Preventative Health Care for Aviculture

disinfection and sanitation

by Robert Clipsham, D.V.M.
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The topics of sanitation and disinfection tend to be rather unstimulating subjects which are rarely brought up in conversation among aviculturists. They are the ugly twins generally left in the back closet and only brought out during problem times when attention is severely in need and more frequently done behind closed doors.

Recently, I have taken to addressing a few points about specific antiseptics and disinfectants in my presentations to various avicultural groups and the resulting response has been very strong. What has resulted is a much clearer understanding of the difference in the relative knowledge of common cleaning chemicals between veterinarians and aviculturists.

First, disinfectants and detergents and their limitations and chemical abilities are poorly understood by the average aviculturists. No single disinfectant can do every task as some people will mistakenly expect them to do.

Second, veterinarians tend to overlook the fact that a great volume of knowledge about these products requires eight years of college and decades of practice to imprint, and their explanation is both important and time consuming.

Last, I believe that retroactive "fire fighting" is a counterproductive use of time and money. Preventative disinfection programs are, *in the final account,* less expensive.

What I have attempted to achieve here is a rather thorough presentation of a tremendous amount of *very practical* information that can be used by the average aviculturist to the benefit of his or herself and their birds.

This article is designed to be a guideline for disease prevention and disease erradication purposes. Some of the categories presented may sound trifling or like some laboratory gibberish, but the following actual client case may reveal the practical importance of these details.

Case: Papova outbreak in large psittacine aviary in 1986 with macaw baby deaths in southern California; "I have had Papova virus diagnosed in the deaths of four baby blue and gold macaws by a lab. What can I use on the sand floors as an effective virus killer to stop the spread of Papova?"

Herein lies the real question:

1. What chemicals can quickly and effectively neutralize viruses, in particular, Papova virus?
2. What chemicals will not be rendered useless by the presence of dirt (organic debris)?
3. What chemicals are safe around birds, water dishes, and food cups?

Answer: Gluteraldehyde compound
Trade Name: Wavicide-01 or
Wavicide-06 Spray

The previous suggestions offered to this aviculturist (concrete the floors of all the aviaries, move all of the stock to a new area, pull all the nest boxes and throw out all the eggs) are not practical within the economic capacity for most aviculturists or designed to allow for the survival of most back yard breeders in a high overhead industry.

In my efforts to establish the best avian health care program possible, efficiency and cost effectiveness have been a top priority for myself and my clients. Drug use has been a valuable and necessary aid in this effort, but the employment of these pharmaceuticals has become increasingly more difficult and has, at times, exceeded the cost of depopulation and replacement of a flock. This situation is highly stressful for all involved including the veterinarian, client and birds. In the process of obtaining and employing more sophisticated drugs for avicultural disease problems, I have witnessed the loss of many valuable drugs, particularly antibiotics, on a rapidly increasing scale. Money does not solve all health problems.

Therefore, a great re-evaluation of our traditional approach to disease must be undertaken. For instance, the habit of addressing only those conditions which have produced an avian health crisis when it raises its ugly head. This process must be altered if we are to continue to have the progressive success which avicultural survival demands as it enters a new century. Overdependency upon chemical therapy has led to this crisis and the chain of events leading up to this point out the loss in dollars, time and breeding stock. I believe a re-evaluation of management is due, particularly in light of the dwindling supply of wild caught replacement stock that must be realistically addressed by aviculture.

This long term solution has taken over ten years to become so blatantly obvious to myself and the age-old axiom of "cleanliness is next to Godliness" has taken on new meaning when I have witnessed that sanitation truly leads to a bounty of new babies, improved reproductive success and a greater source of new genetic stock for domestic breeders.

