



# Does Covid-19 ride air waves?

Scientists call on the World Health Organisation to raise the bar

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Two hundred and thirty nine scientists have called upon the World Health Organisation to include the airborne path as a transmission route of Sars-CoV-2, to serve as a basis for due measures to be taken, worldwide.

The "open letter" to the WHO is in the form of a "commentary", dated 6 July 2020 in the journal *Clinical Infectious Diseases* of the Infectious Diseases Society of America, by Lidia Morawska from the International Laboratory for Air Quality and Health, Queensland Institute of Technology, Australia, and Donald K Milton, from the University of Maryland School of Public Health, US.

The letter, which is endorsed by 239 scientists, opens with the words, "We appeal to the medical community and to the relevant national and international bodies to recognize the potential for airborne spread of Covid-19. There is significant potential for inhalation exposure to viruses in microscopic respiratory droplets (micro-droplets) at short to medium distances (up to several meters, or room scale), and we are advocating for the use of preventive measures to mitigate this route of airborne transmission."

WHO guidelines, to date, are limited to transmission through respiratory droplets. Many kinds of viral, bacterial or fungal infections spread through respiratory droplets. They are the liquid specks of saliva, mucus, sputum, which are expelled when a person coughs, sneezes or even speaks loudly. Such droplets could originate from different parts of the respiratory tract and could be laden with viruses and bacteria. They are typically more than five microns (thousandths of a millimetre) wide and if they reach sensitive areas, like the eyes, within the nose or the mouth of another person, they would



Lidia Morawska



Donald Milton

## Recommendations in the open letter

It is vital, now that states are reopening workplaces, schools and colleges, that there is awareness of the risk of airborne transmission. One important measure is effective ventilation – clean air or the least re-circulation. Simple steps like opening both doors and windows can dramatically increase air flow rates in many buildings.

Ventilation and AC engineers in the US and Europe, the letter says, have issued guidelines to control air quality. These need to be adapted to systems in India, so that getting back to work does not lead to further peaks of infection.

transfer the infection. Examples of viruses transmitted in this way are the flu, the common cold, infections of the bronchial or respiratory tract, disease of the intestines, even measles and chicken pox. And Covid-19 has been treated, by WHO, as one more.

Traditionally, it is nearly visible droplets, more than five microns wide, which have been studied and they are known to fall to the ground, or other surfaces, within a metre or two. The first precautions that WHO recommended, in respect of Sars-CoV-2 were hence that people keep a distance of two metres. And, as viruses deposited on surfaces can be viable for many hours, not to touch exposed surfaces, to wash one's hands and avoid touching one's face.

There had been studies that suggested that the virus was also spread by aerosols, or smaller droplets, which did not settle, but stayed airborne for minutes and hours. This is the way influenza or measles spreads. Those studies had come to the notice of the WHO and they did evaluate what had been reported. But WHO found no evidence of Covid-19 spread by aerosols and on 27 March 2020, they published a "scientific brief" called *Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations* (IPC stands for Infection Prevention and Control). The brief concluded that the spread by aerosols was limited to "specific circumstances and settings" which gave rise to aerosols, specifically, when dealing with patients, during procedures like working with the bronchi or tracheae of patients or during inserting and removing ventilator devices.

As for the studies that reported persistence of the virus, WHO observed that they were with artificially generated aerosols in a laboratory setting and did not represent normal conditions of human aerosol generation. "In analysis of 75,465 Covid-19 cases in China, airborne transmission was not reported," the report said. Strangely, the report stresses that there are "settings with symptomatic Covid-19 patients in which no Covid-19 RNA was detected in air samples." And where traces of RNA have been detected, it is not clear that there were viable viruses.

The evidence of airborne transmission, however, has continued to be found and on 27 May 2020, the journal *Science* carried an article (reported in these columns on 3 June 2020) citing recent studies, includ-

ing one where Lidia Morawska, an author of the appeal to the WHO, with G Buonanno and L Stabile, from the department of civil and mechanical engineering, University of Cassino and Southern Lazio, Italy, had quantified the viral load emitted by infected persons under controlled conditions. The results of the study, which disposes of the WHO remark that lab studies did not reflect real life, surprisingly showed that an asymptomatic person could reach high virus emission levels while vocalising, in the course of just slowly walking.

This is in keeping with other studies cited by *Science*, which showed that asymptomatic persons were "highly contagious for several days, peaking on or before symptoms occur, and could be critical drivers of the spread of Sars-CoV-2. The paper in *Science* hence drew attention to this unseen, airborne presence of the virus, and, with more instances of high airborne emission, and the record of the best results in places where universal masking was ordered, recommended the use of masks, certainly in enclosed spaces.

