
Classification of Zoonoses

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Rudolf Virchow
1821-1905

Coined the term **“Zoonoses”**

Stating that

“Between animal and human medicine, there is no dividing line, nor should there be. The object is different but the experience gained constitute the basis of all medicine”

What are zoonoses?

Zoonosis (singular) / **Zoonoses** (plural)

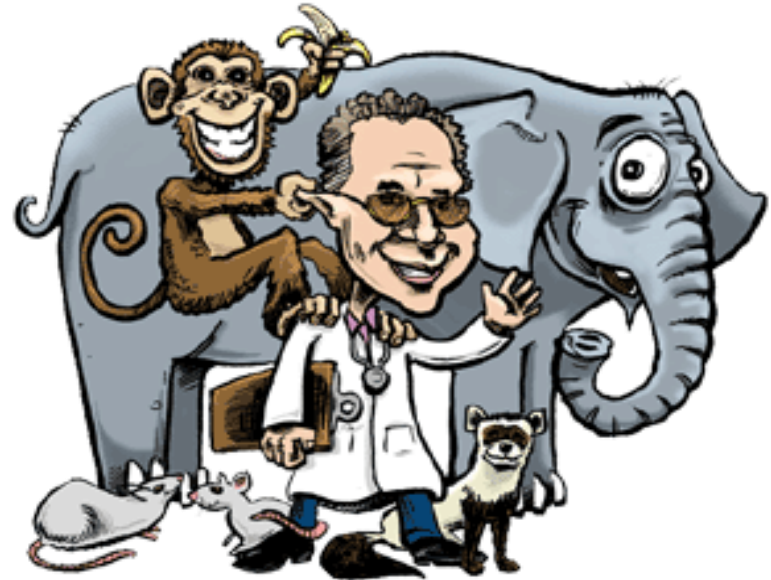
Zoon = animals

Noses = diseases

Infections or agents that are

naturally transmitted

Animals ← → **Humans**

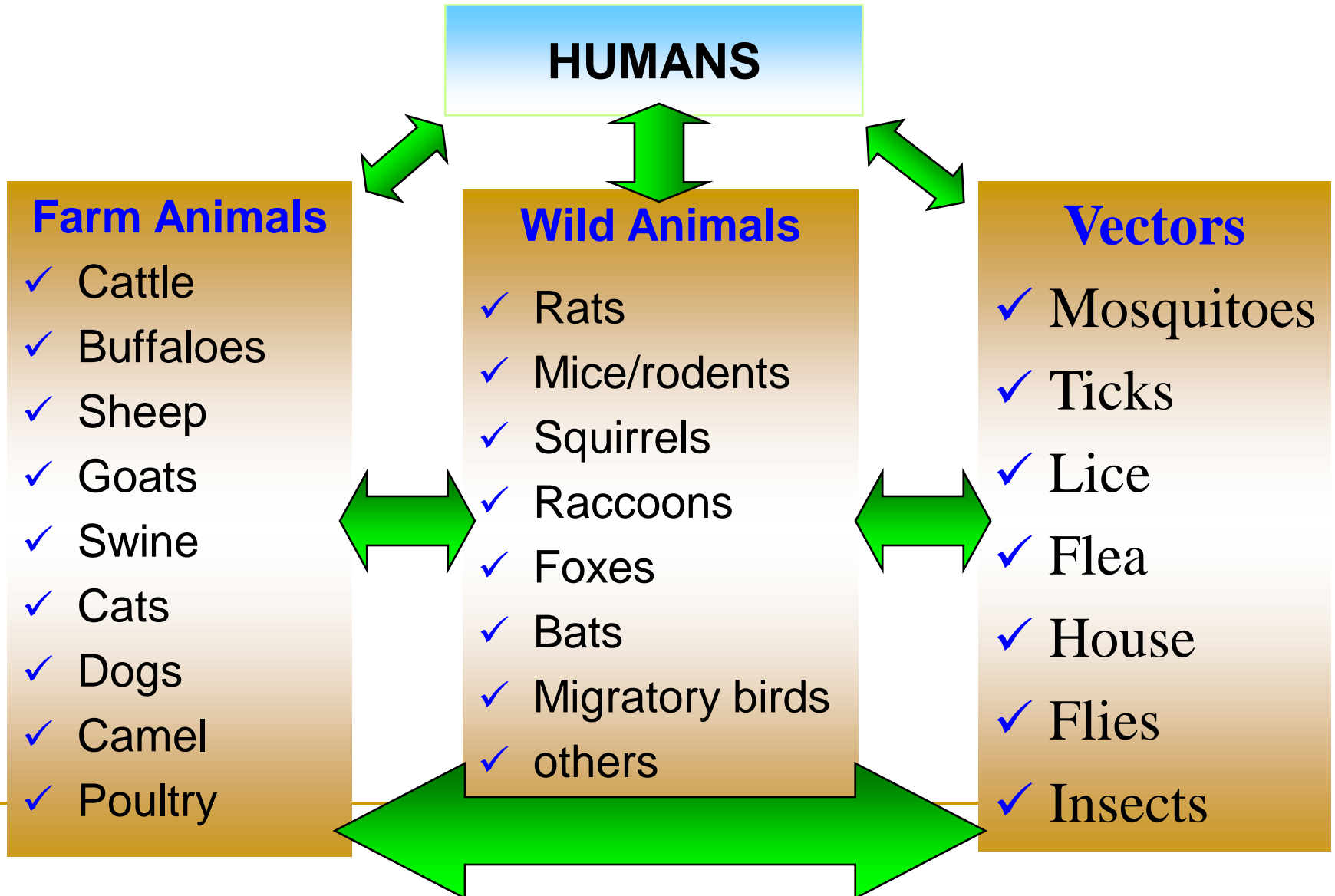


Diseases and infections which are naturally transmitted between vertebrate animals and humans - WHO 1959

Why zoonotic diseases are important ?

