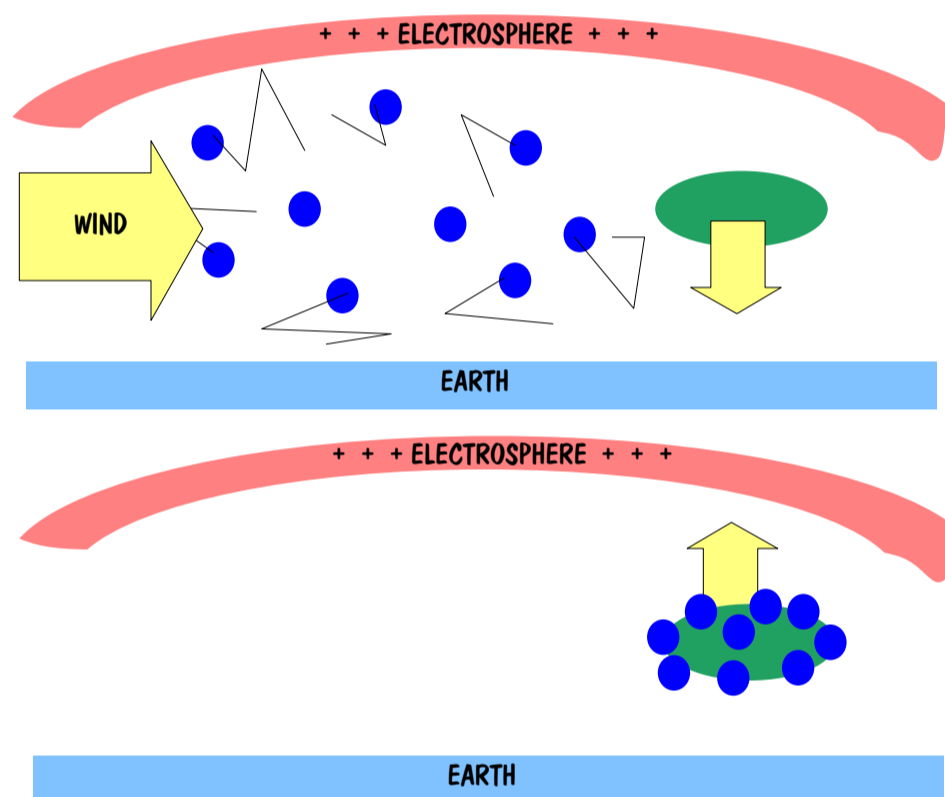


THE INFLUENCE OF ELECTRICAL CHARGES AND MAN-MADE POLLUTANTS ON AIRBORNE POLLEN AND SPORES

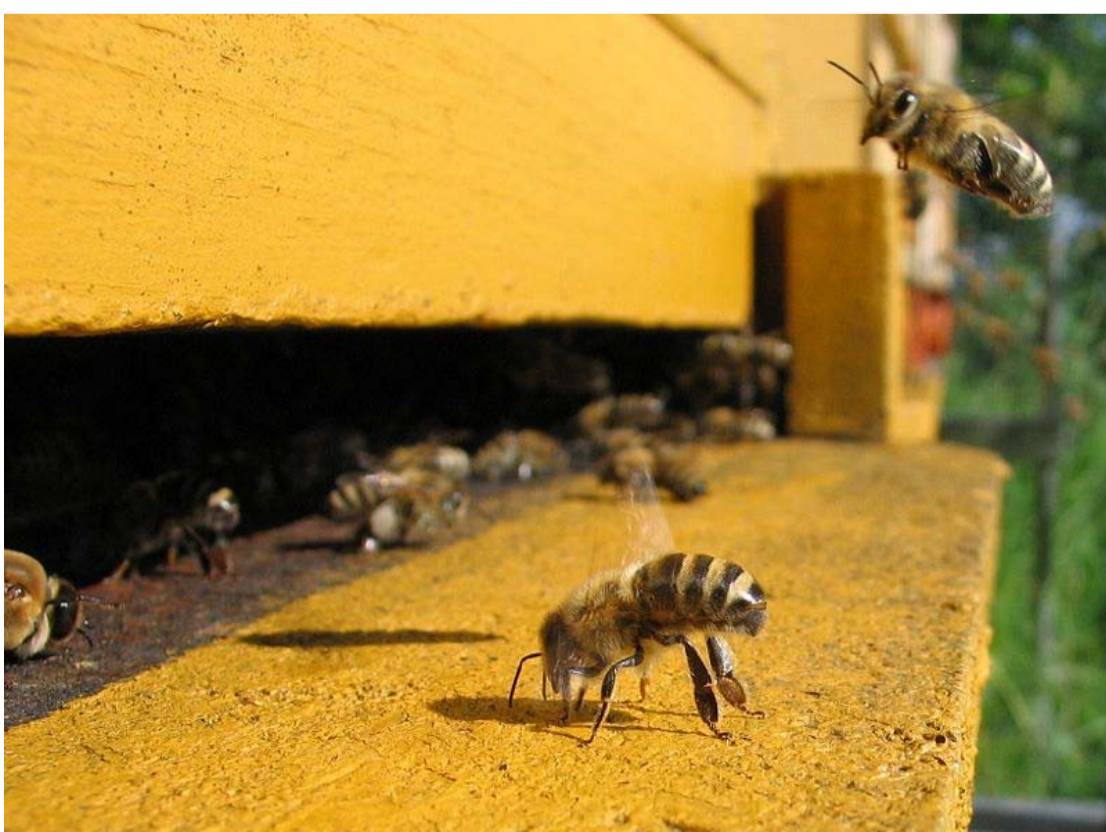
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Particle diameter (µm)	settling speed cm/s	settling height per minute (cm)	settling height per hour (m)	settling height per 24h (km)
6	0.196	11.7	7	0,168
10	0.305	18.3	11	0.263
20	1.21	72	43	1.036
40	4.82	289	173	4.164
60	10.3	618	370	8.899
100	24.8	1488	893	21.427

