Influenza: Initial introduction of influenza viruses to the population via abiotic water supply versus biotic human viral respirated droplet shedding

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The primary, initial transmission of the human influenza epidemics by the biotic droplet infection is not proven (BRANKSTON et al. 2007) and extremely improbably as influenza epidemics

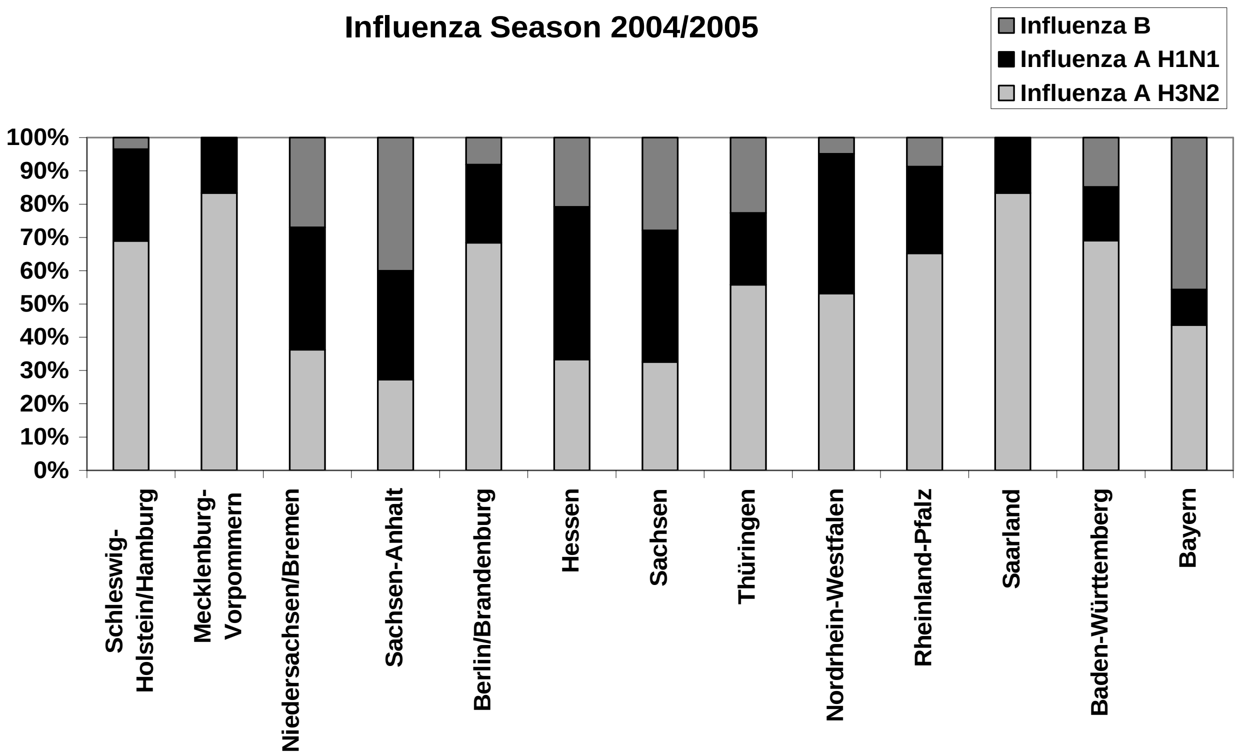
- **appear only in 9% of the cases (season 2004/2005 in Germany) together with recognized clusters.**
- **appear virologically locally singularly (influenza-subtypes and precision typing).**
- **appear geographically locally singularly.**
- **are not proven with priority in large cities and densely populated areas.**
- **appear predominantly in the colder regions of Germany.**
- **regularly reach their maxima in certain districts/cities.**
- **strictly run parallel to the course of the sum of coldness during the winter.**
- **can hardly spread via saliva droplets. Saliva contains far less Influenza viruses than the - heavier - droplets from throat and nose.**

The facts

Influenza epidemics in Germany rarely appear together with recognized clusters (9% of the cases in the season 2004/2005) (RKI 2006).