- **61%** (868 / 1415) of human pathogens are shared by animals
(Zoonoses)
(Woolhouse et al., 2005)
 - **64%** (14/ 22) infectious agents identified from 1973-1994 are zoonoses
(Chomel, 2003)
 - **73%** (130/177) of emerging infectious diseases are zoonotic in origin
(Woolhouse et al., 2005)
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Who transmit zoonoses?



who are at risk in humans ?

- **Population at higher risk**

- ❑ Infants
- ❑ Children <5
- ❑ Pregnant women
- ❑ People undergoing chemotherapy
- ❑ People with organ transplants
- ❑ People with HIV/AIDS
- ❑ Elderly

- **Most susceptible groups**

(Farmers, livestock owners & occupational groups)

1. **Share** air and space with animals
2. **Frequent contact** with domestic and wild animals

who are at risk in animals ?

- ✓ **Immunosupressed**
- ✓ **High yielder**
- ✓ **Reptiles**
- ✓ **Chicks/ducklings**
- ✓ **Puppies, kittens < 6 months**
- ✓ **Animals with diarrhea**
- ✓ **Exotic and wild animals**

Classification of Zoonoses

- **Etiological agents.**
 - **Transmission cycle.**
 - **Reservoir hosts**
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Classification based on Etiological agents.

- **Bacterial**

Ex. Brucellosis, leptospirosis, listeriosis, TB

- **Viral**

Ex. Rabies, JE, KFD, Dengue

- **Rickettsial and Chlamydial**

Ex. scrub typhus, RMSF, Ornithosis

- **Mycotic / Fungal**

Ex. Dermatophytosis, Cryptococcosis, Histoplasmosis

- **Parasitic**

- ✓ Protozoan : Ex. Toxoplasmosis, Babesiosis, Leishmaniasis,
African Trypanosomiasis

- ✓ Trematode / Fluke : Ex. Fascioliasis, Amphistomiasis, Schistosomiasis

- ✓ Cestodes / Tapeworms : Ex. Cysticercosis, Hydatidosis, Coenuriasis

- ✓ Nematodes / Round worms : Ex. Trichinellosis, Cutaneous Larva migrans,
Thelaziasis

Classification based on Transmission Cycle

■ **Direct zoonoses (Orthozoonoses).**

- ✓ zoonotic diseases are perpetuated in nature by a single vertebrate species
- ✓ Transmission is either by direct or indirect contact

Ex. Anthrax, Rabies, Tuberculosis, Brucellosis

■ **Cyclozoonoses.**

- ✓ zoonotic diseases require two or more vertebrate hosts to complete transmission cycle of an infectious agent
- ✓ Subdivided into 2 subtypes
- ✓ **Obligatory cyclozoonoses (Euzoonoses)**

- human is must for completion of Life Cycle

Ex. .Taenia solium, Taenia saginata

- ✓ **Non-Obligatory cyclozoonoses –**

- human is accidentally involved in completion of Life cycle

Ex. Hydatid disease, Toxoplasmosis

■ Metazoonoses (Pherozoonoses).

✓ both vertebrate and invertebrate species are involved in the transmission of an infectious agent.

✓ In invertebrate hosts, infectious agent may multiply, develop or remain dormant

Subdivided into 4 subtypes

✓ Metazoonoses type I :

One vertebrate & one invertebrate host. Ex. Yellow fever, plague.

✓ Metazoonoses type II :

One vertebrate & two invertebrate host Ex. Paragonimiasis.

✓ Metazoonoses type III :

Two vertebrate & one invertebrate host Ex. Clonorchiasis

✓ Metazoonoses type IV : Transovarian transmission

Ex. Tickborne encephalitis

■ Saprozoonoses.

- ✓ zoonotic diseases require a **non-animate substance** for completion of life cycle in addition to vertebrate or invertebrate host.
- ✓ An infectious agent may multiply, develop or propagate in an inanimate site.

Subdivided in 3 subtypes

➤ Saproanthropozoonoses

These diseases of animals are transmitted to human beings via non-animate substance. **Ex. Cutaneous larva migrans, Ancylostomiasis.**

➤ Saproamphixenoses .

These diseases are equally shared in nature by man and animals but are transmitted through inanimate objects.

Ex. Histoplasmosis, fungal infections

➤ Saprozetanthropozoonoses.

These diseases require vertebrate host, invertebrate host and inanimate object for completion of transmission cycle.

Ex. Fascioliasis.

Classification based on Reservoir hosts

■ Anthrapozoonoses

These are diseases of domestic and wild animals which occur in nature independent of man.

Human beings get infected from animals in unusual circumstances, through occupational contact or food .

Ex. Leptospirosis, tularemia, Rift valley fever, hydatidosis, rabies.

■ Zooanthroponoses

These are diseases which normally pass from human to other vertebrate animals.

Ex. Tuberculosis (Human type), amoebias

■ Amphixenoses

The agent can pass from man to animal and animal to man.

Ex. Streptococcosis, non-host specific Salmonellosis, Staphylococcosis

Transmission cycles

■ Sylvatic cycle.

- propagates among wild animals.
 - hunters and forest rangers or domestic animals stray
- e.g. Kyasanur forest disease, Monkey pox

■ Synanthropic cycle.

- The pathogens occur and propagate in domestic animals via synanthropic animals like rodents, birds and lizards
 - Man is often exposed to zoonotic diseases propagating in the synanthropic cycle.
- e.g. Plague, Tularemia

■ Human cycle.

- man to man cycle and can also pass from man to animals
- e.g. Human tuberculosis
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