In the meantime, despite extended lockdown in all parts of the world, and despite restrictions when services are resumed, there is no sign of the pandemic abating. The appeal of the group of scientists is hence that governments and communities recognise that there are more ways than direct contact and close approach to spread the infection. The appeal refers to 17 authoritative studies, with established results, and some as recent as May and June, to assert that "several retrospective studies conducted after the Sars-CoV-1 epidemic demonstrated that airborne transmission was the most likely mechanism explaining the spatial pattern of infections... retrospective studies have shown the same for Sars-CoV-2."

The appeal cites an instance of three independent families who dined at a restaurant. Members of two of the families were found to have been infected, from a suspected source in the restaurant. Simulation of the movement of the air in the restaurant demonstrated that the infection instances were in keeping with the air having transferred aerosols exhaled by the source to the persons infected, but not to the family which was not. "Airborne transmission appears to be the only plausible explanation," of this and other instances, the appeal says.

It grants that the "evidence" of transmission by aerosols is not complete, but this is the same with droplets and fomites. The WHO guidelines warn against droplets and fomites, but why not the pathway of airborne transmission? "In our collective assessment there is more than enough supporting evidence... in order to control the pandemic, pending the availability of a vaccine, all routes of transmission must be interrupted," the appeal says. It is therefore important, the appeal says, that the airborne route of the infection be officially recognised.

Communities follow government instructions and governments need authorities like the WHO, before they commit themselves. WHO, in reaction to the letter from the scientists, has granted "the possibility of airborne infection," but not more. There would be procedures the organisation needs to follow before they act to make the declaration. This, however, should not deter the community from paying heed, in its own best interest.

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PLUS POINTS

### Alien germs



Nasa has asked the Seti Institute to ensure alien life does not contaminate Earth.

The Seti, or Search for Extra-terrestrial Intelligence, Institute is primarily focused on discovering life elsewhere in the universe. But the new contract asks it to ensure that it is not spread anywhere else – tasking it with avoiding the contamination of Earth or other planets during space missions.

As well as working with Nasa to provide training, develop guidelines, and help promote information to the public about its endeavours, the Seti Institute will "validate (the) biological cleanliness on flight projects" to ensure that any biological contamination from missions to other bodies does not negatively affect Earth.

The contract covers numerous space exploration missions including the Mars 2020 and Europa Clipper missions, and preparations for Nasa's Mars Sample Return mission. The Mars missions include plans to fly a helicopter on the Red Planet to prove that powered-flight would be possible on another world.

The Europa Clipper mission, meanwhile, is the attempt to send probes to a moon of Jupiter. The project is expected to launch sometime this decade, and would aim to understand whether Europa would be able to support biological life. The moon has a sub-surface ocean and could generate heat from its core, both conditions that would encourage life to flourish.

The contract also covers future human spaceflight under Nasa's Artemis programme, which intends to send the first woman to the Moon by 2024, as well as programmes for a lunar outpost.

"As we return to the Moon, look for evidence of past or present life on Mars and continue our missions of exploration and discovery in the solar system, planetary protection becomes an increasingly important component of mission planning and execution," said Bill Diamond, president and chief executive officer of the Seti Institute, in a statement, "We are proud to be Nasa's partner for this mission-critical function, protecting Earth from backward contamination, and helping ensure that the life we may find on other worlds, didn't come from our own."

The issue of foreign contaminants is a serious one. Last year, it was reported that a mistake made during the Apollo 11 lunar landing could have resulted in lunar germs being transported from the Moon back to Earth.

We have also been responsible for contaminating other bodies, bringing life to the Moon when an Israeli spacecraft crashed and spilled tardigrades onto the surface of the satellite. Tardigrades are microscopic animals which can survive extreme conditions including extreme temperatures, extreme pressures (both high and low), air deprivation, radiation, dehydration, and starvation.

"Implementing effective and consistent planetary protection standards is more important than ever, as we increasingly venture into space, not only on missions governed by space agencies, but with projects run in conjunction with, and even wholly by, the commercial sector," Nasa says.

-The independent

# All in the name

There is no dearth of Greek mythonyms in the zoological lexicon



Aphrodita

SANJUKTA DAS & CHINGLEMA CHINGTHAM

Mythonyms are terms juxtaposed with mythology – in a broader sense, they are words or phrases related to mythological characters or incidents. Greek mythonyms are known to be in great use in the biological sciences including zoology. The word "zoology" itself has its derivation from Greek – "zoon" meaning animals and "logia" meaning study of. In the zoological lexicon, there is no dearth of Greek mythonyms that have played a meaningful role in the etymology of terms. Therefore, knowing the mythological basis to zoological terms makes the teaching and learning process more interesting and convenient.

