Giants of microbiology and the Hungarian Royal State Institute of Bacteriology

In the second part of the 19th century medicine had gone through a revolutionary transformation one reason to which was the discovery of the real nature and pathogens of infectious diseases: bacteria and viruses. Though the Dutch Antoni van Leeuwenhoek had observed bacteria two hundred years before in his microscope, it was much later that this knowledge gained practical significance in medicine with the work of Pasteur and Koch. The existence of viruses – pathogens smaller than bacteria – was only revealed in experiments carried out at the end of the 19th century.

Devastating animal diseases caused and still cause severe economic losses. It is enough to think of the consequences of the foot and mouth disease epidemic in England a few years ago. Due to the joint efforts of science and veterinary control – the veterinary police system as it was called in the 19th century – Hungary was able to fight epidemics usually approaching our country from the east due to climate and habits of animal husbandry there. Our first veterinary regulations served the fighting of cattle plague, and in fact Hungary became free of this disease by 1881. Law VII. of 1888 was a comprehensive regulation of the veterinary sector containing strict regulations regarding border control, animal transport and husbandry, slaughter, the reporting of animal diseases, the localisation of disease outbreaks, and described the tasks of veterinarians in great detail. The examination and testing of veterinary medications and vaccines was also important of which samples were sent to the Hungarian Royal State Institute of Bacteriology.

The veterinary school had always been closely related to practice, and had been submitting its scientific proposals regarding hot issues such as the most up-to-date methods of disinfection for ship and wagons involved in animal transport, or vaccination against anthrax. The veterinary school has also been involved in the management of official examinations compulsory for state veterinarians. The Institute of Bacteriology was also founded here in 1891. It was directed by Hugo Preisz, the excellent bacteriologist, who identified the pathogen of the caseous lymphadenitis of sheep and goat in the same year, which turned out to be the bacterium called today Corynebacterium pseudotuberculosis.

The institute had the following tasks:

1. The scientific study of infectious diseases.
2. The application of the achievements of bacteriology in order to prevent and eradicate infectious diseases.
3. To provide opportunity for veterinary or human doctors or other interested parties to study and research bacteriology.
4. To give expert opinion in bacteriological matters for authorities, offices or private persons.

In 1906 Aladár Aujeszky took over the management of the institute which provided national services from 1893 on: testing and distribution of diagnostic materials and vaccines, rabies tests, examination of water, milk, honey, hay, sputum, etc. Aujeszky discovered the virus and disease later named after him already in 1902 in cattle, the symptoms of which are similar to that of rabies.

The Institute moved to a new, modern, well-equipped building in 1900 at the corner of Hungária circular road and the Stefánia road which was supplemented by stables for sick and laboratory animals. The building was presented at the World's Fair in Paris, 1900 where the Institute won Gold Medal for its activity. The building houses the Department of Microbiology and Infectious Diseases.

Few years after cattle plague another imported disease, classical swine fever challenged the newly formed veterinary system. Jozsef Marek was asked to examine the problem. He summarized his experiences gained at the royal Veterinary Office of Kőbánya in a significant study on the pathology of the disease. Some time later in 1907, already as head of the department of internal medicine of the Veterinary College, he described the disease of poultry named after him. After neuropathological and transocculation experiments it turned out that this disease is a malignant disease of herpes viral origin accompanied by tumour formation which may be prevented efficiently by vaccination. The discovery was important not only from the economic point of view but also because this was the first time when a neoplasmic disease could be prevented by vaccination. Our microbiologists had achieved further significant results using the modern equipment of the Institute of Bacteriology.

In 1914 János Köves (Department of Epidemiology) managed to describe a symptom indicative of other diseases. Then in the 1960s the achievement of the early 20th century was repeated when in one decade a new strain of the Aujeszky-virus was described, called Bartha strain, and when there was a breakthrough in the research of goose influenza with the discovery of Derzsy's disease.

