

THE COST OF
CLEANNESS

A TWENTIETH CENTURY
PROBLEM

ELLEN H. RICHARDS

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THE COST OF CLEANNESS

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Cleanness, the state of being clean, a sanitary necessity of
the Twentieth Century whatever it may cost

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ELLEN H. RICHARDS

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FOREWORD.

SOCIETY needs family homes today more than it needs fine public buildings. If the young architects and engineers are seeking distinction for themselves and the praise of the future let them turn their attention to the housing problem. There are millions to be saved to the community in the cost of cleaning alone, besides the saving in health and efficiency.

The limit of modification has been reached. Reconstruction is needed, first of ideals, second of the buildings in which to carry them out.

The old order has passed; only the shadow is left to terrify the young householder.

TABLE OF CONTENTS.

	PAGE
FOREWORD	iii
CHAPTER I.	
THE CLEAN HOUSE	I
CHAPTER II.	
PERSONAL CLEANNESS AND THE DISPOSAL OF PERSONAL WASTES	30
CHAPTER III.	
THE CLEAN CITY	49
CHAPTER IV.	
THE COST OF UNCLEANNESSE	67
CHAPTER V.	
THE WAY TO FUTURE CLEANNESS	93

THE COST OF CLEANNESSE

CHAPTER I.

THE CLEAN HOUSE.

THE family budget has been steadily increasing. The air space a given income could provide has been diminishing and, in general, the cost of living has become a heavier and heavier burden until thoughtful students of social conditions wonder what the end will be.

Crowding has already shown its evil effects in the prevalence of tuberculosis and other close-air diseases. The demand of the sanitarian is insistent—more room! But how is a family to have more space with as good food on the same income? Economics has not yet shown how all incomes can be in-

creased in actual dollars and cents. As the carpenters' and plumbers' wages increase and their hours of work diminish, the salaries of professional men are worth less in purchasing value. Therefore it is pertinent to examine our habits and traditions to find, if possible, a means of securing more efficient living for the same money. Not until this is *tried* are we at liberty to join in the cry for higher salaries as a necessity for a higher standard of living.

This Cost Series is intended for the intelligent family with \$1500 to \$3000 a year income. This family has the most difficult problem of any to solve, and it should have the best help in solving it.

In discussing the cost of food, the author ventured to doubt if increased efficiency was a result of an increased use of costly food-stuffs above a limited amount; and certainly any increase above the normal in the cost of

clothing, or of dress even, is of doubtful value as a factor in human efficiency.

The marked rise in the cost of shelter has often been placed in the same category of doubtful advantage, and so far as this rise is due to the pressure of fashion, to the introduction of barbaric ornament, it is true; but recent studies indicate the presence of another set of factors which *do* have the most marked effect on human efficiency and which enter into household budgets with greater and greater insistency.

To an examination of these factors in relation to daily living and their cost in time, money and strength the following pages are devoted.

Like the others of the Cost Series, this is written from the viewpoint of the householder, the spender of the income, and it is with the house *as the social unit* that the discussion begins. Cleanness is the state of

being free from all objectionable matter, and when the sanitary engineer and the home economics teacher preach the Gospel of Cleanliness to the distraught housewife, it behooves them to know just what they are demanding of her in the cost of money, time and strength. To that end this discussion is sent out to gather information rather than to give authoritative figures. The estimates will, it is believed, furnish a basis for further study.

In a former discussion of the division of the income, "Cost of Living," the care of the house is put down as operating expenses, varying from 10 to 20 per cent of the income. No attempt was there made to divide this sum into the elements of which this care is composed, especially to separate the expense of the two chief functions,—cooking and cleaning. That attempt we now make as a basis for discussion.

The rent paid from this grade of salaries

has been found to average 25 per cent, or one quarter of the income: \$375 from a total of \$1500; \$500 from \$2000; \$750 from \$3000.

A new house in a clean city would remain clean if unused. It is the occupation and operation of the house as a family center that causes expense in cleaning.

Dirt is introduced into the house in three ways:

1. Faulty construction and management.
2. Careless habits of occupants.
3. Municipal neglect.

There are three ways to secure better conditions:

1. To rebuild old houses.
2. Education for permanent reform.
3. Employment of preventive methods.

The cost of cleaning may be lessened by

I. Scientific, dust and vermin-proof construction.

II. Prevention of entrance and lodgment of dirt:

(a) Use of fine screens and of mechanical ventilation.