Two observations substantiate these statements. The monitoring of bacterial cultures is essential for the accurate use of prescription drugs, but some major trends are being recorded over the past decade. Antibiotics that have served as the mainstay of avicultural medicine are gradually losing their effectiveness with each passing year. The time-favored choices of tetracyclines, ampicillin, sulfas and nitrofurans can no longer do what we expect of them. This is also becoming evident when our heavy guns, the aminoglycoside group which includes gentomycin, kananycin and amikacin, have all experienced a statistical reduction in their impact on bacterial infections.

The other observation that forces us to choose a more efficient means of health control is intimately tied to the first. With the oncoming (guaranteed, not theoretical) reduction of new breeding stock entering this country via import, it is vital to recognize that any loss of breeding adults or babies each new year will have a significant impact on the quality of breeding programs years later. The occasional loss of a potential or proven breeder should no longer be accepted as being stan-

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dard. Progressive medicine and technology have proven that conscientious husbandry, management, and common sense will provide for greater success at a reduced cost in the long term.

The bottom line is that no amount of money can serve as a replacement for good health, new stock, or common sense. There are just too many *potential* diseases available to monitor and treat them all.

The simple alternative is to return to the fundamental principles of husbandry that originated with the advent of captive animal keeping 8,000 years ago. These principles, combined with modern technology, are the best answers to a majority of the health concerns identified today through epidemiology.

The reasoning behind this proposal is that most infections are not just the presence of a microorganism merely being around birds. Our aviary culture surveys reveal that a plethora of potentially dangerous infectious sources are in most aviaries in water faucets, feed cups, water bowls, and flight floors. Bird diseases are generally the result of a microorganism *coupled with* a deficient or compromised immune system. If this were not true, virtually all of our birds would be sick most of the time and this is certainly not the case. Microbes, combined with sufficient stress on a bird's immune system, do present quite a serious concern. These stresses can appear in the form of poor diets, inclement weather, overcrowding, or a poor state of cleanliness. Since many of these insidious stresses are unpredictable and uncontrollable, it is obvious that what limited control we can exert as aviculturists is very important. The implementation of a *routine* sanitary and disinfection program is one of the few constant controls we may employ. A haphazard or intermittent program will eventually lead to the same results as no program at all, as infectious diseases take no days off. As our diagnostic lab tests improve, the list of new pathogens will continue to increase, not decrease, leading to greater concerns about previously unconsidered microbes.

The Mechanics of a Sanitation Program

Sanitation is defined as "the measures required to promote health and prevent disease through the removal of dirt and pathogens." This is best accomplished through the removal of grime, feces, food and other organic debris. Such layers protect microorgan-

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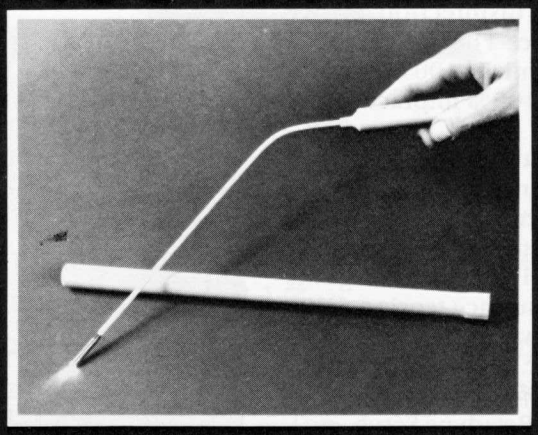

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isms from natural destruction and also provide a source of nutrition for bacteria, fungus, etc.

The most critical aviary surfaces are floors, wire, feeding bowls, perches, and nest boxes. The two ultimate methods of pure disinfection are live steam and flame. These have been proven to be essentially 100% effective but also usually 100% impractical for aviaries in use.

