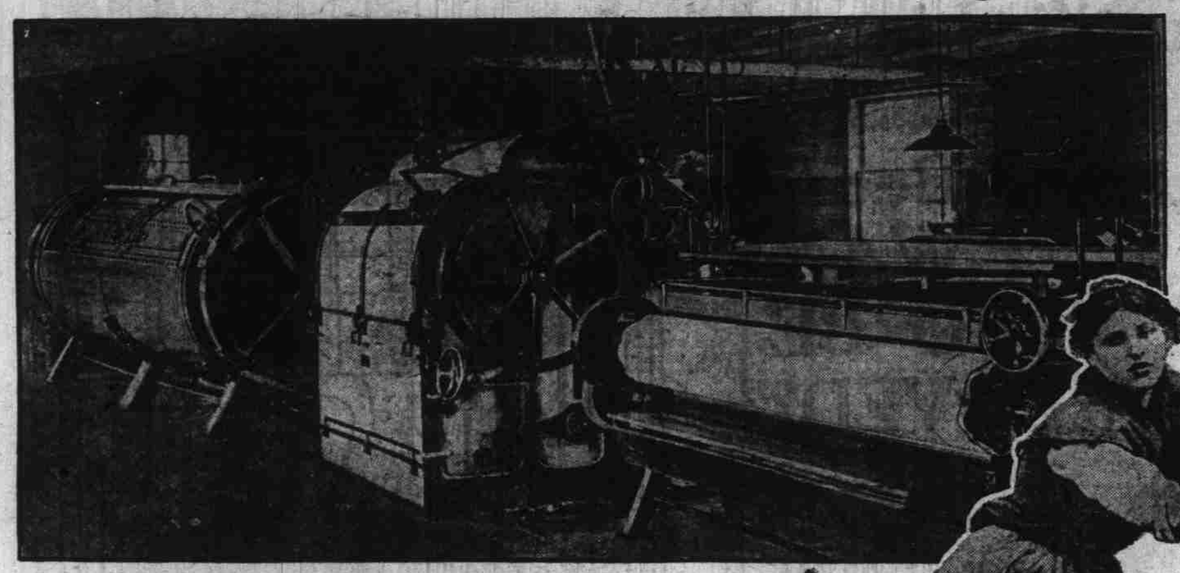
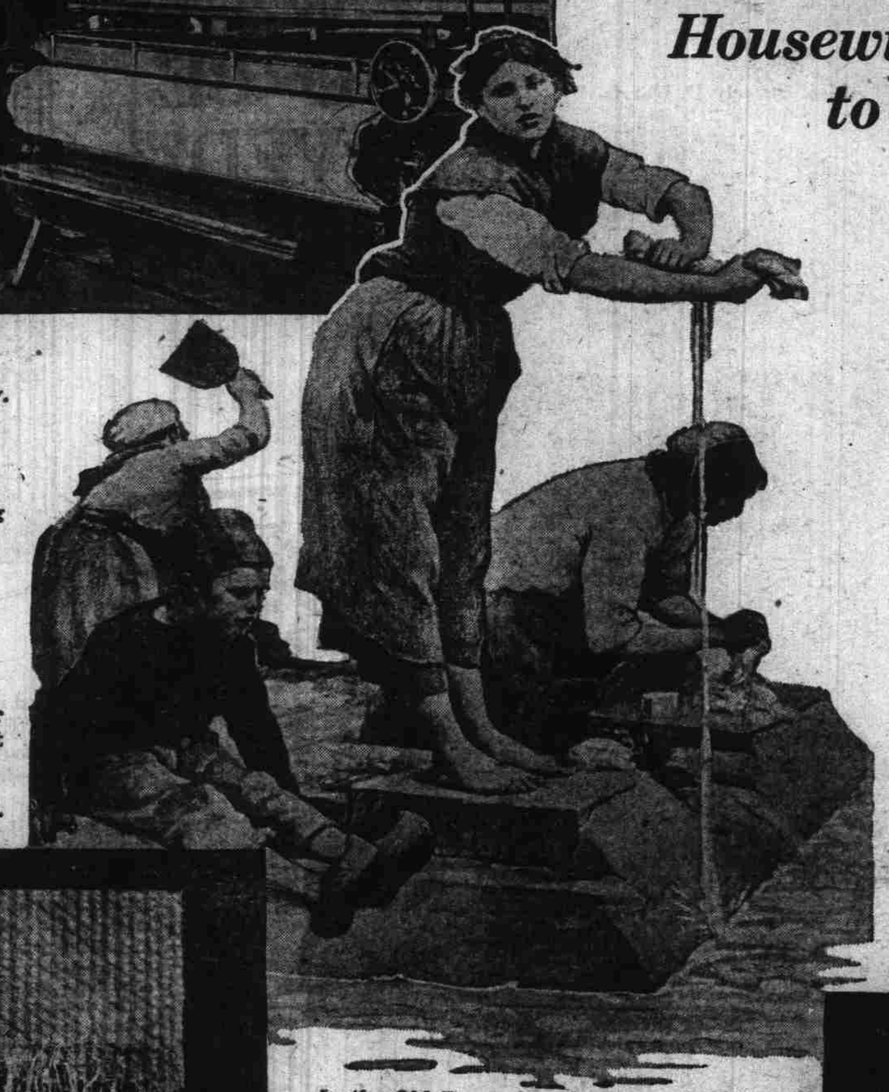