(b) Use of putty and paint.

(c) Banishment of all unnecessary articles.

III. Municipal care of refuse.

Dirt once in, there are needed methods of routing it out in more economical fashion than at present, no matter how it gains entrance.

The question before us is how much does it cost to keep this rented (or owned) space in a sufficiently cleanly condition, that is, in such a condition that it offers no menace to the

health of neighbors and affords that protection to its occupants which the very idea of home implies.

The conclusion arrived at may be stated before giving the argument. The author believes that not less than one quarter the sum paid for rent will in any case be sufficient to keep the family shelter "just above the diphtheria level," as one intelligent housewife pertinently remarked it was her practical aim to do.

To keep a house, used throughout as is the custom today, with the usual style of serving meals in many courses, in *really sanitary* condition where risk is nearly eliminated, and to do this under the circumstances imposed by the prevailing low ideals of personal and municipal customs, the author believes will require a sum equal to nearly or quite one half as much as is paid for rent, or 12.5 per cent of the total income. For the three

grades considered, this would be \$187, \$250 and \$350 respectively.

Where this sum is not paid, one of two conditions exists: Either the standard is not kept up or the housewife spends a large portion of her unpaid, uncounted, unrewarded time. Therefore the statement of costs is misleading unless her wages are added to the income, as the author considers they should be.

If the housewife furnishes \$800 worth of work in the house, the family income should be counted as \$2800 and not \$2000.

It is agreed that the house should be maintained in a cleanly condition, in spite of the requisite cost. A clean house means clean people and a clean city. To attain this condition demands a reform in the habits of the people and an increase in taxes for public works. This will be accomplished only when the economy becomes apparent.

The following detailed estimate is offered:

To remove dust and tracked-in dirt in an ordinary eight-room house costs 18 hours a week, 50 weeks in a year, or 900 hours. If there is a furnace and frequent open fires, four special cleanings of 20 hours each, in the year, or 80 hours are sufficient. The washing of windows takes 10 hours a month, of blinds and porches 8 hours more, or 78 hours a year. The washing of walls and paint needs 15 hours twice a year; and with a library, 15 hours four times a year, or 90 hours. The laundering and cleansing of textiles, curtains, draperies, etc., uses 8 hours a month or 96 hours, making a total of 1244 hours or the time of a maid at 56 hours a week for 22 weeks in the year.

If this cleaning is done by an unskilled maid at \$4 a week wages, working 56 hours a week for 22 weeks, it will cost \$88, or, if counted as average house wages of 8 cents an hour, \$109.52. Too many houses

show that this inefficient work is the character of the cleaning. Apartment houses have been known to "furnish care" in the form of one maid to twenty-seven rooms and nine bath rooms!

If outside help is employed (which shows the real cost, as the housed and fed maid does not) at 15 cents an hour, the work will cost \$186.60, or for really skilled work at 20 cents, \$248.80.

If this cleaning is done largely by installed vacuum cleaner, the interest on the plant and the higher cost labor will probably amount to a similar sum.

It is true that a well-built apartment house offers eight rooms that may be kept in apparent order for a quarter this sum, and that is one of the temptations of such living.

If a family would go through its detached house and remove one half of the objects in it, would use paint, putty and enamel to render

surfaces smooth, and then would institute a rigid economy of dust entrance by windows, clothes and boots, it might be clean with no greater expense than that involved in the apartment. It is surprising the number of things we can do without when we have no place for them. A lady once remarked: "When one moves, family gods become family devils."

Laundry and cleansing of bedding, table, kitchen linen, and towels, costs not less than \$40 a year per person, if the standard is kept up.

The time spent in cleaning dishes, silver, etc., for our family living in moderate luxury is six hours a day; 6 times 300 equals 1800 hours, \$180 or more than the house cleaning.

For a family of five on a \$3000 income:

House cleaning.....	\$248.00
Care of utensils.....	180.00
Laundry for house for five persons.....	100.00
	<hr/>
	\$528.00

This is above the estimated one fourth, \$350.

Modern plumbing adds to the first cost of an \$8000 house one tenth to one eighth. Repairs and water rates require an annual outlay of perhaps \$50, often more. This estimate is for only one bath and two toilets.

