

Why Choose Ozone?

by Fred Bauer
Redway, California

When it comes to pathogenic microorganisms affecting aviculture there are three groups:

- Those bird keepers who have experienced the problem.
- Those who will soon experience the problem.
- Those who are not honest about the subject.

The concern, and often fear, that is generated by these health problems is greatly increased because we cannot see these pesky little troublemakers. You cannot swat them with a fly swatter nor capture them in a trap and discard them. They are like the thief-in-the-night that causes your imagination to struggle to create an image of them and a way to deal with them. This indirect relationship often brings about indirect solutions. We just want to get rid of them no matter what it takes, which usually means to *kill them!* Ironically, making war on unseen microorganisms usually creates invisible effects that can be worse than the microbes themselves.

Safe Chemicals?

How many times in your life have you been told that the use of some chemical product was "safe," only to be told later that it is dangerous after all? You might have lost count. The fact is that almost all lethal agents are dangerous.

Perhaps if such a tool could be used with surgical precision, the gain would be greater than the loss. However, spraying one's environment with toxic chemicals (disinfectants) or dosing one's bird with them (antibiotics) is scarcely surgically precise. What's more, the repeated application of these substances compounds the loss. It is undeniable that no matter how many times you rinse the treated items and areas, no matter how hard you scrub the treated surfaces, and no matter how much probiotic you give your bird, the effect of toxic chemicals is cumulative.

It becomes a matter of "beginners

luck." The longer and harder you try to kill microbes with these poisons, the worse your problems become. The most common disinfectant recommended by avian veterinarians is bleach. Besides being toxic, caustic, highly corrosive, and not really very effective against some common pathogens, the potential for bleach to combine with certain organic substances to form "trihalomethanes" makes bleach extremely dangerous. Trihalomethanes are one of the most carcinogenic compounds known to man. Also remember, Chlorine gas was the poison gas of World War I. Ozone gas, on the other hand, has over 100 times the oxidizing power of bleach with *none* of the hazards.

Some years ago I was impressed with a study done by a Minnesota hospital which was experiencing an ongoing problem. More and more patients were becoming ill from microbes that they did not have before entering the hospital. Their investigation showed that not only were the increasing amounts and types of disinfectants that they were using unable to reduce the numbers of microbes, the microbes were becoming resistant to these chemicals and the antibiotics used against them. By reverting to their practice of 30 years ago of sanitizing with soap, water, and elbow grease, they dramatically reversed the trend.

This became our model at the China Prairie Breeding Facility, and led to the complete elimination of toxic disinfectants and antibiotics. This practice, combined with our sprouted diet, meant we rarely saw a problem with pathogenic microbes.

Consider that parrots in the wild drink from contaminated puddles, do not eat sterile, processed foods, and do not receive antibiotic treatment. Why is it that generally they look and behave better than they do under our care? Clearly they possess an inherent ability to deal with pathogens; and that inherent ability is an adequate immune response. Anything we do to compro-

mise this ability leads to disease and I firmly believe that chemical toxins are a leading cause of compromised immune systems in captive birds.

What to Do?

So what do you do when the microbes get the upper hand? First you evaluate all the possible causes for the imbalance. Then you go after the critters. Fortunately we have viable tools at hand to dispatch the invaders safely, and start over with a clean slate. Ozone gas is one of them. Before we look at the effectiveness of ozone, let's look at how ozone is made and at the consequence of using ozone to kill microbes.

Simply put, an ozone generator breaks apart the two oxygen atoms of an oxygen molecule (O₂) into separate O₁ atoms. These individual atoms immediately recombine with other O₂ molecules to form ozone (O₃), thus greatly increasing its oxidizing power. Microorganisms that evolved in an O₂ environment can not withstand this oxidizing action. Now here comes the best part: ten minutes after the generator is turned off, *all* of the very unstable ozone reverts to pure oxygen as the extra oxygen atoms seek out partners. There is *no* residue left behind. You can use ozone (properly) as often as is needed without any cumulative effect.

(insert graphic)

One could call ozone natural as it is produced in nature by the sun and by every lightning discharge. Do not confuse this ozone with the ozone in city air pollution that is complexed with compounds of nitrogen and other toxic substances. Man-made ozone must be produced with a generator capable of clean output. Man replicates natural ozone by two methods: (1) Ultraviolet Ozone Generators (replicates the sun) and (2) Corona Discharge Ozone Generators (replicates lightning).