The Hungarian Royal State Institute of Bacteriology, today the Department of Epidemiology and Microbiology

Pathogens and diseases named after Hungarian veterinary microbiologists

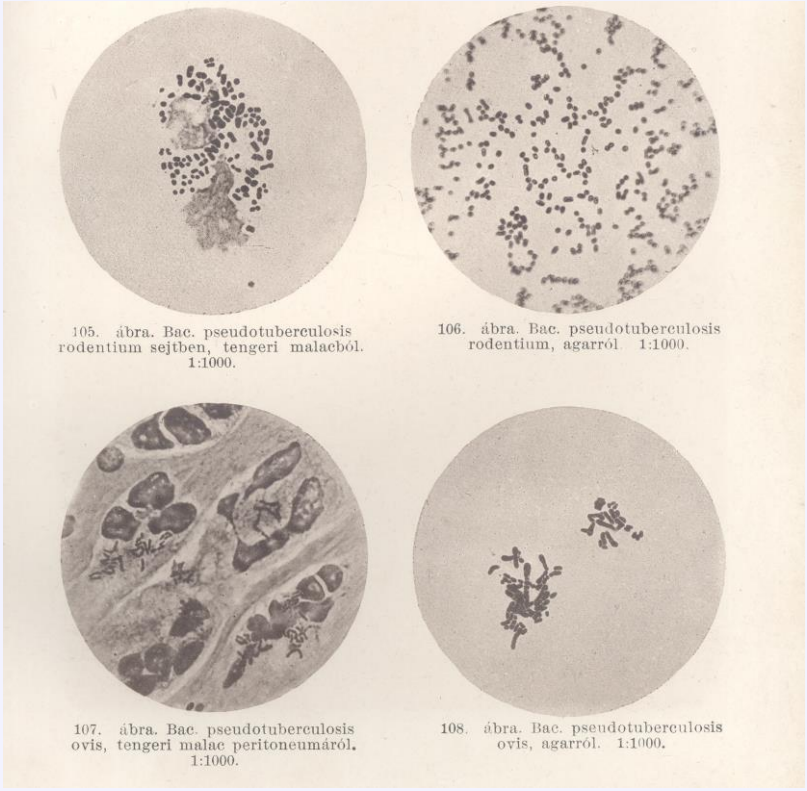
Preisz-Nocard-bacterium, disease
Aujeszky-betegség
Marek-betegség
Köves-betegség
Derzsy-betegség
Bartha-féle törzs
Móvár-vírus

Preisz-Nocard-bacterium, disease
Other names: Corynebacterium pseudotuberculosis, Corynebacterium ovis
Described by: Hugo Preisz (1860-1940) doctor, veterinarian, bacteriologist, member of the Hungarian Academy of Sciences. Founder of modern bacteriological research in Hungary, head of the Bacteriology Institute of the Hungarian Royal Veterinary College.

Description: Corynebacterium pseudotuberculosis causes caseous lymphadenitis and the ulcerative inflammation of lymph vessels of horses. The bacterium excretes a toxin harmful for red blood cells and the endothelial cells of vessels.
Species: sheep, goat, occasionally cattle, horse
Route of infection: Through skin lesions, the mucosal membrane of the mouth or throat or by inhalation. It does not threaten humans.

