# Twitter Thread by Jonathan Mesiano-Crookston @/#COVIDisAirborne

**Jonathan Mesiano-Crookston @/#COVIDisAirborne**
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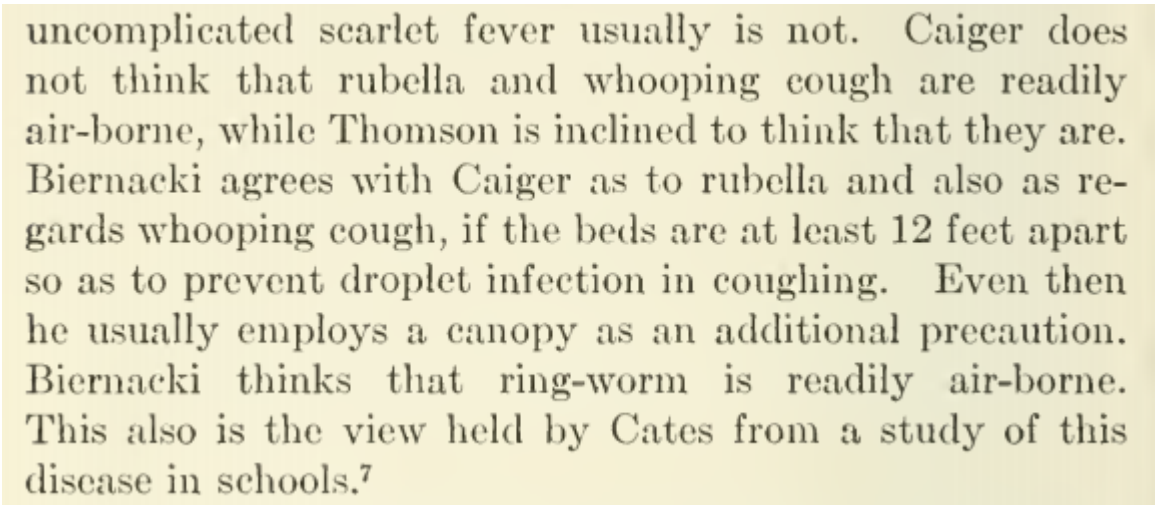
**Chapin 1912.**

**Talking about droplets and airborne. To him "airborne" meant long-range as in many kilometers. Droplet could be through the air more than 1 or 2 m. Plus, he said study it more! We have failed to do that.**

**Quick thread.**

12 foot droplets? I guess they shrunk over the years.

Also, ring worm may be through air.


uncomplicated scarlet fever usually is not. Caiger does not think that rubella and whooping cough are readily air-borne, while Thomson is inclined to think that they are. Biernacki agrees with Caiger as to rubella and also as regards whooping cough, if the beds are at least 12 feet apart so as to prevent droplet infection in coughing. Even then he usually employs a canopy as an additional precaution. Biernacki thinks that ring-worm is readily air-borne. This also is the view held by Cates from a study of this disease in schools.[7]

Page 281. Plague. Droplets means through air over distance, but not long-range.

Note that MASKS WORKED.

**Pneumonic Plague.** — The extensive outbreak of plague in Manchuria in 1910 attracted much attention, since rodents, while perhaps furnishing the original infection, played little part in the extension, as it seemed to be spread almost exclusively from person to person. Kitasato,[1] if reported correctly, concluded that the disease could not be air-borne but is caused "by coming in close contact with plague victims and by sputa." That droplet infection is of great importance in this type of the disease cannot be doubted and was amply demonstrated by Strong.[2] In a preliminary note he reports experiments in which 15 of 39 plates held in front of coughing patients were infected with virulent bacilli. He says that the air throughout the ward was infected, though the experiments, as reported, do not seem to furnish proof of this. Respirators are said to have been used successfully in avoiding infection by physicians and others in close contact with the patients. No real evidence, however, seems to have been advanced to show that the disease was air-borne other than by droplets.

page 295. Droplets detected, Flugge first found them during SPEAKING, LOUD TALKING, COUGHING and SNEEZING. Tiny droplets. Yup.

Note found 2 meters BEHIND the person

So clearly, our "droplet" has morphed from Chapin's droplet. That's weird.

**Droplet Infection.** — Another way in which living bacteria may be carried by the air is in tiny floating particles of liquid. Flügge[1] was the first to call attention to the fact that during speaking, and especially during loud talking, coughing and sneezing, tiny droplets of saliva are thrown off from the mouth. Indeed such droplets may be readily seen in the proper light, and it hardly needed special experiment to prove their existence. Nevertheless, Flügge[2] and Laschtschenko,[3] by infecting the mouth with *B. prodigiosus*, showed that germ-carrying droplets are, during coughing, borne to a distance of nine meters in front of the mouth. These droplet experiments have been repeated with confirmatory results by Goldie, Esmarch, B. Fränkel, Möller, Hübner, Weismayr and Königer, and the last mentioned has shown that the droplets may be found two meters behind the person coughing.[4] Goldie showed that in fourteen per cent of the cases tubercle bacilli could be caught on plates after a single act of coughing. Every patient examined at one time or another gave positive results. No bacilli were found, even as near as six inches, during deep breathing, but after coughing they could be recovered from all parts of the room.

p 296. How much do they travel? Well even Chapin said droplets fill a room. Five to six hours. Interesting.