Influenza epidemics appear virologically locally singularly (influenza-subtypes and precision typing) (AGI 2007) (Graph 1).

Influenza epidemics also run geographically locally singularly. They are not proven with priority in large cities and densely populated areas. They arise predominantly in the colder regions of Germany (in the east with cold continental climate in the winter, southeast, altitudes) (RKI 2007). They reach their maxima regularly in certain districts/cities (absolute maxima: Frankenthal, Worms, district Stollberg) (RKI 2007) (Graph 2).



Graph 1: Percentage of Influenza types in the season 2004/2005 (AGI 2007)

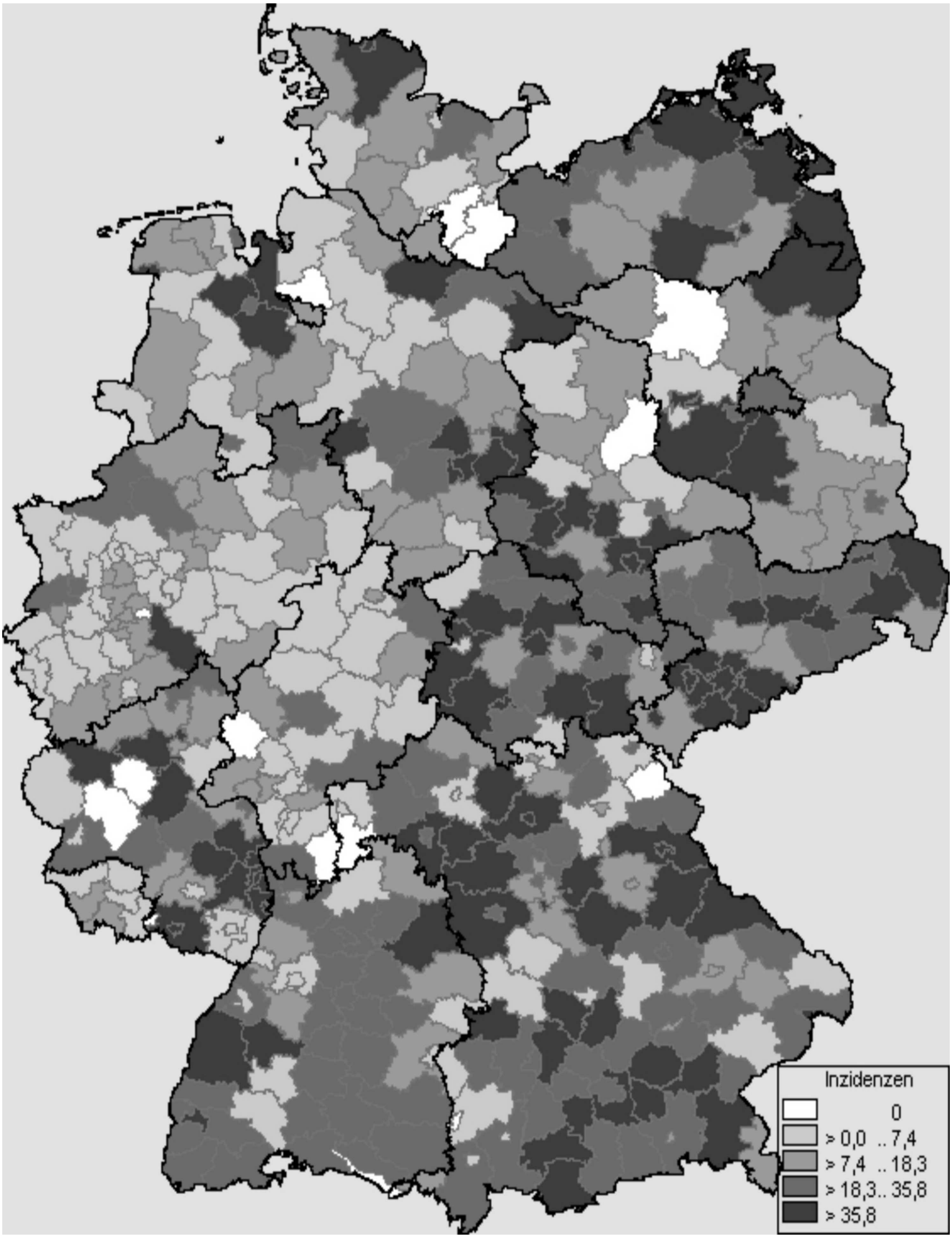
Influenza epidemics run strictly parallel to the course of the sum of coldness during winter (Graph 3, 4).