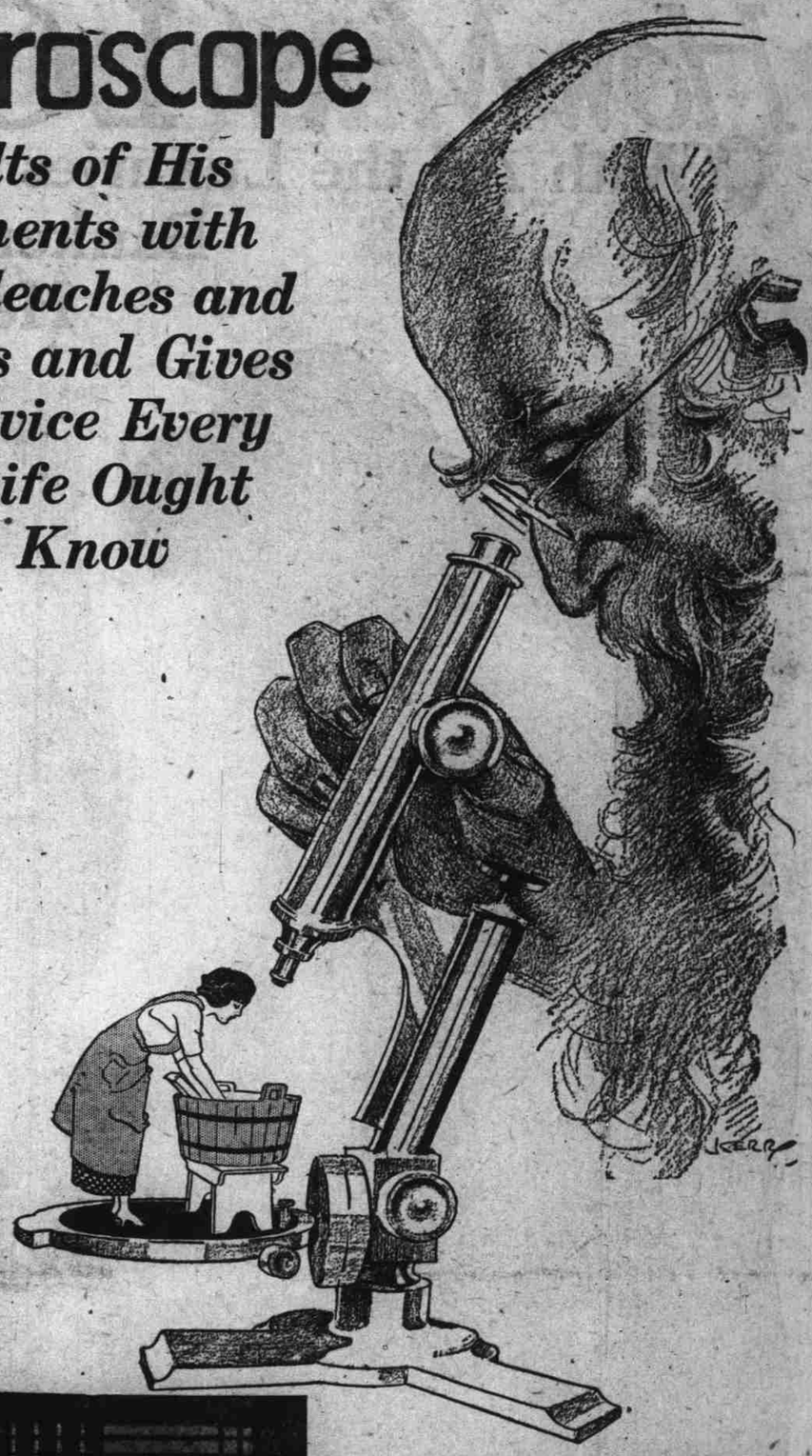
Your Wash-Tub Under The Microscope

