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SELF-FRUSTRATION REPORT

Without our realizing it, our actions and assumptions often thwart our intended purpose.

The progress of microbiology over the last century has been accompanied by many examples of self-frustration. Consider the strategies we have deployed to vanquish pathogenic bacteria. Antimicrobial drugs have saved countless lives, but also created the ominous spectra of multiple resistant superbugs. Similarly, hospitals have helped to win many struggles against communicable disease, but have also become prime locations for patients to acquire virtually untreatable infections. Replacing small local hospitals with larger centralized ones, in order to focus high-tech facilities and provide better care, has extended further the opportunities for "hospital strains" to proliferated and cause more opportunistic infections. Antibiotics, killing non-pathogens as well as pathogens, have made candidiasis a more serious problem than it was before. The increased use of refrigeration and chill compartments in supermarkets positive developments in the drive to minimize food-born infection have turned listeriae, which thrives at those temperatures, into more insidious and formidable foe than they were hitherto.

One of the oddest examples of self-frustration concerns the viruses, bacteria, fungal spores and protozoan trophozoites and cysts that can stick avidly to clothing. Decades ago, the piping-hot temperatures used for the weekly wash at home, and in commercial laundries, were sufficient to sterilize garments of all, but the most resistant spores. Then came two entirely laudable ecological concerns.

First, growing anxiety about energy saving triggered a shift away from washing with scalding fingers toward much lower temperatures, which are tolerated by most microorganisms. Second, environmental researchers traced the eutrophication of rivers and lakes to salts in the water discharged into these natural water systems. A key culprit proved to be sodium tripolyphosphate, which in consequence was removed from commercial laundry detergents, or at least drastically reduced in concentration.

However, the main role of sodium tripolyphosphate had been to prevent organic and inorganic substances from accumulating on fabrics. Washed repeatedly without it, garments accumulate nasty, tenacious insoluble encrustations. So have we exacerbated one problem by well-intentioned measures to deal with another?

When I studied the microbiological dimensions of the encrustation, my findings were not encouraging. I laundered pieces of cotton, terry cloth tea towels, and a cotton/polyester fiber 25 times in a household washing machine with various branded detergents. Afterwards, I measured the amounts of organic and inorganic encrustation and agitated strips of material in nutrient media to see what proportion of bacteria were released.

OVERNIGHT TUBE INCUBATION AT 34C

TUBE	1	2	3	4	5	6	7	8	9	10
	+	+	+	+	+	+	+	+	+	+
	11	12	13	14	15	16	17	18	19	20
	+	+	+	+	+	+	+	+	+	+
	21	22	23	24	25					
	+	+	-+	-	-					

The results showed that, while small percentages were eluted, the majority of organisms remained firmly stuck. The degree varied according to the fabric, but encrustation clearly enhances the adhesion of bacteria – the two phenomena being directly proportional to each other.

I next laundered pieces of cotton, terry cloth tea towels, and a cotton/polyester fiber 25 times in a household washing machine with Ultra Safe Solution. Afterwards, I measured the amounts of organic and inorganic encrustation and agitated strips of material in nutrient media to see what proportion of bacteria were released.

OVERNIGHT TUBE INCUBATION AT 34C

Tube	1	2	3	4	5	6	7	8	9	10
	+	+	-	-	-	-	-	-	-	-
	11	12	13	14	15	16	17	18	19	20
	-	-	-	-	-	-	-	-	-	-
	21	22	23	24	25					
	-	-	-	-	-					

The results showed that, the majority of organisms were eluted and after two washings, the cloth was sterile. The degree varied according to the fabric, but encrustation clearly enhances the adhesion of bacteria – the two phenomena being directly proportional to each other.

SOLUTIONS-4-YOU FASHIONS, ANTIMICROBIAL FABRICS

When pathogenic microorganisms adhere to fabrics in clothing, such materials become a carrier of odor-generating and potentially infectious bacteria and fungi. Textiles now used in hospitals or other health care facilities thus often carry ordinary or opportunistic pathogens, sometimes causing cross-infections between patients or transmitting diseases from one section of a facility to another. To further test the antimicrobial activity of Ultra Safe Solution wet – finished cloth activity in commonly available commercial products, I subjected a variety of

materials and products to the Ultra Safe Solution wet-finishing treatment. I then challenged those materials with a range of potential human pathogens. The anti-microbial activity was highly potent (for Gram – bacteria) typically producing up to 7 log reductions in the concentrations of the challenge pathogens within 15 minutes. The effectiveness of the anti-microbial fabrics depends on the amount of Ultra Safe Solution agent incorporated onto the fabrics.