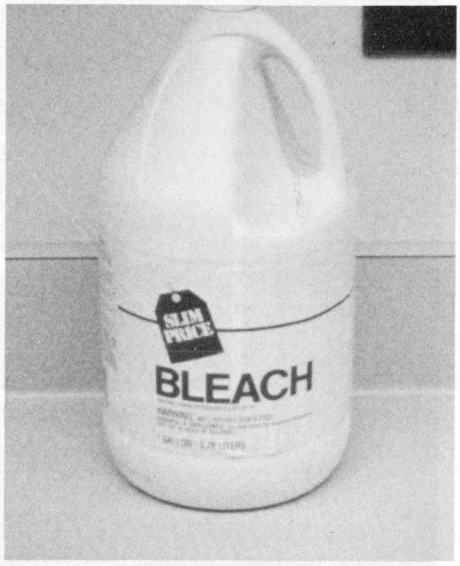
A better alternative involves the use of chemical agents and mechanical scrubbing coupled with high pressure water streams, especially warm or hot water. The addition of detergents which decrease surface tension to the penetration of water also make this task much easier. Disinfectant detergents are sold for just this purpose (i.e., Nolvason Scrub, Betadyne Scrub, etc.). Disinfectants and detergents have limitations both as separate classes and in combined form, depending on the chemical formula used.

The practice of sanitation is universally accepted in theory by everyone, and employed about as faithfully as auto maintenance and bathtub cleaning. Some variation in practice does exist. Since this endeavor requires the consistent effort of wire cleaning, crock changing and floor hosing, one must search for a way to make this as routine *and* easy as possible. My own personal experience shows that the easier a task is, the more likely I am to repeat it, given a busy schedule and too few hours in a day. I think this idea, incorporated into the original aviary design or future reconstruction projects, will make both your lifestyle and your birds happier.

This program decreases the risk of disease spread or recurrence, as microorganisms are spread by wind, wing flapping, and direct fecal contamination from flight to flight. Since the detection of each yeast, bacterial or viral disease is both time consuming and expensive, it makes more sense to stop it before it can get started. This is especially true when veterinarian researchers are discovering more infectious agents, especially viruses, every year that we are not even aware of today.

Detergents and Soaps

This group includes anionic (negatively charged) soaps and synthetic cationic (positively charged) detergents. The compounds are designed to lift away dirt from surfaces by reducing the natural surface tensions of organic debris which repels water. These chemicals allow the water to more effectively mix with grime to allow it to be mechanically flushed away. Regular household dish soaps do this quite well. Ingestion may cause stomach upset and/or diarrhea.



Photos by Robert Clipsham, D.V.M.

Common household bleach is an excellent, cost effective disinfectant under the proper conditions.

Betadine, the best known brand name of the tamed iodophor group.

Chlorine Compounds: Many commercial forms of chlorine are available such as Clorox, Purex, etc. This chemical will kill virtually all microorganisms except *Mycobacterium* (the T.B. organism) and spores.

Advantages: a powerful oxidizer effective against virtually all *routine* infectious organisms, including *E. coli, Pseudomonas, Salmonella,* and fungi; *very* cost effective when diluted to the proper concentration of 1:32 (1/2 cup per each gallon of water); effectiveness is not reduced when diluted with hard (heavy mineral content) water; potent deodorizer; readily available; works best in the presence of sunlight.

Disadvantages: highly reactive and indiscriminately attacks microorganisms, living tissue, and metal surfaces; organic debris (dirt) inactivates it, works best on clean surfaces; has limitations in killing spore forms and tuberculosis organisms; gasses from chlorine compounds may burn eyes and lungs in poorly ventilated areas; some organisms or situations may require prolonged contact or repeated use as chlorine dissipates with heat, wind, and sunlight and, therefore, may not be as effective as needed (this is the primary limitation factor for not recommending chlorine bleaches for a variety of tasks).

Iodines: Today's iodine-based compounds are actually iodophors or "tamed iodines." Pure iodine solutions are too reactive and too unstable for practical use. Tamed compounds have a stabilizing agent to extend the shelf life and reduce causticity.

Advantages: great safety for tissue and metals; broad range of action against fungi, bacteria, and many viruses; not inactivated by hard water; long term stability (good shelf life); equally effective in cold and warm water (an unusual disinfectant quality).

