Fact or Fiction?

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"Bugs"

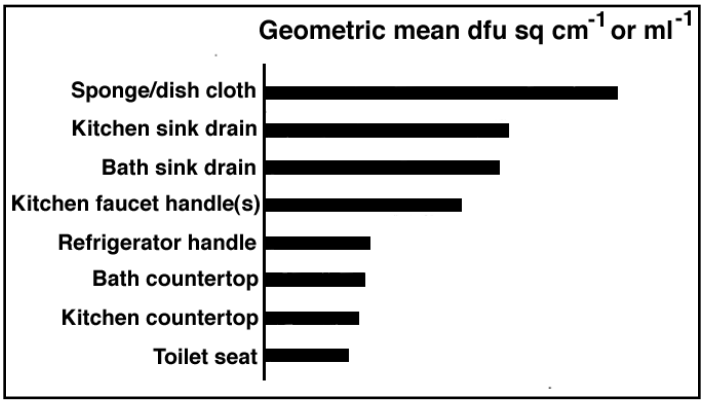
"Invisible peril lurks in your bathroom."
— D. Blum[1]

Next time you see someone at a party or a pub washing a beer mug by dipping it in a solution or two of water, be aware that this really doesn't clean the glassware. Ten or more total and fecal coliforms were found in 67.6 percent and 12.2 percent of vat-washed mugs, vs. 30.3 percent and 4.7 percent of machine-washed mugs, respectively.[2]

Other places where bacteria can be found include kitchens and bathrooms. Kitchen areas and items such as counters, sinks, dish cloths, sponges and dish towels have been identified as reservoirs and/or disseminators of potentially pathogenic bacteria. Coffee preparation areas are regions where more than just people congregate. Concentrations and types of bacteria found in these spaces (*e.g.*, drains/sinks, washcloths, sponges and coffee spoons) were similar to those identified in household kitchens.[2]

Bacteria identified do not usually cause illness in healthy individuals, but they may cause infections in immune-compromised people. But if you're thinking this isn't a health issue, check these statistics. It has been estimated that each year the cost of food-borne bacterial illness in the U.S. is approximately $4 billion to $6 billion, and the number of gastroenteritis cases related to food-borne pathogens is 6.5 million, leading to 9,000 deaths. In a review study[3] including more than 1,000 outbreaks of food poisoning, it was shown that the source of highest percentage of cases (19.7%) was family homes, followed by restaurants (17.1%) and banquets (12.2%).

The most contaminated sites within the home are those that tend to remain moist, such as the sponge/dishcloth and drain areas, and the site that is most frequently touched—the kitchen faucet handles. A study by Rusin *et al.*[4] showed that sites with highest densities of fecal coliforms were found in kitchens. Three of the top four most-contaminated sites in their study were in the kitchen (see figure). These included the sponge/dishcloth, the kitchen sink drain area, the bath sink drain area and the kitchen faucet handles.



Fecal coliform densities in kitchen and bathroom areas (from Rusin, et al.*, ref. 4).*

Sites with the lowest concentrations of fecal coliforms were the refrigerator handle, the bathroom counter top, the bathroom floor around the toilet and the toilet seat. Surprisingly, the bathroom counter top and the toilet seat were two of the least contaminated sites in the household. The toilet seat was probably dry between periods of use, which might explain the low level of contamination (because bacteria—or "bugs"—thrive in moist conditions). Ordinary cleaning practices may do little to reduce the microbial load. The use of "self-disinfecting" sponges in a household kitchen environment, however, significantly reduces the level of total and fecal coliform bacteria within the sponges, and greatly reduces the transfer of such bacteria to surfaces and fingers.[5] Also, the introduction of hypochlorite cleaning products do result in a significant reduction of bacteria in most cases.[4]

As mentioned earlier, the concentrations and occurrence of coliform bacteria in office coffee preparation areas (*e.g.*, counters, drains/sinks, washcloths, sponges and coffee spoons) were found to be similar to that found in household kitchens. In a study by Meer, *et al.*,[2] 41 percent of all cups contained coliform bacteria. Wiping the cups with a moist sponge or dish cloth resulted in a significant increase in bacterial contamination of the cups, in addition to cross-contamination with Escherichia coli and other coliforms. It was demonstrated that a small, office cup washer completely eliminated coliforms and most other heterotrophic bacteria. The accompanying table shows some results.

Now some more words about the bathroom area. Flushing of a household toilet produces bacteria-laden aerosols that settle on the toilet and

Effect of a Commercial Coffee Cup Washer on Bacterial Reduction(a)

	Heterotrophic plate count		Percent positive	
	Average(b)	Range	Coliforms	E. coli
Before washing	6.4×10^2	2.4 to 4×10^5	36	0
After washing	3.0	0 to 48	0	0

a. From Meer *et al*., ref. 2
b. Average was calculated as the geometric mean

bathroom surfaces.[1, 6] Charles Gerba, a microbiologist at the University of Arizona, reports that a very fine aerosol spray is ejected when you flush. You don't see it or feel it, but it fills the room, so if your toothbrushes are out, you may end up brushing your teeth with material you thought had gone down the toilet. His experiments have shown that the spray clearly did not reach above six feet (so, only if your toothbrushes are hanging from the ceiling do they remain uncontaminated). Coupled with the fact that some studies have suggested that touching a contaminated surface is much more likely to bring on a cold than being exposed to a sneeze leads Gerba to recommend that bathrooms and kitchens be disinfected weekly using a chemical disinfectant. [1, 6]

Gerba, who's been referred to as America's "germ guru," [7] has done other interesting things in his never-ending search for bugs. Once, after a cross-country trip, he conducted a study to see whether the cleanliness of a motel room bore a direct relationship to its price and, if so, whether the relationship was the one you might expect. The answer is yes, on both accounts.[8]

More recently, he has moved his microscope from kitchen and bathroom surfaces to the household's laundry room.[7] Gerba wanted to find out what happens to the bacteria in laundry when it's washed. Does it all go down the drain or is some left behind, like bacteria that can remain on kitchen counters after cleaning? He and his colleagues simulated typical home laundry practices, using warm-water washes. They observed that after washing, bacterial contamination was found throughout the clothing and on the machine tub itself. To their surprise, the heat from the dryer did not kill all the bacteria. E. coli was eliminated, but Salmonella and Mycobacterium fortuitium (a common bacteria that causes skin infections) were still present. The solution to eliminate cross-contamination problems in laundry, according to Gerba, is to wash hands after transferring wet clothes to the dryer and wash underwear loads last, along with a cup of bleach. The study confirmed that using bleach killed 99.99 percent of the bacteria in the clothes and on machine surfaces.[7]

A Few More Thoughts to "Bug" You

Although medical authorities prefer not to advertise this fact, a modern hospital ranks high on the list of ideal targets for microscopic life forms. They flourish where a changing group of unrelated people spend their days packed closely together. Other places that are unusually hospitable to the rapid spread of microscopic predators include: Army basic training barracks and school classrooms.[9]

Lastly, as Rathje and Cullen[8] point out: "That vast array of wrappers and boxes at fast-food restaurants, which are the object of so much disparagement, fulfills a role other than mere ease of carry-out. It keeps food safe. Fast-food restaurants and other establishments (such as schools and nursing homes) that rely heavily on throwaway containers disseminate far fewer bacteria and viruses through their disposables—some 50 percent fewer—than sit-down restaurants do through their glassware, silverware and ceramic plates." P&SF

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