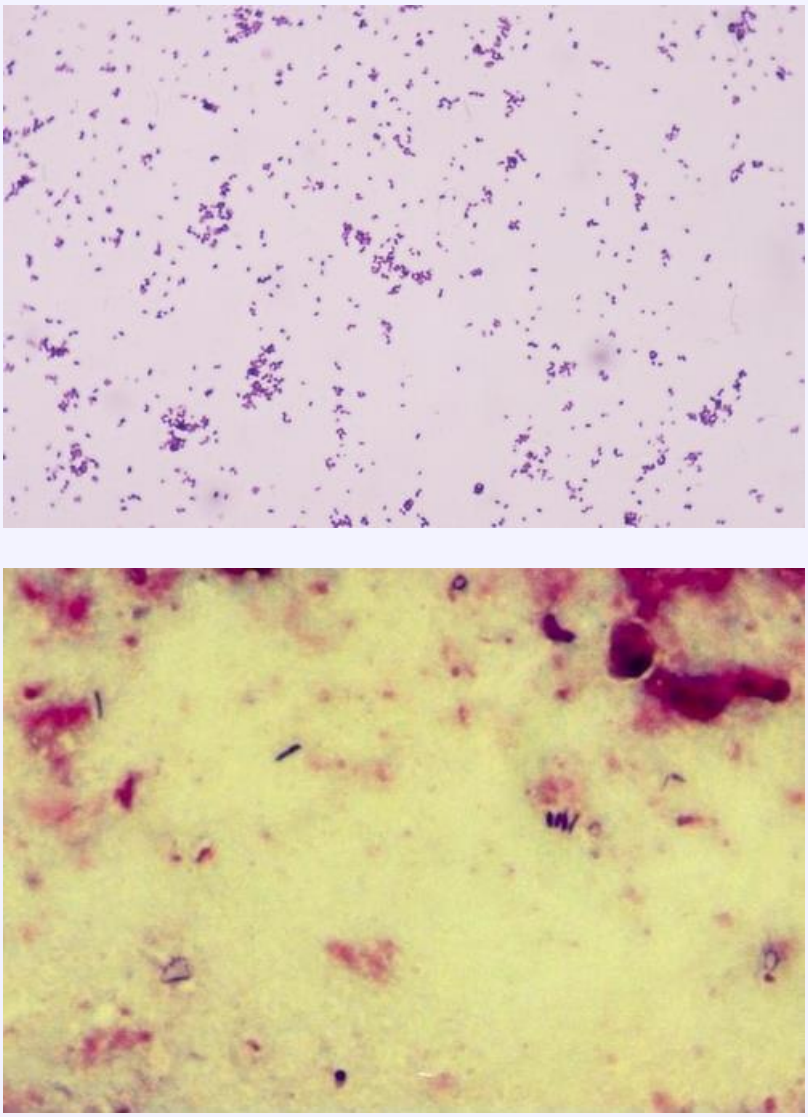
Signs (pathology): Clinical signs appear in mature animals: enlargement of lymph nodes, purulent abscesses. Lack of appetite, wasting may be followed by death.
Prevention: Separation and slaughter of sick animals, the treatment of those not showing clinical signs with antibiotics may prevent further cases, however, the infection may persist. Vaccination is also possible.

Economic significance: 20-40% of infected goat herds may get sick. The disease may also become chronic without visible signs, but with a dramatic decrease of production.
Distribution: Frequent in the tropics, sporadic in the countries of the temperate zone.

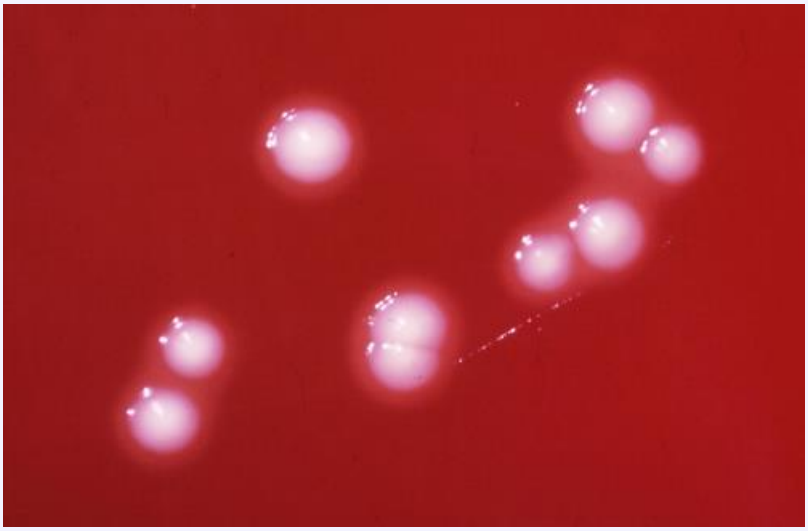


Micrscopic view of the Preisz-Nocard bacterium
Source: Preisz Hugó: Bakteriológia. Budapest, Országos Állatorvos Egyesület, 1899