Consider the problem of cleanness confronting the school teacher on a salary of \$400 to \$500 a year.

To the \$528 for the family, there must be added \$100 for personal cleanliness, making a total of \$628, and it is therefore quite evident that the standard is not kept up, or that the house-mistress gives not only unpaid but unrecognized service.

We may make the statement thus: The cost of keeping a fully occupied house in a thickly settled village or city up to the old-time standard of "pizen clean" will be found equal to one half as much as the rent of the house.

To keep "just above the diphtheria level" will cost one quarter the sum paid for rent.

Where the cost is less, the perfection of attainment is less and the dangers are greater whenever an epidemic appears.

In the rural community less of the house room is used daily. One set of china, fewer napkins, curtains, bed linen, etc., are handled and a room once cleaned stays clean longer. But, on the other hand, there is more shed and out-house space, more field dirt and barnyard filth to be guarded against. Real country dwellers, back from automobile roads, suffer less from the matter of dust (although the automobile is making many a country house close to the road uninhabitable) but more from insect pests. Here, again, cleanliness comes in to prevent insects. Screened stables, covered and screened manure piles, underground sink drains, filled pools, drained marshes, improve these condi-

tions and add to real cleanliness. There is less care put upon these points in the country very often and hence the health of the rural dweller suffers as does that of the city boarder.

The trouble is, cause and effect are not put together.

Change in habits brings change in dangers. The excess of water drawn from grandfather's well is returned without the complete purification of the earlier time when a gallon a day per person was ample.

House cleaning as usually interpreted means a dusting of pictures and walls, bric-a-brac and books, beating of upholstered furniture, wiping of woods and metals, and, finally, cleaning of floors, carpets, rugs or bare wood or tile mosaic. If rugs are frequently taken out, the coarse dust is taken with them, but alas, is distributed back by the wind and into other houses.

The substances to be removed are fly spots,

sooty dust, fine house dust or "lint" from the wear of textiles, street dust coming in through furnace cold-air boxes, and windows, as well as that brought in on clothes and shoes.

Two thirds of this might be prevented by having the upper half of the windows screened to keep out flies and street dust, and by an outer shoe-cleaning closet until the streets are better cared for.

The cold-air box for the furnace should be large enough to permit of screening. Children should be trained to put things away and to wipe their feet on entering the house. Dirty boots cause unnecessary work.

The laundering and dry-cleaning of textiles, curtains, portières, bed covers, bureau scarfs, etc., means more or less, as these things abound. If the cost were counted of keeping these things fresh and really beautiful, four fifths of them would be put away into the linen closet and no fresh ones would

be purchased. Good color effects may be gained by fewer, carefully-chosen, materials which will not clash with each other.

The dangers of the absorbent surfaces of household stuffs stand out when we look at them as harborers of the fly and his foot-prints, and of mosquitoes, as well as of the ubiquitous germ.

Prevention of wear is a saving in that the freshness of the articles is preserved, for most covers, rugs and curtains lose in beauty by being cleaned. Table and bed linen, on the other hand, gain in beauty by reasonable use.

House dust is always liable to be infected dirt. What more unhygienic and uneconomic proceeding, then, than to beat the neighborhood rugs on the neighborhood lawn or piazza and thus mix the various characters and redistribute them into every room in the region to settle throughout the week in a new

composite. To shake rugs and dusters out of the window in a closely settled section should be a statute offence as also should be the sweeping of house and porch dirt on to the sidewalk or into the street.

The dampened duster and the vacuum cleaner are the twentieth century helps in getting rid of fine dirt in the house. That the feather duster is a thing of the past is shown by the recent order for its banishment by the War Department, on the theory that tuberculosis is largely traceable to dust. The washable office floors, and asphalt or brick streets and cement sidewalks, also washable, are coming to the rescue in municipal cleanliness.

Clean air in the house means obedience to the first law of sanitation — quick removal of all wastes. Such wastes are used-up air from bedrooms, living rooms and especially from kitchens, where odors of cooking and

volatile grease from frying, boiling and roasting meat should be let out at once and not confined to become stale and offensive. This volatile grease, if not so removed, permeates the house and serves as a retainer of dust and smoke and adds greatly to the labor of cleaning.

The cost of really clean air in most houses is the doubling of the coal bill or the recognition of the value of fresh air at a lower temperature. The present cost of coal is partly waste in that the excess heat and closeness of the air predisposes to illness of many kinds.