Disadvantages: moderately expensive; may produce some temporary staining of materials; excessive oral ingestion may be toxic; may cause excessive skin drying; will not kill all infectious organisms; may be metal corrosive with prolonged contact; recommended at full strength use (expensive) and classified as a low level disinfectant when diluted with water.

Common Trade Names: Betadyne, Povidone, Wescodyne, Virac, Prepodyne. Also available in detergent forms.

NOTE: This disinfectant was proven most effective against all others excepting Gluteraldehyde including Nolvasan, Roccal, bleach, Cetylcide, 70% methyl alcohol, and in clinical trials for cold sterilized surgical packs, dental packs, and necropsy packs in my veterinary clinic in 1987 on a bacteriological testing survey.

Quaternary Ammonium Compounds: These are most commonly referred to as Q.A.C. or "QUATS." Quats are created by adding a complex organic molecule to the basic ammonia structure to produce a cationic detergent. The effectiveness of the approxi-

mately 100 trade name compounds is based upon the added side molecule.

Advantages: an excellent general disinfectant kills both gram positive and gram negative bacteria; kills *Chlamydia,* the agent of psittacosis; has no odor or color in its pure form but most commercial types have pleasant odors added; very cost effective when diluted properly.

Disadvantages: not effective against spores, fungi or many viruses; inactivated by high levels of dirt or grime; effectiveness reduced in hard water; incompatible (neutralized) by soaps; toxic to birds if ingested causing curare-like respiratory paralysis.

Common Trade Names: Roccal-D, Cetylcide, A-33, Hi-Tor, Omega.

Chlorhexidines: This product is widely available to the public both as Phisohex, and as a commercial disinfectant. Some federal concerns are being expressed recently over its safety. This chemical is used widely by aviculturists as a general soak solution for feeding bowls, baby syringes and as a hand wash. It has also been employed as a drinking water additive to prevent disease spread at 1 cc per pint of water. It is highly recommended as an additive to brooder or egg incubator water chambers used for humidity production to prevent fungal growth.

Advantages: wide range of effectiveness against fungi, yeast, some bacteria, and viruses including Newcastle's virus; used as a feed or water additive against the so-called "sour crop" organism *Candida;* used against fungal propagation in warm, humid environments including *Aspergillus;* very low toxicity potential; available in solution, scrub and scented forms; effective against many gram negative bacteria; used as water system additive to limit infection transfer from bird to bird via drinking water.

Disadvantages: ineffective against many gram positive bacteria and some gram negatives, especially *Pseudomonas* (Virosan solution will kill *Pseudomonas* bacteria); ineffective against some significant viruses; incriminated by the FDA as a potential carcinogen; moderately expensive.

Common Trade Names: Nolvasan, Virosan.

Formalin: This is an old traditional disinfectant used in many livestock industries and manufacturing concerns, including its use as a poultry house clean-up agent. Its use has recently been curtailed by laboratory

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evidence as a carcinogen a few years ago. Its use continues in Europe where it is manufactured in combination with other chemicals, primarily for its excellent anti-tubercular properties. Formalin is formaldehyde diluted to a 40% solution with water and sold commercially as a preservative.

Advantages: low cost; kills bacteria, spores and many viruses (single stranded RNA types).

Disadvantages: less available due to governmental restriction; produces skin and tissue irritation on fluid or vapor contact; incriminated as a carcinogen; requires proper surface preparation.

Phenols: This class is the product of distillation of coal into both organic and inorganic (non-carbon based) disinfectants. Straight phenol was the first type produced, but is no longer used. Sodium-O-phenylphenol is widely used in combination with other cleaners and disinfectants. Common names which are easily recognized are Staphene, Lysol, and One-Stroke Environ. One-Stroke Environ is sanctioned by the USDA for quarantine cleanup procedures at 1/2 oz. per gallon of water.