Prof. Kugelmass Explains Some Surprising Results of His Experiments with Soaps, Bleaches and Chemicals and Gives Some Advice Every Housewife Ought to Know





The Modern Machinery of a Scientific Laundry. The Washing Machine (in the distance), the Dryer and the Mangle, or Ironing Machine.



By Prof. I. Newton Kugelmass
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EVERY housewife is interested in longer life, and certainly in that of clothes, if she would know that her old-fashioned methods of laundering halve the wear of garments. Think of it! She is paying the price in two ways to use clean garments—the cost of laundering and half the cost of every piece of goods. If your linen tablecloth costs ten dollars, washing it the old way gives you only five dollars' worth of service, apart from the additional cost of laundering it about fifty times.

But the cost is not the only item. Just examine the looks of the linen. Now and then streaky and blotchy. Every once in a while tinged gray, spotted blue and rusted red here and there. Gradually the fibers begin to cleave, holes form and the tablecloth is forever barred from appearing on Sunday. What a big waste in these trying times. Taking the chemists' advice and using their economic simplified methods to wash will add twenty-five per cent to the length of wear, decrease the cost of the laundering bill and at that turn out a higher grade of work.

If that same table linen were washed by the latest methods you would get $7.50 worth of wear out of the linen, use it about seventy-five times, cut the cost of cleaning quite a bit, save much of the patching trouble and get a cleaner, clearer and more inviting cloth. You don't have to think about it much, nor talk it over, but use the suggestions offered here, for they are the results of the trained chemist at the expense of brain, brawn and bank. Why not reap the advantages of the service of science in the home as well as manufacturers do in industry?

Put a ban once and for all on the misuse of soiled goods. Using towels to clean furniture, napkins to polish cut glass and a host of other goods for non-adaptable uses just ruins them. Materials are made for certain uses. They get into that "habit" and serve best in that way. They can't be fooled. Every time they are misused for another purpose their life is shortened more than during their regular use and you pay the price for ignorance.