Influenza epidemics can hardly spread by saliva droplets. Saliva contains far less influenza viruses than the substantially heavier droplets from throat and nose (ANONYMOUS 2003) (GOLDMANN 2001).

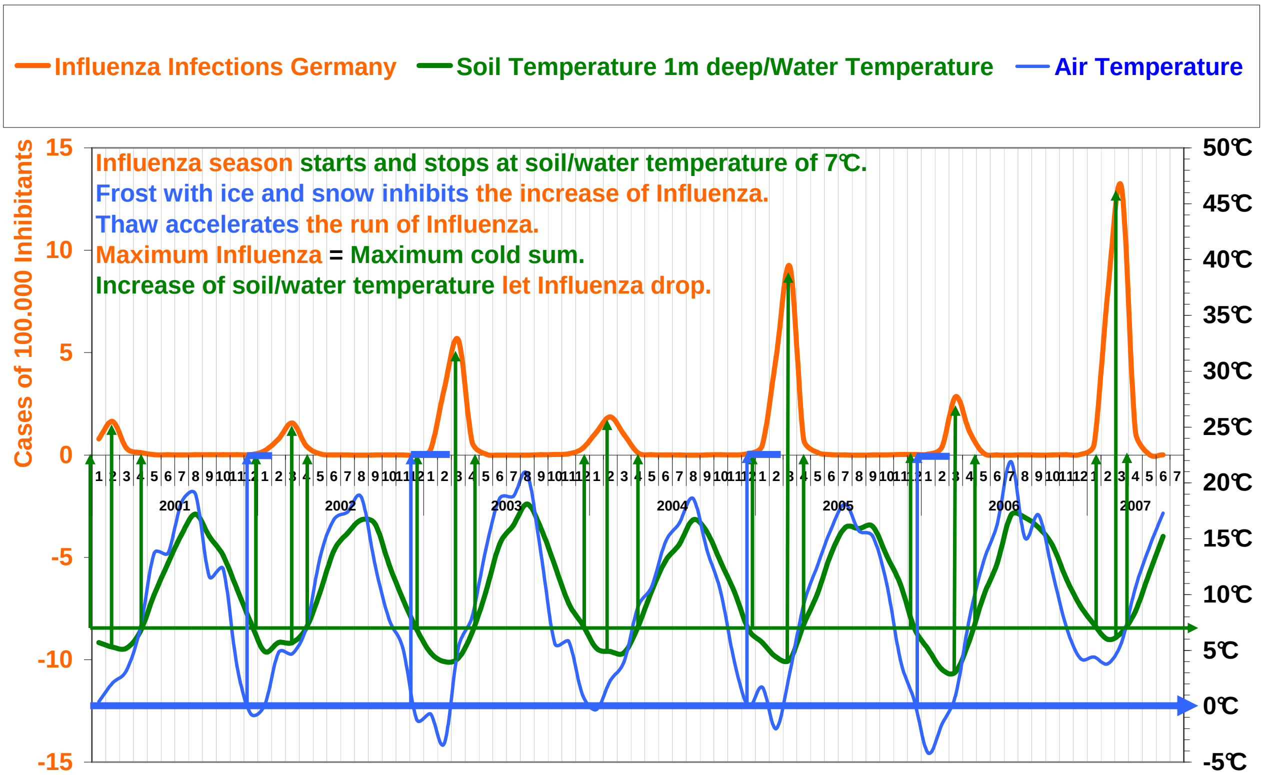
Human Influenzaviruses could be proven in the excretions of mammals such as pigs (faecal and oronasal), wild boar (faecal and oronasal), cattle and goats, so that the transmission path from the environment over waters and the drinking water in principle is possible (BROWN 2004) (GRAVES et al. 1975) (KADEN et al. 2001) (KAWAOKA et al. 1986) (LANDOLT et al. 2003) (MARKOWSKA DANIEL et al. 1999) (RKI 1999) (VICENTE et al. 2002) (WEBSTER 1998) (ZHOU et al. 1996) (CARPENTER 2001). With considerable certainty further animal species that are infected with influenza A will be discovered in the future (WEBSTER 1998).