Preisz-Nocard disease in sheep



Smears of the Preisz-Nocard bacterium



Culture of the Preisz-Nocard bacterium
Photo: Dr. Hajtós István

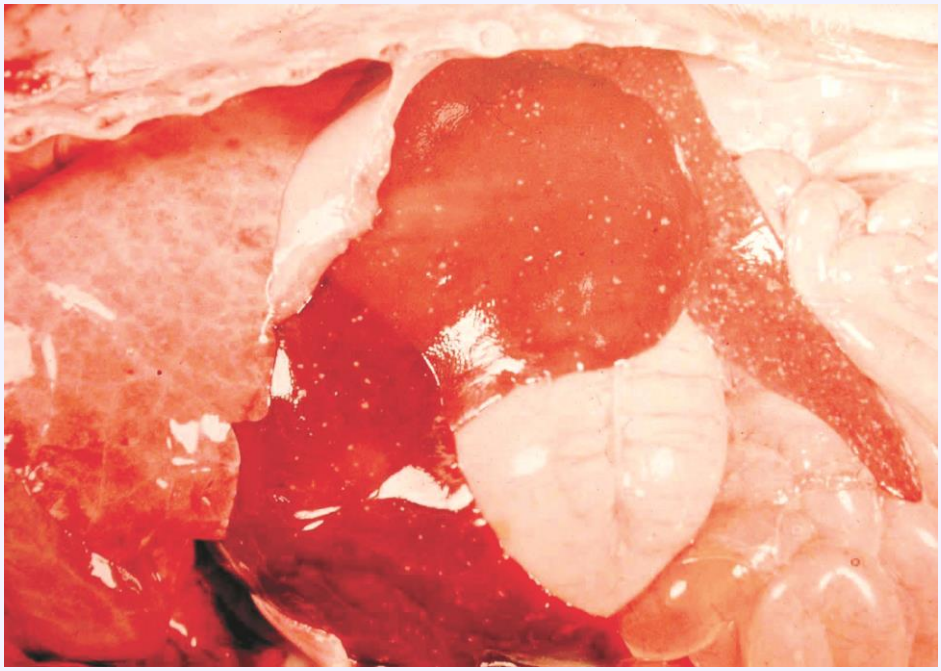
Aujeszky's disease

Other names: pseudolyssa, pseudorabies, Pseudowut

Described by Aladár Aujeszky (1869-1933), doctor, veterinarian, professor of bacteriology and bacteriological diagnosis, head of the Institute of Bacteriology of the Hungarian Royal Veterinary College (1907-1933). He was the first to describe ''pseudolyssa'' in 1902, and distinguish it from rabies.

Description: Aujeszky's disease is caused by a herpesvirus and results in neurological symptoms and death in piglets and other species, while adult pigs have only mild respiratory symptoms or have no symptoms at all.
Species: Pig, dog, cat, cattle, sheep, goat, mink
Route of infection: Pigs are the virus hosts, all other species are infected by pigs through direct or indirect contact (e.g. by eating infected meat). Pigs can be infected by inhalation or orally. It does not threaten humans.

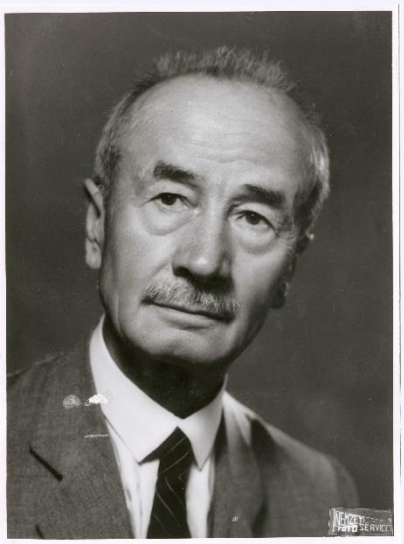
Signs (pathology): Piglets showing neurological symptoms die in large numbers, while adult pigs show only mild respiratory symptoms or fever. It can be accompanied with fever, salivation, lack of appetite, convulsions, paralysis. In other species itching and myeloencephalitis occur. Aujeszky's disease is difficult to be distinguished from rabies at its early stage, so animals showing similar symptoms should be treated with caution.



Numerous inflammatory-necrotic foci are present in the liver, spleen and lungs of a newborn piglet due to Aujeszky's disease
Source: Vetési Ferenc – Dobos-Kovács Mihály: Állatorvosi patológiai képes album = Colour atlas of veterinary pathology. Budapest : VET-Image Kft., 2006. 609. kép

Marek-betegség

Other names: Neurolymphomatosis *Described by* József Marek (1868–1952), veterinarian, Doctor of Philosophy, university professor, member of the Hungarian Academy of Sciences awarded the Kossuth Prize, founder and head of the department and clinic of internal medicine at the Hungarian royal Veterinary College.