Floors are a great source of dust in a house if they are of the old-type, two-layers-of-wood variety.

The cement floor, satisfactory for public buildings, is too hard and possibly too cold for the housemaid. It may be necessary to resort to a soft, thick-soled shoe. This will be a great saving in the case of the

polished wood floors, which are today shamefully abused by tramping on them in heavy shoes with projecting nails and gritty adhesions.

The monolith, or moulded floor, is destined to have a wide application.

Lack of adjustment is seen in that most prolific source of house dust the ordinary furnace set in the open cellar, which is filled with fine ashes each time it is shaken and cleared out. From this cool area, warm pipes in open ducts lead up through the walls to every part of the house, drawing this dust and allowing it to permeate every room and closet. It is an excellent example of needless work. If the furnace door opened into a closed space whence the ashes could be removed without dust escaping, and if the cold-air duct was efficiently screened, house-cleaning in furnace-heated houses in the winter would be reduced more than one half. The

fault lies in the construction. The furnace was an added convenience to an old-style building without a thought as to consequences. Hard coal gives more dirt than wood, and soft coal adds an oily soot. The use of gas has done much to lighten the burden entailed by ashes. Central heating plants will save yet more by removing the need for furnace-made ashes in the cellar.

It is in this direction of cooperation that the coming saving lies.

Instead of putting energy into holding back the wheels of progress, trying to maintain the old order of things, let us not only keep up with the procession but look ahead.

The time is rapidly on us when a small motor in the cellar will clean, ventilate, cool or heat the house and, I think, cook, and wash dishes. The electric motor is destined to figure as the housewife's friend. It goes without saying that unless she develops into a

sort of helpless queen bee she must learn to run machinery. Schools for chauffeurs have not refused to take women to learn to run automobiles; schools for household mechanics will come next. Here is an opportunity for something new. Who will be the first to found the — institute for house engineers or domestic automaids?

The state now has factory inspectors, the city, plumbing inspectors and sanitary officers. Typewriting firms send out teachers with the machine. Why not send teachers of domestic management — with the machines?

The present situation in regard to house-cleaning by compressed air and suction illustrates the common attitude in relation to household machinery. This method has the advantage of complete removal without redistribution of dirt; of cleaning without disturbing books, pictures and rugs; of rapidity of working; and, if used frequently enough,

would keep a house free from movable dirt. It also effectually disposes of the dirt and does not leave it on the top of ash barrels. A more ready acceptance of the relief given by such machinery would hasten the day when every house might have an apparatus of its own for daily use.

Central "care companies" are doing a successful and satisfactory business in many cities. The idea could be further developed for villages.

The universal presence of the telephone makes possible the notification of the company of the work needed as quickly as if the worker were of one's own household. Skilled service, using the best proved materials, can perform the work of cleaning in the quickest and least destructive manner. Cleaning is often put off because of the danger of injuring or destroying the article.

The use of all such aids is spreading

among those who can understand true household economy, that is, accomplishment of the purpose desired with the least wear and tear on both material and mental equipment.

Men or women trained in economics of consumption, that is, in the measure of satisfaction to be had from the expenditure of money or time, must be found to solve the problems confronting us.

It must be made clear that the cost of mechanical apparatus offsets the loss caused by the lack of efficiency and the excess in time used by unskilled labor, because if the time of the cleaner is not valued, then the estimate seems wild. And it is one of the economic anomalies that the wage-earning capacity of the family is always set at the money brought in from work done out of the house, while no estimate is made as to the actual wage-earning in the house. Economic theory has not become adjusted to industrial

conditions. It is because neither the housewife nor the provider of the income has been in the habit of counting *her time* as of value that all efforts at outside help have proved fruitless. To keep a house up requires a given number of hours of some one's time. If this time is not given, the standard falls.

One of the most enlightening studies of the situation was made in 1904-5 by the Household Aid Company under the auspices of the Woman's Education Association of Boston. As conclusions the report states:

"It was established as a fact that mechanical progress has been less utilized in the household to save hard labor by human hands than in any other line of work.

"That less attention is paid to avoid the making of work than in other lines.

"That physical strength and muscular education are both wanting, in even the

foreign-born, as compared with a generation ago.

“That pleasure in work, in seeing a thing well done, is no longer found. It is only for the money to spend that most people work, and work as little as they can for it.