The approach should not contribute to the development of anti-microbial resistance by microorganisms because Ultra Safe Solution disinfectant hit many targets. In contrast, antibiotics strike specific targets, and a single mutation can shift susceptibility substantially.

Solutions-4-You may want to apply this technology in three areas: Textile preservation, odor control, and health care. Many natural fibers themselves are damaged by bacteria and fungi, reducing their durability and lifetime. Volatile, smelly odors, such as those in socks, dishcloths, hotel pillows, gym cloths, and diapers, are generated when microorganisms in body secretions partly degrade polymers in such fabrics. Maybe we should be looking at working on odor control with these polymers, Medical-use textiles could also prevent the spread of pathogens on surgeons' gowns, patient draperies, nurses' clothing, carpeting, bedding materials, and sheets and towels.

METHODS FOR TESTING ANTIMICROBIAL EFFECTIVENESS

Protocol for performing this test is found in the National Committee for Clinical Laboratory Standards (NCCLS) publication M7-T2.

Test #3 Laboratory Methods in Basic Mycology
September 3, 1999 Solutions-4-You sample of "Multi-Purpose" tested at Laboratory, for effectiveness against Mycological agents.

One part of Ultra Safe Solution was mixed and vortexed with three parts distilled water to make test sample.

Broth Dilution method, decreasing concentrations of the Ultra Safe Solution to be tested are placed in tubes of a broth medium that will support growth of Saccharomyces cerebisiae.

Test procedure: 1 ml. of Ultra Safe Solution was placed into #1 test tube, 9/10 ml. into #2, 8/10 ml. into #3, 7/10 ml. into #4, 6/10 ml. into #5, 5/10 ml. into #6, 4/10 ml. into # 7, 3/10 ml. into #8, 2/10 ml. into #9, 1/10 ml. into #10.

9/10 ml. of distilled water was placed into #10, 8/10 ml. into #9, 7/10 ml. into #8, 6/10 ml. into #7, 5/10 ml. into #6, 4/10 ml. into #5, 3/10 ml. into #4, 2/10 ml. into #3, 1/10 ml. into #2.

All tubes contain 1 ml. Liquid at this point.

1/10 dilution with distilled water (1 ml. of Solutions-4-You sample is diluted with 9 ml. distilled water then vortexed).

Test procedure: 1 ml. Ultra Safe Solution at 1/10 was placed into #1 test tube, 9/10 ml. into #2, 8/10 ml. into #3, 7/10 ml. into #4, 6/10 ml. into #5, 5/10 ml. into #6, 4/10 ml. into #7, 3/10 ml. into #8, 2/10 ml. into #9, 1/10 ml. into #10.

9/10 ml. of distilled water was placed into #10, 8/10 ml. into #9, 7/10 ml. into #8, 6/10 ml. into #7, 5/10 ml. into #6, 4/10 ml. into #5, 3/10 ml. into #4, 2/10 ml. into #3, 1/10 ml. into #2

All tubes contain 1 ml. Liquid.

1 ml. Nutrient broth added to all tubes.
0.1 ml. of test organism suspension (1 x 10 x 6 CFU/ml) is added to tubes containing 1 ml. broth and 1 ml. of concentrations of Planet Solutions.

All tubes contain 2.1 ml. Liquid with 2.5 x 10x4 CFU/ml.
immediately 0.001 ml. from control tube is subcultured to agar, after overnight incubation = 250 colonies.

OVERNIGHT TEST TUBE INCUBATION AT 35C
(+)= Turbid (growth) (-) = Nonturbid (no growth)

Tube	1	2	3	4	5	6	7	8	9	10
	-	-	-	-	-	-	-	-	-	+
Cells per field	8	8	9	9	11	15	17	20	23	33
1/10 dilution	1	2	3	4	5	6	7	8	9	10
	+	+	+	+	+	+	+	+	+	+
Cells per field	33	35	40	48	51	59	80	85	90	100+

0.001 ml. from control tube subcultured to agar = 250 CFU

Minimum inhibitory concentration (MIC) = 20%

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