



# Cleaning & Restoration

\$9.00

January 2007 • Vol. 44 No. 1

The Official Publication of ASCR International

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# Effective Cleaning and Health

By Michael A. Berry, Ph.D.

**A**s health issues and microbiology-based concerns related to cleaning emerge, it is vitally important that we understand, at least in fundamental scientific terms, what it is we are confronting. Without this basic knowledge, when facing issues like HIV, Anthrax, mold, West Nile Virus and more recently Avian or Bird Flu, we are limited in solving problems, protecting our clients and our cleaning professionals, not to mention ourselves.

We need to recognize from the start three facts:

- 1) that we have, and probably will always have, incomplete knowledge of the micro-biological world around us — it is a very unpredictable environment
- 2) that cleaning by itself will not always quell epidemics
- 3) that effective cleaning historically has successfully removed biological hazards and created conditions that reduce the risk of disease and enhance human longevity and the quality of life

Therefore, to help our industry approach these issues in a systematic, science-based manner, we have put together this overview of effective cleaning and health.

## The Science Behind Cleaning

“Clean” is a condition free of unwanted matter and is the systematic management process used to achieve the “clean condition.” Cleaning is a fundamental environmental management process in that it is the process of putting unwanted matter in its proper place so as to not get in the way of human endeavors or cause harm to humans or their valuable materials. The process of cleaning reduces exposures and risks; it lessens the probability of an adverse effect.

We cannot manage what we do not understand; therefore, science is essential to effective cleaning. Science answers the

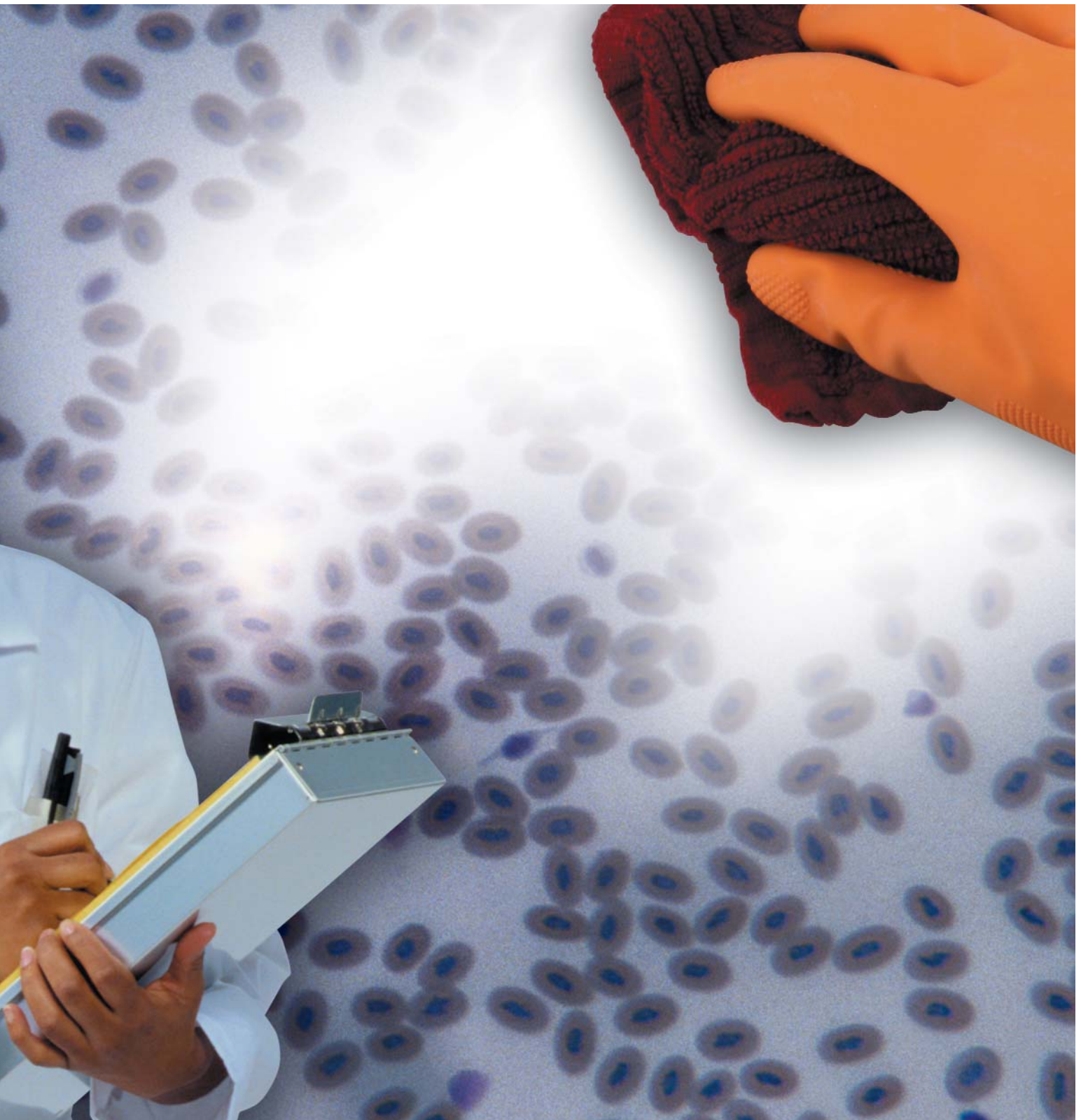


question “how.” “How does the environment of which we are a part function?” “How is cleaning effective?”