“That employers foster this feeling by failing to distinguish good work from bad, and by failing to reward good work over and above bad.

“The most frequent calls were for scrub women and laundresses and for heavy work, such as cleaning paint work, which the company did not furnish.

“It still remains a question whether this demand is the demand of the future or whether all work, such as cleaning and repairing of garments and even the fulfilment of social duties, as dinner and tea giving, are going *out of the house*.

“If household duties are to be well done

in the house, they must be systematized into a trade, and training given for it as in any other trade. This involves acceptance of certain standards by large groups of employers; not necessarily by all, but by sufficiently large and well-defined groups to make it profitable to train for them satisfactory employees."

The success of trade schools in other directions gives promise of ultimate success in this.

While it is true that this is an age of prevention, and while most schemes for social betterment imply a new starting point, it is also true that most of us live in houses of a past age and with persons of settled habits. It is not easy to reform from within in any department of life, and it is particularly difficult in that which has been assumed to be especially under feminine control. Today, when all else is taken out of the house,

cooking and cleaning are generally left, although both these operations are coming under the control of companies with men as employees.

These two operations share the groundwork of human living; to have food and to keep clean is the aim of all housekeeping, and that in turn is for what Dr. Albion Small terms the "achievement of human values" — the production and preservation of the most valuable assets of the state, human beings.

In view of this great cost of cleanness, the housewife may be pardoned if she shrinks from incurring it until she can show good cause for the outlay. In her department it has not been customary to consider a large present outlay as justified in probable future saving. Where style ranks supreme, as it too often has done, investment is precarious, and in household affairs women's fashions have been allowed to rule.

Schools of domestic science are being blamed because they do not furnish willing and skilled workers at low wages. Certainly they do not. They attempt to educate the housewife and the house-provider to pay for what is done at a reasonable rate for good service.

A serious study of home economics is changing the attitude of enough women to begin to affect the furnishing and decorating of a house with regard to the possibility of keeping it clean. At the international sanitation congress at Geneva, 1906, one section was given to this subject, and at the next one we shall expect to see a session devoted to vacuum cleaners and to floor coverings.

In three to five years mechanical appliances will have made themselves felt as factors in urban and suburban cleanliness. This will be because of the meeting ground of lessened cost and of recognition of the saving. Public

buildings are, as usual and as natural, far ahead of private in this matter.

That the actual cost of keeping clean is not realized by the housewife is proved by the reluctance she has shown to the introduction of temporary help, to the installation of mechanical appliances; by her lukewarmness to the idea of simplification of living and to the banishment of three fourths of the "things" now collecting dust.

It is hoped that many families will be kind enough to keep some accounts of costs of cleaning and send to the author for the second edition of this little volume. Whatever value the little book, "Cost of Living," now has is due to the actual accounts so furnished.

CHAPTER II.

PERSONAL CLEANNES AND THE DISPOSAL OF PERSONAL WASTES

PERSONAL uncleanness as it affects the community:

- (a) By degradation of ideals.
- (b) By disagreeableness without danger.
- (c) By danger of infection and spread of disease.

Cleanness is a matter for education.

“Take away the hovels and filthy places, let sunshine and pure air circulate through their homes, and teach them habits of cleanliness and responsibility, and the first step toward the elevation of the degraded and the education of the ignorant will be taken, not only in the warfare against tuberculosis and

other diseases engendered by unsanitary surroundings, but also in the battle for higher moral and social standards." — (Geo. M. Kober, Bulletin of the Bureau of Labor, No. 75, March, 1908.)

(a) There is a moral value in cleanliness not to be expressed in dollars and cents. In all ages and in all religions there runs a thread of the elevating effect of "clean hands" of eating "in a clean place" or from clean dishes as well as of keeping one's self clean. It is as though man, in his effort to reach up higher, lifted himself from that close contact with earth and waste, and with his fellowmen, to a cleaner level. There is a psychological element here worth noting. No man can be self-respecting and dirty at the same time. Clean dirt, or the smut of the coal heaver, or the iron-rust of the machinist is not meant. This is inert, harmless, on the outside, but the waste of human life should be put forever

away, else it drags man down lower than the beasts of the field.

In his essay on the Advancement of Learning, Francis Bacon wrote in the sixteenth century: "Cleanness of body was ever deemed to proceed from a due reverence to God."