Ultraviolet (UV) Ozone Generators

Ultraviolet (UV) Ozone Generators produce ozone by exposing a flow of ambient air to an ultraviolet lamp of 185-nanometer wavelength that disas-



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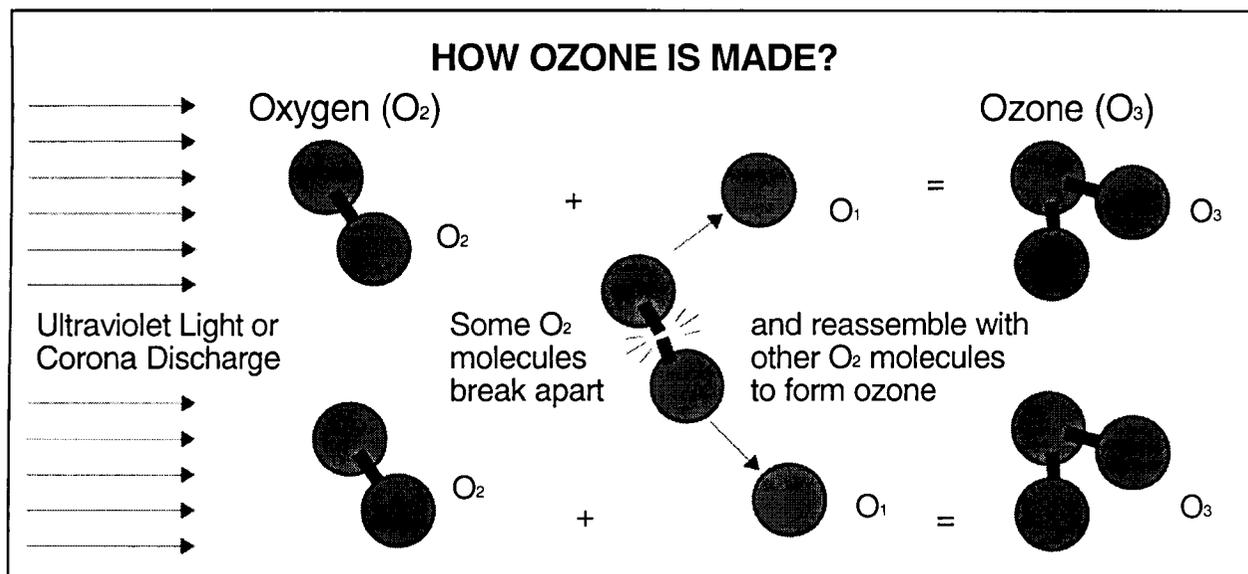
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sociates oxygen atoms as described above. UV generators are relatively inexpensive and simple but they are limited in the ability to produce high concentrations of ozone. However, for most avicultural needs, a quality UV generator with an output of at least .01 grams per hour, is capable of disinfecting incubators, hatchers, brooders, nest boxes, and rooms up to 300 sq. ft. Since UV generators produce little heat, they are completely incapable of producing unwanted nitrogen by-products, a built-in safety factor of sorts.

Do not confuse UV ozone generators with UV disinfection lamps. The latter kill microbes with direct UV light exposure. Microbes easily escape exposure by being on the dark side of a dust particle or the tiniest air bubble in the case of water treatment. It is impossible to expose the nooks and crannies of electronics, fans, carpeting, drapery and other fabric to direct UV light. One should not, of course, use any type of liquid disinfectant there either. Ozone gas, on the other hand, penetrates all of these areas.

Corona Discharge (CD) Ozone Generators

Corona Discharge (CD) Ozone Generators produce ozone by passing dried air through a high-energy electrical field. These units require an air drier to avoid formation of harmful nitrogen compounds, but are capable of output concentrations more than ten times that of UV units. Even though CD units must

be fan cooled, their output of ozone per watt of input is more than double that of UV units making CD the choice where high concentrations are required as in water disinfection or treating large areas (over 2500 cu. ft.).

Advantages of Using Ozone

When we first became interested in the advantages of using ozone, we wanted to know just how effective it was against problematic pathogens in aviculture. We took an Alpha-Genesis incubator to a microbiology lab and had them place cultures of E.coli, Klebsiella, Pseudomonas, Pasteurella, Salmonella, Shigella, Enterobacter, Streptococcus, Aspergillus, and Candida inside the unit. A China Prairie UV ozone generator with .01 grams/hr. output was attached to the incubator via a PVC feed tube and a hood over the incubator's air intake. The air exit port was set to the smallest setting thus creating a slight pressure inside from the action of the generator's pump. After 20 minutes of running the generator, all organisms were killed. Other tests have shown that ozone is effective against a wide range of bacterial, fungal, and viral organisms.