APHRODITE

In zoology, aphrodita is the generic name of a marine annelid commonly known as a sea mouse and it is mainly found in the Atlantic Ocean and Mediterranean Sea. Its appearance and behaviour are sug-

gestive of a true mouse! Its zoological name is derived from Aphrodite, the Greek goddess of love, beauty and fertility. Greek stories relate that she was born from sea foam and foam in Greek is known as "aphros".

ATLAS

In vertebrates, it is the first cervical vertebra in the vertebral column of creatures from amphibians to mammals. It bears the skull which remains firmly attached to it and the rest of the vertebral column remains upright behind it.

In Greek mythology, Atlas was a Titan who fought for the resurrection of the Titans against Zeus. But he was defeated and condemned to hold the sky for eternity.

HERCULES



They are some of the largest beetles alive today and dwell in the rainforests of Central and South America. They are named after the mythic Hercules who was known to be the strongest of the Greek heroes.

HIPPOCAMPUS



In zoology, hippocampus is a genus of fish commonly known as sea horse because its head is horse-like. The name of this fish is derived from a Greek mythological creature called "hippocamp" meaning sea monster whose upper body was like a horse and lower body was like a fish. Hippocampus is also a part of the human brain under the cerebral cortex.

HYDRA

It is the name of an animal

belonging to the cnidarians group that is diploblastic being made up of two germ layers. It has a cylindrical body with a ring of tentacles surrounding the mouth. It has radial symmetry and leads a sedentary life. This is a generic name for the freshwater polyp since 1798.

In Greek mythology it is also called Lernean hydra and it was a gigantic water-snake-like monster with nine heads, one of which was immortal. When one head was cut off, it used to generate two heads from the wound site. It was slain by Hercules. Hydra has been named so for its high regeneration ability.

IRIS

It is an essential component of the eye in vertebrates and its function is to regulate the amount of light passing inside. This term has its derivation from the Greek goddess of the rainbow. Eye colour and more specifically, the colour of the iris varies as a conspicuous characteristic encompassing every colour of the rainbow.

MEDUSA

It represents a free swimming sexual stage in the life cycle of cnidarians. It is saucer-shaped and bears tentacles along its margin with a centrally placed mouth. It is named so as it resembles the mythological Greek winged female monster Medusa who had offended the goddess Athena. The latter changed her hair into snakes and made her face so hideous that it turned onlookers to stone.

NYMPH

The term nymph refers to a

young insect with incomplete metamorphosis. In Greek mythology, they were minor divinities represented as beautiful maidens inhabiting and representing a feature of nature.

SIRENIANS



They are a group of marine mammals that include manatee and dugong. In Greek mythology, a siren was a sea-nymph, depicted as a creature with the head and body of a woman and the tail of a fish.

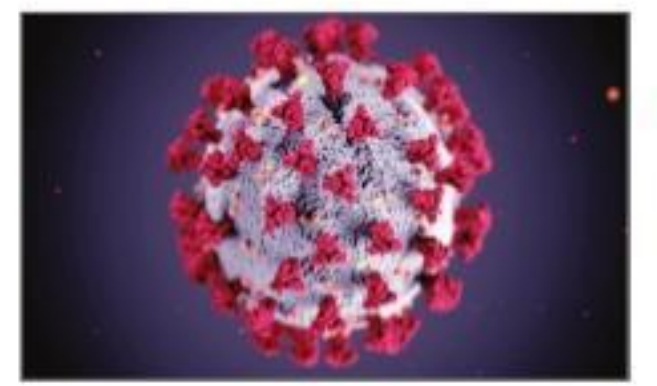
SYRINX

It is characteristically present in birds and is the voice box at the base of the wind pipe trachea. It is best developed in song birds. In Greek mythology, it means pipe or pipe-like object. In 1872, it was named syrinx after a Greek mountain nymph of Arcadia who was transformed into panpipes.

No doubt, mythonyms bring novelty to the scientific language and make the comprehension of a complex concept easier. As E Cassirer, the German, philosopher, rightly said, "The myth revives and enriches itself due to language, and language revives and enriches itself due to myth".

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### Symptoms confirmed



A persistent cough and fever have been confirmed as the most prevalent symptoms associated with Covid-19, according to a major international review of patient data. Other major symptoms include fatigue, losing the ability to smell and difficulty in breathing. The study ratifies the list of symptoms compiled by the World Health Organisation at the start of the pandemic.

A team of researchers combined data from 148 separate studies to identify the common symptoms experienced by more than 24,000 patients from nine countries including the UK, China and the US. The study, published in the online journal *PLoS One*, is one of the biggest reviews, or meta analysis, ever conducted into Covid-19 symptoms.

The study involved academics from the University of Leeds with colleagues from the University of Sheffield, University of Bristol, Imperial College, London, and the Belgium Cancer Centre. The researchers acknowledged, however, that there are people who had the virus but did not display any symptoms.