Elimination and inactivating of viruses during the drinking water treatment

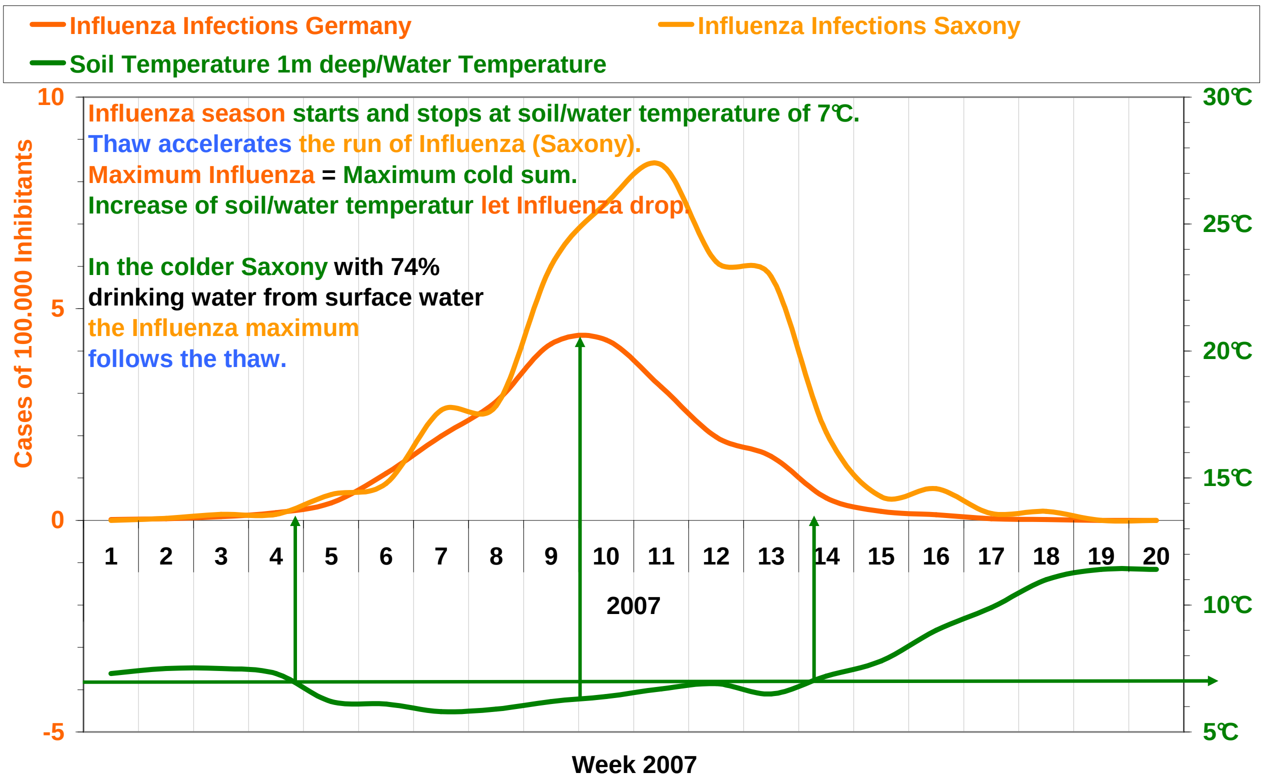
Drinking water is often not or only roughly filtered in Germany. The very small viruses are not definitely removed thereby. For groundwater treatment fast speed filtration plants for the elimination of iron and manganese do not possess any effect regarding the elimination of viruses (WHO 2004). Even the plants in Germany which are known to be particularly efficient regarding the flocculation and filtration can not reach the elimination and inactivating goals demanded from the WHO (WHO 2004); not even under the consideration of the common disinfection procedures, whose efficiency decreases with sinking water temperature [Chlorine and ozone treatment] and that are only of limited efficiency when microorganisms are embedded in particles or in biofilm [Chlorine, ozone treatment and UV irradiation].