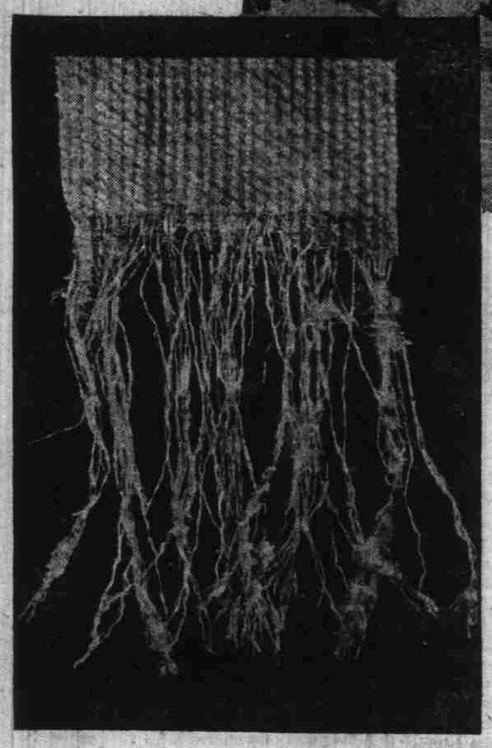
Another wrong done soiled clothes is stocking them up to laundering time. The longer you keep garments that way the more "vitality" do they lose. Piled up that way the raiment is in damp, dirty and dark places. This is most favorable for clothes-destroying bacteria to cultivate and multiply and the effect is certainly injurious.

These micro-organisms have the specific power to decompose and split the very small molecular particles that make up the fibrils of cloth. The products of decomposition constitute part of the food upon which the bacilli thrive. In other words, they have the power to turn goods into eatables to keep them alive and active for many an offspring. This destructive action persists through the many generations of these bacteria. They breed under the very conditions favorably brought about by stacks of dirty clothes.

Washing is begun by soaking to loosen dirt, save rubbing, time and energy. It is well to soak the goods in cold water without soap. This will remove the starch and albuminous matter for good. Hot water will coagulate the albuminous substances and starch. These will stick on the clothes and give blotches. Soap in soaking water may change some stains into difficultly removable blotches.

Water is used in practically every operation in laundering and affects them all. Natural water contains dissolved mineral matter. A high content of it makes water "hard." Hard water offers a score of troubles. It decomposes the soap, forming insoluble curdy stuff that sticks to clothes in streaks and clots. Even if this sticky soap sets evenly in the meshes of the cloth the fabric becomes stiff and harsh and later the heat from the iron turns it gray. In bluing, the traces of the insoluble soap on the fibre absorb the blue, yielding blue spots and streaks.

In starching the prevalence of this curdy soap makes the surface of the garments coarse and the starch on that account distributes unevenly, leaving blotches here and there. In wool scouring the gelatinous soap clogs the porous good wool fibres, and not only does this interfere with thorough washing, but diminishes its insulation wearing value. Apart from all these troubles soap is wasted.



An "All Linen" Towel—the Lower Part Shows What Linen Was Left After Acids Had Removed the Cotton.

The first assurance of best results is to use prepared water. This is easily done. Add about an ounce of soda-ash, three ounces of washing soda, four ounces of borax, or a half pint of ammonia to a ten-gallon tub of water of about ten degrees hardness. These compounds precipitate the objectionable minerals. Stir, let the water settle and let the clear water flow into the washing tub. Water over eight degrees hardness should be so softened. The hardness of the water you use is determined by the city water works, board of health, city chemical laboratory or some other office in the community.

The difference between soda-ash, washing soda and caustic soda may perhaps not be familiar to all. Soda-ash is practically water-free washing soda. It is a powder, while washing soda is crystalline. For the softening of water and aiding the soap in its cleansing action, one pound of soda-ash will do the work of three pounds of washing soda. Caustic soda is the familiar lye. Its use for these purposes is detrimental. All may be bought at the grocer's.

In buying soap do not get a cheap, soft, highly colored variety that conceals adulterations. Every grain of material other than the pure soap content is an objectionable contamination. Sodium silicate or water glass in soap weakens the fibre by loosening and separating it and making the fibrils brittle. Caustic soda sets yellow casts, roughens the thread, forms lint and diminishes the strength of the fibre texture. Rosin yields acids in the meshes of the cloth and there deposits yellow casts. Peroxides, perborates, clay, gelatin, boric acid, salicylic acid, carbonates and scores of other additions have but one decidedly known effect, and that is they depreciate the fibre. The best grade is uncolored neutral soap containing neither free alkali nor contamination.