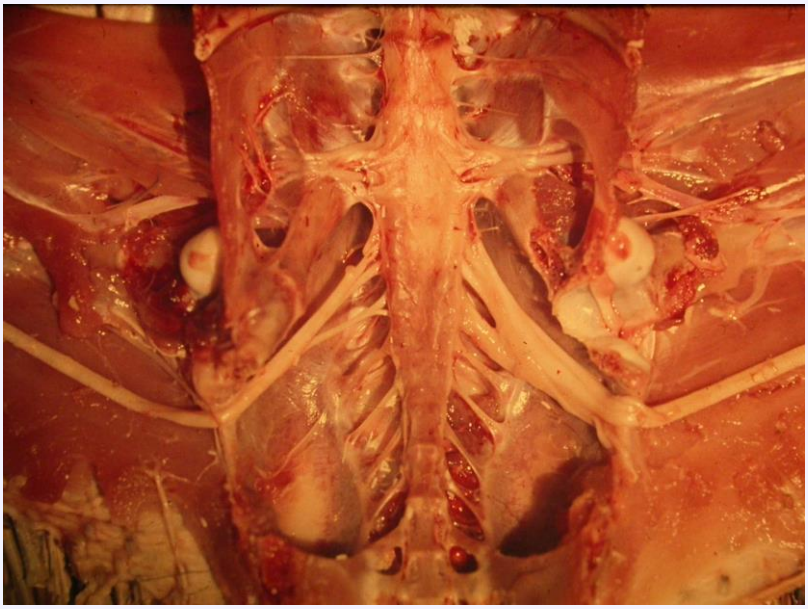


Description: In flocks of hens a disease of virus origin with acute hyperplasia, oncogenesis and in its chronic form with the inflammation of peripheral nerves.
Species: Hen, rarely other bird species

How infection spreads: It has been reported in almost all flocks kept under traditional husbandry conditions. The infected birds, objects and the air also spread the virus. It does not threaten humans.
Syndromes: In acute Marek's disease birds show depression, lack of appetite, and they die in some days or weeks. The so-called classical Marek's disease is associated with incoordination, an asymmetric paralysis of one or both legs or wings, wing dropping and the lowering of the head and neck are common.
Prevention: The fate of the diseased flocks cannot be controlled. Prevention from Marek's disease is possible by vaccination, sterilization and fumigation, by ensuring maximum hygiene in hatcheries and in stablings, and air filtration.
Economic significance: Besides its economic significance it improved knowledge on malignant tumours of virus origin.
Spreading: Occurs worldwide.

Hen suffering from Marek's disease
Source: Vetési Ferenc – Mészáros M. János:
Háziállatok diagnosztikai boncolása. Budapest, Mezőgazda K., 1993.

Hen’s head died of Marek’s disease
Source: Department of Pathology and Forensic Veterinary Medicine



Enlargement of nerves in a hen suffering from Marek’s disease
Source: Vetési Ferenc – Mészáros M. János:
Háziállatok diagnosztikai boncolása. Budapest, Mezőgazda K., 1993.