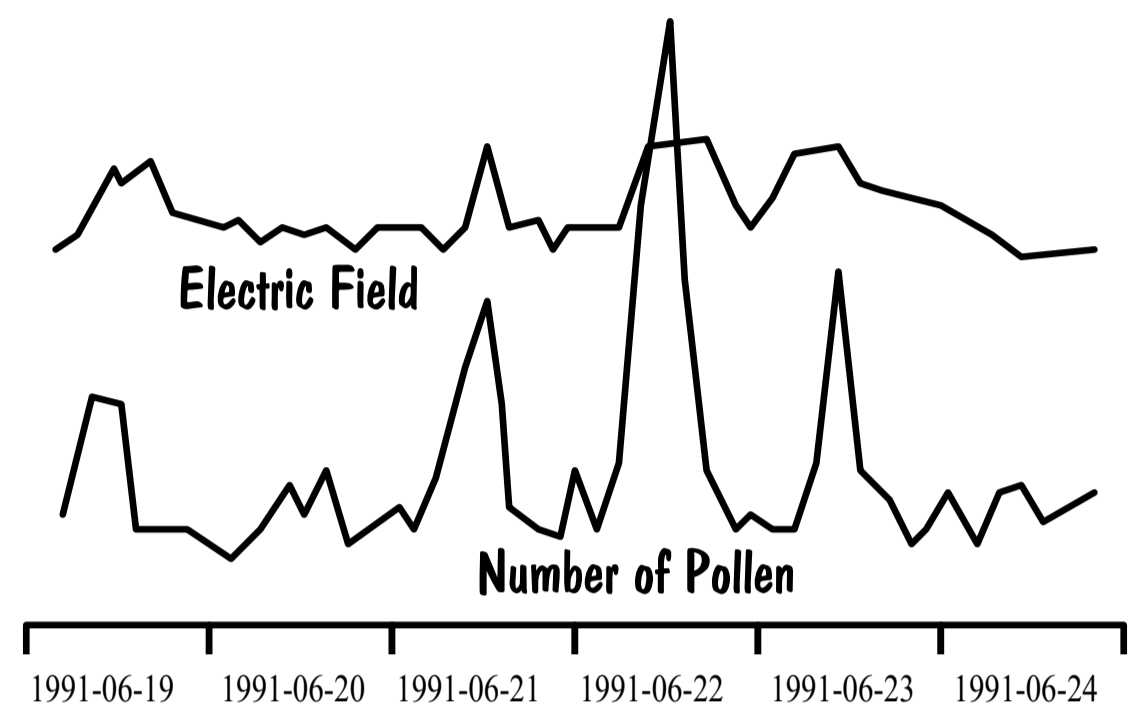
Observations made at the Atmospheric Aerosol Observatory at Nocé (France) in collaboration with the Institut Pasteur of Paris, showed that there is a clear interdependence between the number of pollen grains and the quantity of airborne particles. In fact, when there are lots of particles there are almost no pollen grain present. However, when there are many pollen grains then the charged airborne particles are absent and simultaneously there is also an important increase in the earth electric field which can be caused by the reduction in conductivity in the lower part of the atmosphere. The same mechanism causes fog to remain in the air. However pollen grains are far larger than fog droplets, so they need an extra mechanism to give them lift [1].