In the Old Days of "Elbow Grease" Without the Aid of Science.

Most of the very high grades of soap are neutral. The test for a neutral soap may be easily made made by putting a drop of ether on the soap and touching it with red litmus paper. If the paper is unchanged in color the soap is neutral. If it turns blue the soap contains free lye and is not neutral.

Dirt is held in the soiled clothes by grease. Soap cleans in two steps. It first removes the grease from the materials by forming an emulsion with it. Every drop of grease is kept in solution by the energetic soap particles. They are bound and there is no way for them to get back to the goods. With the grease off the little soap chasers now pull out the dirt particles and make them adhere to their surfaces. This completes the work of the army of dirt-fighters, the soap particles.

Soap works most effectively in a moderate alkalinity obtained by adding soda ash or washing soda, a few ounces to the tub. This gets the soap into perfect distribution essential for uniform cleansing. The mild alkalinity increases the number of energetic finely divided soap particles and keeps them active, thereby multiplying their dirt-pulling power. The added alkali further improves the power of emulsification of the soap, thus more completely washing away every trace of grease that holds dirt.

Many a housewife seems to insist on following the old method of using caustic soda as the source of alkalinity for the soap to work in. She ought to awake to the seriousness of her errors and realize that her guilt is twofold—wasting clothing and wasting laundering materials.

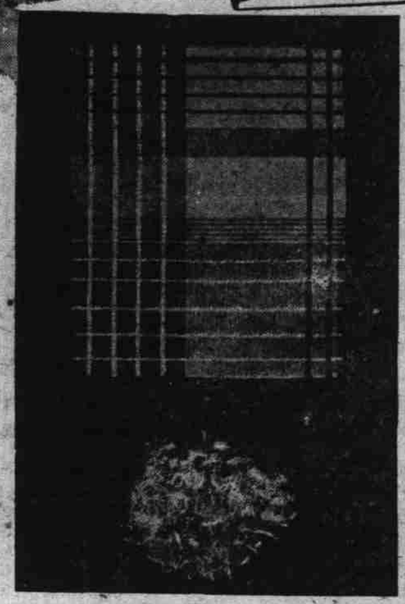
Caustic soda is dangerous, because it gives excess alkalinity. Excess alkalinity attacks all fabrics. The cotton becomes thicker, transparent, lustrous; is, in fact, mercerized and then decomposes. Too much alkalinity curls, knots and tangles the fibres of textiles. It makes the wool yellow, hard and less elastic, and finally dissolves the fibres. Strong alkalinity as that furnished by caustic impairs the lustre of silks, then finally dissolves the fibres as well. This excess may be easily detected by the corrosive effect even upon the skin, soreness, irritation and roughness being produced. The destructive effect of caustic soda is just as evident when it touches the linen. Yellow marks are left and eventually they wear into holes. Caustic soda is responsible for ruining the strength, color, appearance and wear of clothing.

Not only does this large alkali concentration mean a great waste of clothing, but also a waste of materials to the launderer. Rinsings are prolonged, more acid needed in souring, uneven setting of the blue, and even a decomposition of the bluing material if the alkalinity is large enough. These are the grave results of caustic soda. The best combination is neutral soap and soda.

The deadly policy of leaving clothes overnight in dirty soap baths "rots" them. The dirt-laden soap particles settle in the clean pores of the fabrics, causing the familiar streaky gray tinges.

Bleaching in ordinary washing should be carried out only for white clothes. It is the last alternative for removing stains from white goods. The best procedure is, of course, to remove the stains by special treatment, one by one, before washing. However, if that is too lengthy and after washing and rinsing the spots persist, bleaching the white goods is certainly in order. But never bleach for dazzling whiteness alone. Proper washing methods will give that result.