Advantages: kills *Staphylococcus, Pseudomonas,* fungi, tuberculosis and certain viruses; effective in hard water; does not stain or leave objectionable odors.

Disadvantages: concentrates may burn living tissues including skin, eyes, and lungs; gloves and goggles are recommended; will not kill non-enveloped viruses; cats are particularly susceptible to a toxicity problem due to a known enzyme deficiency; will not kill all bacteria types; incriminated in some studies as a potential carcinogen.

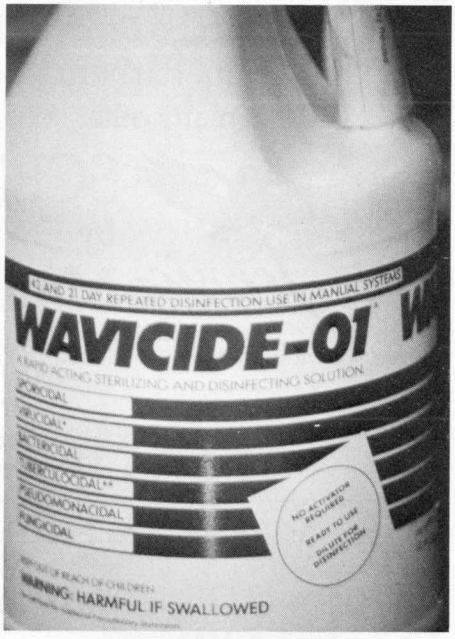
Common Trade Names: Lysol, Staphene, One-Stroke Environ, O-Syl, Matar, Amerse.

Wood Tar Distillates: This category includes turpentine, pine oil, and wood creosotes. Pine oils are the only types used as disinfectants and are combined with soap. These products are considered safe enough for zoo use but are also rated as very low level disinfectants.

Advantages: inexpensive; pleasant odor; lox toxicity factor; good cleaning action (detergent).

Disadvantages: severely limited in range of pathogen control, especially serious infectious agents such as most viruses.

Common Trade Names: Hexol, Pine-Sol.



Wavicide-01 is one commercial form of Gluteraldehyde and is an excellent disinfectant.

Gluteraldehydes: This class is a relative newcomer to the commercial market and has been available for the past approximately 25 years. This compound is available under different trade names, many of which are slightly different chemically and can have different abilities because of this. Gluteraldehydes are not a form of formaldehyde as is frequently mistaken. This compound is as close to an ideal disinfectant that can be purchased today. It can kill every infectious agent known at this time. Some organisms do require either higher temperatures or longer contact time. The federal government is in the process of approving it for the treatment of A.I.D.S. virus infected premises. It is safe enough for animals to lick wet surfaces; does not damage metals or materials and will remain stable (effective) in water solution up to three weeks. The only disadvantage identified to date is the cost factor. This may or may not be important depending on the type of problem present and the cost of the collection at risk. This product was first marketed as Cidex by the Johnson and Johnson Company, but the originals had strong odors, short activity lives, and could not be extended by water dilution.

Advantages: essentially 100% effective against all known organisms, disinfection of psittacosis agent not tested, but proven to kill human venereal *Chlamydia* organism; non-toxic in diluted form if licked from wet surfaces; effective in hard water; effective in cold and warm solution, but more effective in warm; very little skin damage; not deactivated by organic debris; proven effective in cold solution for up to three weeks in gynecological instrument trays; treatment of sand, gravel or dirt floors with spray recommended for control of severe disease outbreaks; kills organisms by denaturation of proteins, and therefore not limited to classes of microbes with certain bio-chemical components.