Every effective cleaning process, especially as it applies to human health and environmental protection, requires:

- 1) knowledge of the environment and the matter to be removed
- 2) separation, isolation and containment of unwanted substances





- 3) transport and removal of the substance from the object or environment
- 4) the proper relocation, reposition or disposal of the unwanted substance

Science tells us that an environment is a system of interconnected compartments and sub-compartments through which

matter and energy flow. Matter and energy are never destroyed, they continuously move around. Without effective cleaning, unwanted matter collects and concentrates, particularly in the built environments where we spend the vast majority of our lives. Various forms of out-of-place matter can cause a multitude of adverse effects and conditions that make us miserable, drive us away or ultimately kill us.

## Pathogens as Disease Producers

“Pathos” is Greek for suffering, and ‘gen’ is a suffix meaning producer; therefore, a “pathogen” is a disease producer and “Pathology” is the study of disease in general. Unwanted matter — often referred to as a pollutant or pathogen — can be a solid, liquid or gas; it can be organic or inorganic; it can be living or

dead or derived from a living or dead organism. Biopathogens are pathogenic microorganisms or substances derived from living organisms that cause disease.

“Germ” is a term to describe a microscopic organism that takes in food and excretes waste, grows, reproduces and dies. Germs are bacteria, viruses, fungi and protozoa.

Bacteria are single-celled organisms that receive nutrients from their environments in order to live. In some cases, that environment is a human body. Bacteria can reproduce outside of our bodies or within our bodies as they cause infections. But not all bacteria are bad. Some bacteria are essential for our bodies; they help keep human physiology in balance.

Prokaryotes is the category of life to which bacteria belong. Prokaryotes’ genetic material (DNA) is not enclosed in a cellular compartment called the nucleus. Bacteria and Archaea are the only prokaryotes. Other life forms including plants, animals and fungi, are Eukaryotes, creatures whose cells have nuclei. Viruses are not considered cells and are a separate category of living organism.

Bacteria live on or in virtually every material and environment on Earth. A square centimeter of skin averages about 100,000 bacteria. A cubic centimeter of topsoil contains somewhere in the order of one billion bacteria. Bacteria can live in temperatures above the boiling point of water and in temperatures that freeze blood. They “eat” everything from sugar and starch derived through photosynthesis to sulfur and iron in rocks.

Protozoa are one-celled organisms like bacteria. Protozoa require and thrive in water, often spreading diseases through contaminated water. Some protozoa cause intestinal infections that lead to diarrhea, nausea and stomach pain.

Fungi are multi-celled plant-like organisms. They do not produce their own food from soil, water and air, but are decomposers. Their main role on Earth is to recycle carbon which, along with water, is essential to all life. Fungi have an absolute requirement for water. They thrive in damp, warm environments and get their nutrition from plants, animals and just about any matter derived through photosynthesis.

Viruses require a host to survive, grow and reproduce. They cannot live outside

of other living cells, and once inside the body, they can spread and make people sick. Viruses cause chicken pox, measles, flu and many other diseases.

The vast majority of microorganisms cause humans no harm. Most microorganisms are not pathogenic or bio-pathogenic. In fact, many microorganisms are essential for our well-being; however, there are exceptions.

## Hygiene for Disease Prevention

The “germ theory of disease” (pathogenic theory of medicine) is a 180-year-old theory that proposes that microorganisms are the cause of many diseases. Germ theory is the foundation of most areas of the health professions that include hygienic and sanitation practices. Hygiene is commonly understood as preventing disease and infection through cleaning. Good hygiene includes the absence of visible soil or malodors and harmful levels of bacteria and other microorganisms and harmful matter. It is indicated by a state of cleanliness, creating a sense of well-being as well as enhancing health, aesthetics, comfort, social interactions and human productivity. In many instances, the process of high performance cleaning directly aids in disease prevention and isolation. Good hygiene, as manifested by cleanliness, maintains a healthy condition and avoids sickness and disease. In the midst of an epidemic, good personal hygiene and effective cleaning processes reduces contagiousness.

Washing with water is the most common means of personal hygienic behavior. Washing is often done with soap or detergent that helps to separate oils and to break up dirt particles so they may be carried away by the flow of water. Frequent hand washing is among the most common hygienic advice. Hand washing and effective cleaning has an enormous impact on reducing the spread of disease. This is because they kill or remove disease-causing organisms in the

immediate surroundings. These cleaning processes reduce the risk of disease by reducing exposure to the pathogen. For example, washing one’s hands after using the toilet and before handling food reduces the chance of spreading E.Coli bacteria and Hepatitis, both of which are spread from fecal contamination of food. Hand washing has been shown to reduce the spread of the common cold virus and various forms of influenza, especially in sensitive environments like hospitals, nursing homes, day-care facilities, schools and universities.

The primary method of preventing the spread of disease is to isolate the infectious organism from the human population. By eliminating the source of infection, there is no transfer, exposure and risk. Often, but not always, effective cleaning provides this isolation and risk reduction. ■

*Michael Berry, Ph.D. was chairman of the Science Advisory Council for the Cleaning Industry Research Institute (CIRI) in 2006. To learn more about CIRI, visit [www.ciri-research.org](http://www.ciri-research.org).*

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