Raw bleaching powder is the most effective deadening agent for clothes as it is used ordinarily. Bleaching can be made a non-destructive procedure. Just treat the bleaching powder with soda in a separate vessel. Reject the precipitated chalk that settles at the bottom. Pour off the supernatant bleach liquor, the sodium hypochlorite, and use with the suggestions given. This bleach bath contains two destructive agents to cotton and linen—the active oxygen from the hypochlorous acid and the strong alkaline medium. Great care must be exercised in this part of the process to produce a grade of work that is excellent in appearance and to do it with comparatively little injury to the fabrics. Common bleaching methods give certain goods yellow colorations, impair their strength, decrease their wear and disintegrate them gradually.



A Sample of Taffeta. The Lower Picture Shows the Large Amount of "Weighting" in It.

This Metallic Adulterant Is Acted Upon by the Chemicals of the Soap and Washing Materials and the Fabric Is Often Ruined.

The best conditions for bleaching without injury to clothes are these. Add soda gradually to the bleaching powder in solution until no more chalk precipitates. In other words, a minimum of soda means a minimum of alkalinity. Immerse the goods in the clear bleach liquor without adding any soap, for the bleaching active agents are taken up by the soap, the garments must necessarily be kept longer and are thus attacked. Raise the temperature of the bath gradually to about 40 degrees centigrade, else much of the hypochlorous acid will soon be decomposed. Slow heating moderates the rate of activity of the bleach liquor. Keep the goods in this bath as little as practicable. Then rinse thoroughly to remove all traces of the bleach solution to prevent it from acting on the goods destructively. These points cannot be overemphasized nor too minutely adhered to if a standard of excellence of laundering work is the aim.

Science Has Discovered Microbes Which Breed in Soiled Clothes and Eat the Fibres of the Cloth.

It is rather difficult to remove the last trace of alkalinity by continued rinsing, and so a souring rinse is advisable. The mild acid, apart from neutralizing the alkali in the clothes, decomposes any yellow streaks on the goods formed in the bleach, destroys any remaining bleach liquor and removes a certain class of stains.

The best-adapted acids are acetic and oxalic. Acetic acid or vinegar is mild, volatiles easily escaping, neutralizes effectively and dissolves out any minerals present at all. Oxalic acid is a stronger acid, but is superior in destroying iron stain and a class of others difficult to remove otherwise.

The best souring results are obtained by using a solution of acids prepared as follows: Dissolve an ounce of oxalic acid crystals in a half-pint of hot water and add this to a half-pint of 50 per cent acetic acid. Use one-half pint of this sour liquor in a ten-gallon tub of water.

It is surprising to observe the high grade of laundering produced with thorough rinsings. You defeat the very aim of washing if you neglect this feature. The purpose of treating the clothes with cleansing agents is to loosen dirt, but rinsings alone will finally clear the goods of it. The average trouble may be traced to insufficient rinsings. Decrease of soap efficiency in the second suds, uneven bluing, incomplete starching, yellow-cast formation during ironing are illustrative of the difficulties that result when rinsing is neglected.

It is not commonly known that the sun acts on clothes other than just drying them. Overdrying in the sun actually distends the fibers of goods and cracks, separates and weakens them.

The time to remove clothes from sun exposure is when the last traces of moisture have just escaped into the air. From that period on the goods gradually get more and more crisp, harden, and the harmful effects to the fiber follow. In other words, avoid overdrying by taking them from the sun when the first signs of crispness are evident.

Our grandmothers prided themselves on their snow-white linens and cottons, but they accomplished their results at the cost of much "elbow grease." Science is at last beginning to understand the rather complicated problem of the washtub, and is able to make suggestions which are of great practical value—but they must be used as directed, not abused.