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## Ozone: A powerful weapon to combat COVID-19 outbreak

By Zhou Muzhi

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**Editor's note: In the following article, Zhou Muzhi, professor of Tokyo Keizai University and president of Cloud River Urban Research Institute, expounds his views on three questions: Will the epidemic disappear suddenly? Who is behind the "God's Hand"? What is able to prevent cross infection of the novel coronavirus?**



Passengers get off an airplane at Qingdao Liuting International Airport in Qingdao, east China's Shandong Province, Feb. 25, 2020. [Photo/Xinhua]

### 1. The earth's protective shield

Since the recent outbreak of the novel coronavirus disease (COVID-19), I have been discussing with Zhang Yue, president of BROAD Group, on how to use ozone for sanitation purpose. Zhang is among one of the first advocates for ozone's application, but has failed to draw much attention. I also notice people's caution against or even ignorance of the ozone use from my discussion with atmospheric scientists as well as based on related research studies. Therefore, it is necessary to take a closer look at the ozone gas in order to reduce misunderstanding and even possibly promote ozone use in combating the current coronavirus outbreak.

The troposphere is the lowest layer of our atmosphere, which starts from ground level all the way extending upward to about 10 kilometers. The temperature generally decreases with the altitude. The next layer up is called the stratosphere, which extends from the top of the troposphere to about 50 kilometers above the ground, with the temperature increasening all the way up. The "infamous" ozone layer is found within the stratosphere, with a concentration of 10 to 20 ppm (parts per million). By absorbing the high-energy ultraviolet (UV) light from the Sun, the ozone layer acts as a shield for some UV damage to the cellular DNA, thus protecting the life on earth.

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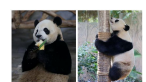
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The time when the ozone layer reaches the current concentration almost coincides with the time when life on earth evolves from the ocean to the land. In other words, the higher level in ozone concentration may play an important role in the colonization of life on land, as a thin ozone layer could only allow for life to exist in the ocean. To put it simply, life or organisms, which formerly only existed in the ocean to shield from the harmful UV radiation, were able to migrate on shore thanks to a higher level of ozone concentration.

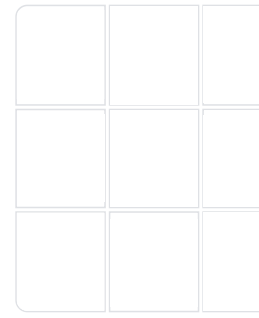
It is fair to say that no life can be found on the earth without the protection of the ozone layer.

The use of man-made chemicals in industrial development such as chlorofluorocarbons (CFCs) and other volatile organic compounds (VOC) is now causing extensive ozone dissociation that could weaken the human's immune system and increase the risk of skin cancer and cataract. Thus, more attention has been given to the ozone depletion, as some even see it as a major global environmental concern no less than global warming and call for stronger protection for its proper functioning.

Ozone is a gas made up of three oxygen atoms (O3). It is created primarily by ultraviolet radiation. When high-energy ultraviolet rays strike ordinary oxygen molecules (O2), they split the molecule into two single oxygen atoms, known as atomic oxygen. A freed oxygen atom then combines with another oxygen molecule to form a molecule of ozone. As an allotrope of oxygen, the pale blue gas has a distinctively pungent smell. The word ozone comes from the Greek word OZEIN, meaning "to smell."

High levels of ozone concentration can filter harmless UV radiation, thus acting as a shield to protect the life on the earth.

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