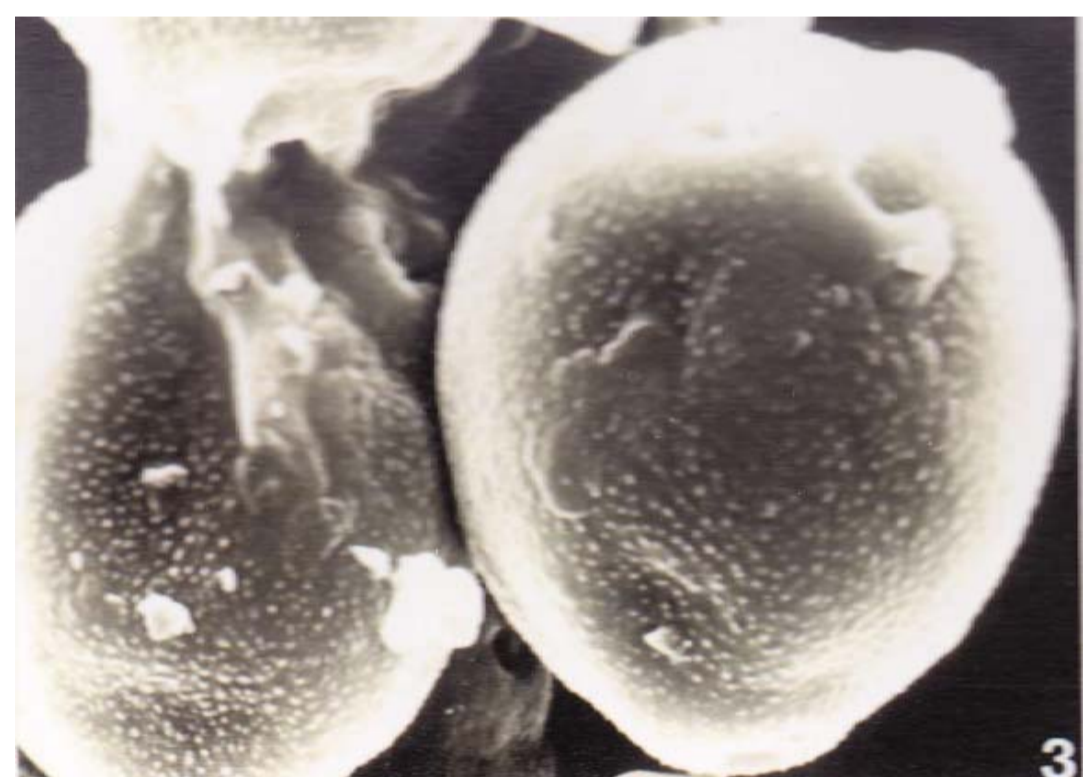
The behaviour of pollen when confronted with other particle has been studied by groups in France and Sweden. [2] This work has made it clear that the surface of the pollen becomes completely modified when transported through a high pollution region, and in such a way that one could consider the pollen as an effective indicator of the state of the atmosphere. Electron Probe Micro Analysis (EPMA) of the pollen surface show that the surface composition of pollen has completely changed through their capability to intercept fine airborne particles. But their interception capability is not only limited to ultra fine dust is shown the Figure where we see large silica particles in intimate contact with a *Betula Verrucosa* pollen grain. [3] All these observations underline the charged particle interception theory as principal **transport** but also **polluting** mechanism for pollen.



In order to reproduce plants produce pollen and spores, which are often transported through the air. The size of such particles differs between the various species of plants, ranging from 6 to 60 µm for spores and 10 to 100 µm for pollen grains. These sizes, however, mean that long distance dispersion of pollen and spores is quite unlikely, because gravity will interfere and cause them to fall back to the earth, as shown in the table for different particle sizes. assuming unit density.



Assumes that pollen, neutral and charged particles are present simultaneously. Then the fine airborne particles will continue to follow the flow lines of the air, while the pollen are falling slowly under the influence of gravitation. This is a situation almost identical to that of a filter, where the fibres are replaced by pollen as dust removers. The finer particles will be caught by the pollen through Brownian movement and interception. A part of these fine particles are emitted from the earth and carry a negative charge. However modern cars fitted with SOOT FILTERS are producing similar charged particles. When intercepted, they will provide the pollen with an extra negative charges resulting in an unexpected buoyancy caused by the positively charged electrostatic sphere which action is even enhanced in the presence of pollen as we saw before.



Colony collapse disorder (CCD) is a phenomenon in which worker bees from a beehive or European honey bee colony abruptly disappear. Beekeepers observed this in Belgium, France, the Netherlands, Greece, Italy, Portugal, and Spain, and initial reports have also come in from Switzerland and Germany, albeit to a lesser degree while the Northern Ireland Assembly receives reports of a decline more than 50%. Pesticides (e.g. neonicotinoids such as imidacloprid), have often be pointed out as a possible cause of CCD. However what about pollen charged with the hormone mimic PAH, which has similarities with DDT and could act as a surprise pesticide, that is killing or modify the behavior of our honey bee colonies.

[1] Roos, R. A. The Forgotten Pollution, Kluwer Academic Press, Dordrecht (1996). [2] Cerceau, M. T. et al. Pollen as bio-marker of air quality in the city of Mulhouse (1994) [3] Cerceau M.T. et al. Grana 30: 532-546 (1991)