Köves's disease

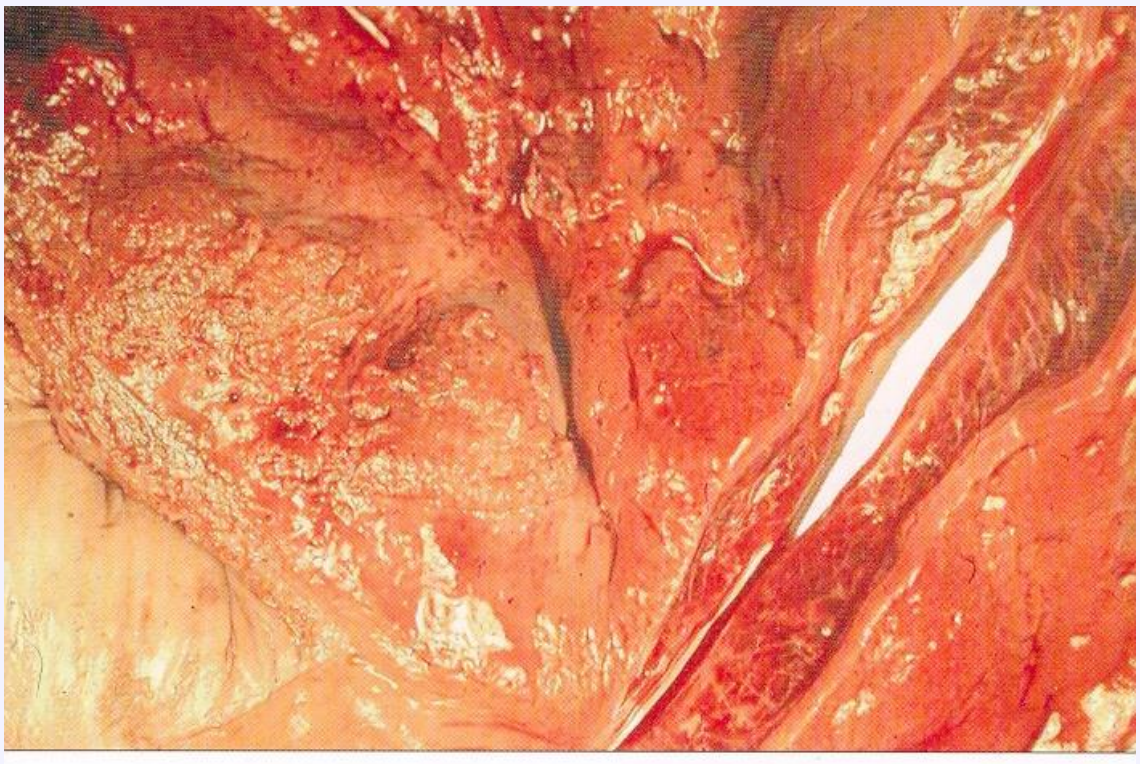
Other name: Emphysematous gastritis

Described by János Köves (1882–1977) professor of the Hungarian Royal Veterinary College, head of the polyclinic, later the epidemiological laboratory in Kőbánya, the founder of the mass production of veterinary vaccines, organizer of the Phylaxia Serum Works Co., deputy director of the Veterinary Research Institute of the Hungarian Academy of Sciences, an expert in swine health.

Description: Köves-disease is a so-called „indicator disease" – it does not occur in itself, i. e. if the veterinarian finds it, he has to think of what other disease could have attacked the mucosal membrane of the stomach. It may be swine fever, the infectious gastroenteritis of piglets, ulcers or mycotoxin intoxication. The bacterium Clostridium septicum causing oedema permeates the bleeding mucosa of the stomach.

Species: swine
Route of infection: Through the lesions of the mucosa of the stomach. It does not threaten humans.
Signs (pathology): The disease can be identified postmortem. The wall of the stomach is thickened, its touch is rubberlike, there are sero-haemorrhagical infiltrations and gas bubbles in and fibrin cover on it.

Prevention: Prevention of other swine diseases.
Economic significance: Related diseases may cause serious losses therefore the fight against them has been going on for more than a hundred years.

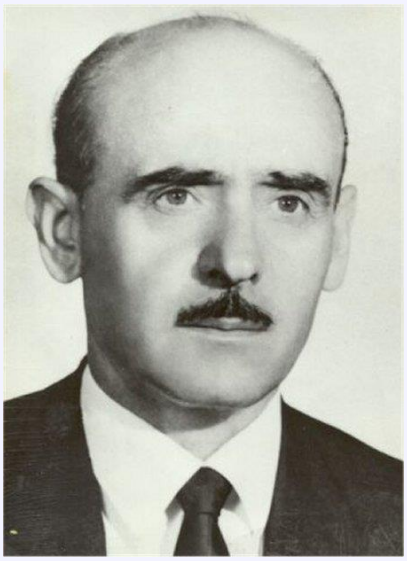


Thickened stomach wall, sero-haemorrhagical infiltrations, gas bubbles caused by Clostridium septicum (swine)
Forrás: Vetési – Dobos-Kovács: Állatorvosi patológiai képes album: Emlős patológia. 2006. 330. ábra