Graph 2: Influenza incidence Germany in the German districts/cities 2007, 18.670 cases (RKI 2007)



Graph 3: Influenza incidence Germany 2001-2007 (RKI 2007) - drawn over soil-/water and air temperatures (DWD 2007)



Graph 4: Influenza incidence Germany and Saxony 2007 (RKI 2007) - drawn over soil-/water temperatures (DWD 2007)

"Cooling chain of the public water supply"

Coldness is by far the most important parameter for the preservation of virulent influenza viruses in water. The temperature minimum of the dam water in Germany values in January and February 3-4℃. Every year, river water has its temperature minimum also in January and February. Close to the surface ground water in Germany has its temperature minimum - similar to the soil in 100 cm depth - at the ground water surface of about 3℃ in February and March. Ground water taken from wells of larger depth can also be colder than the deeper ground water due to the affection of surface water that infiltrates in the case of unsatisfactory sealing between the fountain and the surrounding rock. River water draining away and reaching wells on short ways can have the same effect. Bank filtrate from wells, which was drilled near the bank from surface water, adopts the temperature of the cold surface water. The same applies to wells, from which ground water enriched with surface water is pumped. The soil temperatures in a meter of depth correspond to the temperatures of the drinking water pipelines that are laid frost-protected in the soils. The temperature minima of the soil temperatures in a 100 cm depth value in Germany during the months February and March 3-5℃ (DWD 2007). The temperatures of the drinking water pipelines and the drinking water transported in them adapt themselves to the soil temperatures. In the winter cold raw water remains cold in the drinking water treatment plants and after the treatment to drinking water in the water tanks and water pipelines until the connection to the consumers. The temperature minimum of the drinking water when connecting to the consumers follows in particular the run of the wintry cold sum in the soil and in the water pipelines. It arises in the months February/March. The cold drinking water is first mixed in the dwellings at the taps with warm water from the house installation. Thus the continuous "cooling chain of the public water supply" is described from the water winning up to the consumers with a drinking water temperature of about 4-5℃ in the months February/March. Cold, young, fres hly by Influenzaviruses contaminated drinking water, taken out from surface water and badly protected surface near ground water as well as out of the ground water from karst can be the abiotic vehicle, which conserves virulent Influenzaviruses in the winter at 4-5℃ and transports them over the "cooling chain of the public water supply" to humans.

Transmission paths of the drinking water

Infections by drinking water will not be transmitted alone by drinking the water. Further transmission paths are the inhalation of aerosols and the contact with the drinking water. Access for humans are the conjunctiva, the nose mucous membrane, the mouth mucous membrane, the eardrum, wounds and by catheters affected other mucous membranes.

Conclusions

The primary transmission of the influenza by the biotic “warm” droplet infection from human to human is, already because of the strict dependence on environmental temperatures, extremely improbable. The influenza must be triggered by an abiotic vehicle, which is increasingly efficient regarding the spread of infections with increasingly cold environmental temperatures. Therefore it has to be searched for abiotic vehicles dependent on cold environmental temperatures for the transmission of the influenza. Drinking water is such an abiotic vehicle.

The stated references and indications show that cold drinking water can be that abiotic vehicle, by which virulent human Influenza viruses from the reservoirs reach humans and triggers predominantly the seasonal influenza epidemics.

That applies in particular also to the extremely lethal H5N1 bird flu, whose faecal transmission is indisputable.

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"The subject is capable of being decided by exact numerical investigation, but I have thought it better to publish my inquiry in its present imperfect state than to wait till I should be able to make such a complete research as I could wish, more especially as, by directing the attention of the profession to the question, it may be earlier decided."

JOHN SNOW