(He then goes on to wonder if they are infective, same arguments as today ... sigh ... and he didn't have 100 years of studies to help him.)

**Amount of Droplet Infection.** — Since it has been shown by Flügge that droplets from speaking may float for from five to six hours, and be transported by air currents of only one mm. per second, it is not surprising that they should be carried such distances. Nor is it surprising that Hutchinson[1] was able to prove that a fine spray of a culture of *B. prodigiosus* was carried fifty-five meters along a corridor, and up two flights of stairs, and also a considerable distance out of doors. Others have shown that the bacteria of the mouth may be carried by the air during speaking over a large room or hall.[2] Leon[3] showed that in speaking three hundred words 250,000 bacteria were thrown off from the mouth, and Ziesché[4] found over 20,000 tubercle bacilli on a plate 324 sq. cm. exposed for half an hour. But it has further been shown by Kirstein[5] and Königer[6] and Laschtschenko[7] that the size of the droplets and the distance they can be carried depend to a large extent upon whether the liquid is thin and watery or a thick mucus. Hence we should expect that droplets of thick sputum would not be carried nearly so far as droplets of more liquid saliva, and according to Goldie[8] droplets of the saliva rarely carry bacilli but only the droplets of sputum.

p 297. ... on the next page Chapin talks about an experiment that found no strep in saliva in air (aerosol, let's call it), so Chapin expresses doubt this is more than minor.

mouth. The authors emphasize the distinction noted by others between the larger droplets of mouth spray which contain the most bacteria and which settle out of the air in the space of a few feet from the mouth and the smaller droplets which float for a longer time and may pass to some distance from the speaker, and which alone may be considered as properly constituting an infection of the air. The chief interest

Here is the minor comment:

germs from sick persons. The authors conclude that these experiments furnish "no basis for a belief that tuberculosis or any other disease is contracted to an appreciable extent through the inspired air" and are "in harmony with the conviction now generally gaining ground that aerial infection of any sort is a minor factor in the spread of zymotic disease."

p 298 - thinks float.

Flu floats. (He calls it a bacteria because viruses had just in 1898 and forward begun to be discovered and characterized).

**Pneumococcus.** — Wood [1] found that pneumococci did not retain their vitality in floating droplets over one hour, and not half an hour in diffused light.

**Influenza Bacilli.** — According to Gotschlich,[2] droplets containing influenza bacilli will float for five hours. Very little has been done to demonstrate the existence of infected droplets in any other diseases.

p 298. Far more value and interest derive from the AIR NEAR THE SICK.

**Bacteria found in Air.** — Having shown that bacteria may float in the air on particles of dust and in droplets of liquid, we must next inquire whether pathogenic germs have actually been found in the air. Graham-Smith[3] examined the air of the House of Commons for pathogenic bacteria with negative results, as did Andrewes[4] and Gordon[5] the air in the streets of London. Little light is thrown on our present problem by these and similar negative tests of outdoor air or of air away from the vicinity of the sick. Far more interest and value attach to the examination of air in the vicinity of cases of infectious sickness.

p 302. That Flugge developed the idea that TB spread by droplets, rather than dust (TB bacteria spat out, that would dry out and float around on dust).

But this is interesting, because Flugge knew that this wasn't limited to 2m, but WOULD FILL A ROOM.

dust is not carried to the alveoli. He also developed the theory of droplet infection, which has been received with much

[1] Cornet, Verhandl. d. Berl. med. Gesellsch., 1899, XXX, 2 Th., 91.
[2] Kuss, Sixth Internat. Cong. on Tuberc., Wash., 1908, I, 101.
[3] Köhlisch, Ztschr. f. Hyg. u. Infectionskrankh., Leipz., 1908, LX, 508.
[4] Nenninger, Ztschr. f. Hyg. u. Infectionskrankh., Leipz., 1901, XXXVIII, 94.
[5] Flügge, Ztschr. f. Hyg. u. Infectionskrankh., Leipz., 1899, XXX, 107.



favor, and did much to break down the almost universal view that dust is the chief vehicle of infection in this disease.

p 305. There is then discussion of experiments where guinea pigs were not infected at distance of 1m from a coughing TB patient. (However, my recollection is Flugge found otherwise.)

So, two theories, dust vs droplet. But recall droplet means "stuff spat out and that floats"

**Lack of Agreement among Investigators.** — Thus it is seen that the school of Cornet claims that pulmonary tuberculosis is almost always caused by the passage of infected dust to the alveoli, and that infected droplets are of little moment; while Flügge and his pupils attempt to show that dust rarely reaches the alveoli but that the inhalation of droplets is the easiest method of causing the disease. The unprejudiced reader must conclude that infection in either way is possible, but the conditions of the experiments are so far removed from the natural that there must be much hesitation before assuming that this work indicates in any degree the common mode of infection in human beings.

Le Fin.

This was something I looked through while looking for something else (Chapin's droplets "makes sense" to him, quote)

And now you see why I say that every time I open a book I find more contradictory nonsense.