Derzsy's disease

Other names: Goose influenza, goose viral hepatitis

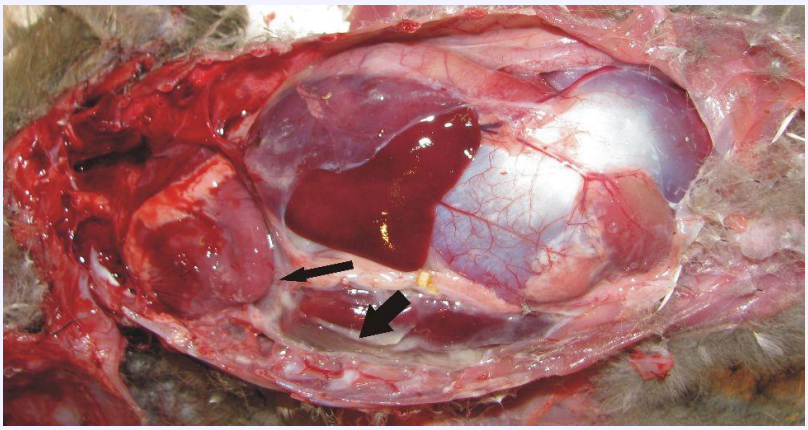
Described by Domokos Derzsy (1914–1975), veterinarian, honorary professor, director of the Veterinary Medical Research Institute of the Hungarian Academy of Sciences (1967-1975). A disease caused by goose parvovirus was named in his honour Derzsy's disease.



Description: A diseases caused by parvovirus which usually results in death in goslings and young Barbary ducks. *Species*: Goslings, young Barbary ducks (clinical symptoms usually do not occur in older animals) *Route of infection*: It may get into the egg with feces. It does not threaten humans.

Signs (pathology): Damage to the liver and the heart muscle, hydroperitoneum.
Prevention: The fate of the diseased population cannot be controlled by therapy. Goslings may be protected by the vaccination of geese, the infection of goslings in large numbers must be prevented by sterilization, by ensuring maximum hygiene, and by providing proper husbandry conditions.
Economic significance: Occurs everywhere where geese are kept in large numbers. Even 30-60% of 1-4 week-old, not protected animals may die. In protected animals losses are much smaller, they do not exceed 3-5%.

Gosling suffering from Derzsy's disease
Source: Department of Pathology and Forensic Veterinary Medicine

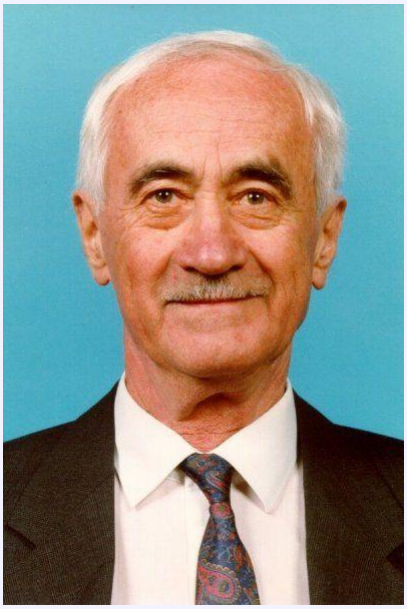


Pathologic image of Derzsy's disease
Source: Department of Pathology and Forensic Veterinary Medicine

Bartha's strain (a type of Aujeszky's virus)

Other name: K/61

Described by Adorján Bartha (1923–1996) veterinarian, professor at the Department of Microbiology and Infectious Diseases at the University of Veterinary Science, member of the Hungarian Academy of Sciences, honorary professor, head of the Veterinary Research Institute of the Hungarian Academy of Sciences (1990-1994). He was an internationally acknowledged virologist.



Description: In 1961 Adorján Bartha isolated the K/61 virus strain with low virulence. Some gene sections are missing from its DNA, thus this virus strain has lost its pathogenic ability. Bartha's K/61 vaccine is used for preventing Aujeszky's disease.
Species: Pig

Name: **MOVAR virus**
Other name: Bovid herpesvirus 4
Description: Adorján Bartha isolated herpesviruses of slow reproductivity causing subclinical infection (without apparent signs) named MOVAR after Mosonmagyaróvár.
Species: Cattle