Disadvantages: tested positive for killing all standard human pathogens

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Comparison of Disinfecting Agents

	Quaternary Ammonium Compounds e.g. Roccal	Phenolics e.g. Lysol	Sodium Hypochlorites e.g. Clorox	Iodophore e.g. Betadyne	Gluteraldehyde e.g. Wavicide-01	Chlorhexidine e.g. Nolvasan
All viruses*	—	—	♦♦♦	♦♦♦	♦♦♦	—
Enveloped viruses	♦♦♦	♦♦♦	♦♦♦	♦♦	♦♦♦	♦♦♦
Bacteria (vegetative forms)	♦♦	♦♦	♦♦	♦♦♦	♦♦♦	♦♦
Fungi	♦♦	♦♦♦	♦♦♦	♦♦♦	♦♦♦	♦♦
Effective in the presence of organic material (grime)	♦♦	♦♦♦	♦	♦♦	♦♦♦	♦♦
Effective in hard water	♦	♦♦♦	♦♦	♦♦	♦♦♦	♦♦
Potential for toxicity	Moderate to minimal	Corrosive irritant	Corrosive irritant	Minimal	Minimal	Minimal
Relative cost per gallon of diluted solution	$ 0.21	$ 0.10	$ 0.10	$ 2.50	$ 3.50	$ 0.36

— No Activity ♦ Slight Activity ♦♦ Moderate Activity ♦♦♦ High Activity

required by the E.P.A. No animal extensive pathogen tests done but all results indicate same results are to be expected; most expensive of commercially available agents; concentrate form can cause some skin damage on prolonged contact; concentrate form will produce irritating vapors with poor ventilation over *prolonged* time periods; some commercial forms have a basic (alkaline) pH and are more caustic to skin and metal, and may be more toxic than the acid pH types such as Wavicide-01. Be cautious of the chemical formulation.

Common Trade Names: Wavicide-01 (2%, best), Sterol, Banacide, Cybact, Sporocide, Cidex, MC-25, Wavicide-06 (spray form).

NOTE: I have monitored cultures on necropsy cold pack instruments and found no *bacterial* growth after 25 days in my own lab with continuous use.

Conclusions for Practical Application

1. Three common disinfectants will kill virtually all infectious microorganisms. Chlorine bleach, formaldehyde (formalin solution), and Gluteraldehyde.
2. Gluteraldehyde is *not* another form of formaldehyde.
3. Formaldehyde use is curtailed by some federal restrictions and potential toxicity in birds by ingestion of vapors.
4. Chlorine bleach use is limited by its safety (tissue burns) and its relatively rapid loss of potent activity. Sunlight, heat and dirt rapidly decrease its effectiveness, especially when prolonged chemical contact is required.
5. Chlorine bleach is, without a doubt, the single best cost effective disinfectant that can be used today under certain circumstances.
6. Chlorine bleach is *not* a detergent and *does not* scrub away dirt.
7. The use of a dishwasher detergent with chlorine will greatly enhance its killing power when automatically washing loads of feeding crocks, etc.
8. The common use of Nolvasan and other chlorhexidene-based solutions for soaking water bowls, baby food syringes and humidity source trays has some severe limitations. Certain viruses and *Pseudomonas* bacteria will not be controlled.
9. The use of hot water vs. cold will generally improve the cleaning action of disinfectants and assist the removal of grime.
10. Diluting disinfectants to the *proper* strength will greatly assist your success. This sounds so basic that it not need mention, but is also one of the most frequent oversights discovered on investigation.
11. If no information is available to start or improve a disinfection program, call your local avian veterinarian. A phone call is less time consuming than using the wrong chemical and certainly a lot less expensive.

Enveloped Viruses include: pox virus corona virus, herpes virus (e.g. Pachecho's, Amazon Tracheitis), paramyxovirus (e.g. Newcastle's, PMV-1, pigeons)

Non-enveloped Viruses: these viruses lack the multi-layered protein coats of enveloped viruses and are generally much more difficult to kill chemically than their enveloped counterparts. They include: parvovirus (PBFD syndrome agent suspect), polyomavirus (tumor causing virus), papillomavirus (suspected in many psittacine papillomatous conditions), adenovirus, reovirus.

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