We recommend that the disinfection run-time for small enclosures be 30 minutes. If the incubator has eggs in it, do not remove them, as the air exchange rate through the shells does not allow any ozone to penetrate. The surface of the eggs gets disinfected too. And remember that since the ozone is

reverting to oxygen very rapidly, it is safe to leave birds in the room while the enclosure treatment is going on. Because the differential is so great between ozone escaping the incubator and ambient air in the average size room, ozone concentrations will be far below the danger level. Of course, this should not be done in a very small room and birds should not be left in hatchers or brooders that are being treated. Also, be sure to remove birds when the entire room is being treated.

Ozone is capable of safely disinfecting materials that cannot be sterilized any other way. Some aviculturists appreciate this feature for sterilizing delicate items such as thermometers, hygrometers, and even toys that cannot be soaked in disinfectant solutions. Keep in mind, however, that it is difficult for ozone to get to the core and underside of carpeting. Older, contaminated carpeting is best discarded. By dividing rooms with plastic sheeting, higher ozone concentrations can be achieved with smaller generators. Longer run-times can also increase concentrations.

How Safe is Ozone?

How safe is ozone? Even at levels as high as .02 PPM (detectable ozone odor), ozone poses no danger to health. Some believe it is even beneficial at these levels. But our recommendation is as follows: Use ozone (or any other antimicrobial agent) as the temporary solution to a problem while

awaiting the permanent solution. Ozone in *high* concentrations can be quite harmful, so do not leave an ozone generator unattended unless it has a timer. Since it is impossible for the user to know what the level of the O₃ concentration is at any particular time, we do not recommend that either birds or humans be present in a room where ozone is being generated directly into the room atmosphere at levels high enough for disinfection. It is, however, not dangerous to enter that room briefly if need be.

The powerful oxidizing action of ozone gas can damage some materials like some cheap plastic sheeting and latex rubber. We have found that most materials we use in aviculture are resistant to ozone. The exposure times are so short that no perceptible degradation occurs even after years of use. Alpha-Genesis incubators are made from materials that are highly ozone resistant.

Many Uses For Ozone

Not only does ozone control pathogens better and safer than the alternatives; it has other important ben-

eficial uses. Its oxidizing action neutralizes many chemical compounds. It can remove and destroy the residues in your bird rooms left from the use of toxic chemicals. This same action creates a powerful deodorizing effect. For example, it does wonders for the "fragrance" of an older car interior. Treating a refrigerator with ozone will greatly extend food freshness. Used in water systems, ozone precipitates metals from the water that can then be removed by filtration. You will find many applications and wonder how you lived without an ozone generator. Remember also that ozone generators require no replacement filters or chemicals and the UV lamps run for over 8000 hours. Just plug it in and use it.

If you make a lot of sprouts for your birds, ozone is the way to go. Simply place the generators output tube, with a bubbler stone on it, into the soak water and run for one hour. Then repeat each day of germination with the rinse water (or just in the sprouting container without any water in the case of the Avian FRESH Diet system). You will have no

microbial problems and no cumulative disinfecting residue.

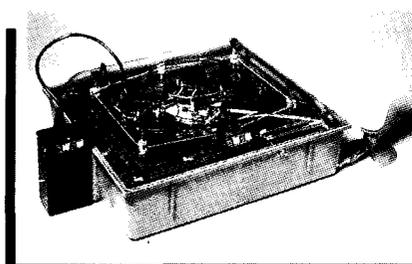
Factors to Consider When Choosing

Here are some factors to consider when choosing an ozone generator. Make sure it can produce at least .01 grams of ozone per hour. Determine the largest area you want to treat and size your unit accordingly. Does it have a flexible tube outlet? This allows you to attach it to your incubator, hatcher, brooder, or nest box as well as running it free in a room. Is it completely made of non-corrosive and ozone resistant materials? Does it have a built-in pump to force the ozone where you want it to go? Fans can not force the ozone through a tube. Does it have a timer?

I predict that an ozone generator will soon be standard equipment for all serious aviculturists. Ozone gas is the only way to eliminate unwanted microbes without leaving some form of residue behind.

For more information online:

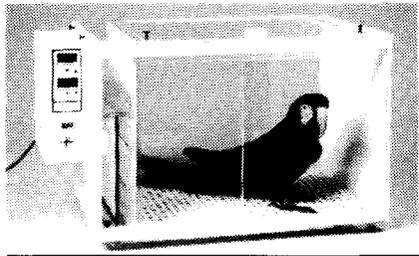
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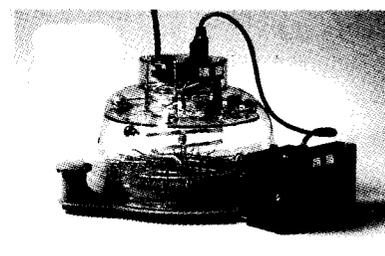
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