b>  | <b>900 000</b>       |
| <b>Enteritis infectiosa</b>     | <b>?</b>            | <b>2 million</b>     |
| <b>Dengue</b>                   | <b>50 million</b>   | <b>?</b>             |
| <b>Tuberculosis</b>             | <b>10 million</b>   | <b>1,5 million</b>   |
| <b>Influenza</b>                | <b>3-5 million</b>  | <b>250-500 000</b>   |
| <b>Haemophilus Influenzae B</b> | <b>3 million</b>    | <b>386 000</b>       |
| <b>HIV / AIDS</b>               | <b>3 million</b>    | <b>2 million</b>     |
| <b>Measles</b>                  | <b>290,000</b>      | <b>250 000</b>       |
| <b>Cholera</b>                  | <b>140,000</b>      | <b>2500</b>          |
| <b>Plague</b>                   | <b>2118</b>         | <b>182</b>           |
| <b>Polio</b>                    | <b>1315</b>         | <b>-</b>             |
| <b>Avian influenza</b>          | <b>399</b>          | <b>252</b>           |