One might say the cost of uncleanness was the loss of the higher sense of manhood, of the ambition to rise in the social scale, of the will to do great things.

This inculcated regard for the human body is prominent in all creeds which look to man as possessing possibilities of godlike performance. In all ages it has at some time become a cult and degenerated into a deteriorating luxury. With the scientific knowledge at hand today this deterioration may be prevented without losing the advantage of the spur to higher attainment. Cleanness of person and surroundings is a concomitant with ambition for a more effective manhood

as well as with a desire to rise in the social scale.

(*b*) There is a moral value to ceremonial cleanness of person and apparel even when there is no sanitary danger.

We dislike to see a beautiful building covered with soot. We dislike to see a rich garment trailed in the mud. For the protection of the building we pass smoke laws; for guarding the garment we pay carriage hire.

The dirt we bring in on our shoes we are not so conscious of. The sand that sifts into our windows, we do not take pains to keep out. The unwashed or highly perfumed are refused admittance because the odor represents a condition of uncleanness to our minds quite as much as because the greasy clothing will leave its mark on our spotless environment.

Do we ever stop to consider what it costs in both money and time for the busy workers to

keep free from this mere "matter in the wrong place" to an unnoticeable standard even?

The opportunity for bathing demands, as we saw in Chapter I, under "The Clean House," a considerable outlay in money or in wearisome labor and time. The brushing of clothes and shoes; the cleaning and pressing of outside garments; the laundering of washable clothing, involves at the least an expense of \$50 a year or makeshifts. For those who go to and fro among people and in cars daily, an average of \$150 is not too high for immaculate appearance. That the school teacher on a salary of \$500 does not and can not spend this shows that she takes time from her rest and recreation to do the work herself under great disadvantages.

Some of the newer materials which do not require ironing are a great boon to impecunious lovers of clean clothing.

To the first cost of laundering must be added at present the wear and tear of bad methods, largely increased by the misuse of articles. Towels are used to wipe boots, to mop up ink stains, to wipe off dusty furnishings. Napkins are used as badly; table cloths and sheets are mussed into dirty corners.

The time saved to the busy worker by such mechanical aids as bathrooms is an important item and tends to encourage cleanliness, although they are not absolutely necessary. The English tin, hat-shaped bath tub, 3 or 4 feet in diameter, with half a pail of water and a sponge or a yard of cheese cloth, will do the work of an expensive shower bath. It means time and trouble, but not money cost. A square of rubber cloth laid over a ring formed of an old blanket or Turkish towelling makes a shallow bowl just as effective and less cumbersome when not in

use. A large sponge takes up the excess of water.

The American habit of using the bedroom as a sitting room prevents these appliances from being common in houses where facilities are meagre.

The time spent each day if one had to use such simple methods and bring and carry water, wash and iron, black one's boots, etc., would be about an hour and a half a day, or 10 hours a week. Six hours of this work others can do for us. If our time is worth 20 cents an hour, we can afford to spend \$1.20 a week on laundry and boot blacking. All this is only for the lower limit of respectable cleanness. Dainty linen and fresh clothing demand often, if we are moving about our sooty cities, ten times that sum.

(c) Personal cleanliness in relation to infection involves clean ways of working. The now classic case of the cook who infected

every family she worked for for a series of years brings up the need of clean hands and of a wider use of the tasting spoon; that is, a second spoon into which a small portion of the food to be tasted is poured from the stirring spoon. Chefs are loath to take this trouble and many cooks and mistresses never heard of a tasting spoon. Without it disease germs find an easy access to cooked food. We can not too often post up in kitchen and school room — “Mouth and hands beware.”

Examples of the danger of unclean hands: Waitress, chambermaid, cook handling food, dishes—glasses especially. How many times do we dare to look for finger-prints on a glass before we drink? The habit of taking up four or five glasses at once with as many fingers *inside* is a highly reprehensible one and may well form a special lesson in school.

The handling of the hair and of money,

and then using the unwashed hands in contact with food is far too common.

It must be remembered that—all moist mucous surfaces within and without the body may harbor germs dangerous to other persons. “Hands off” is the rule, and instant sterilization with hot soap suds if the rule must be infringed.

Habit, guided by scientific reasons for it, stands out boldly as the thing to aim for.

The greatly increased use of restaurants, owing to the influx of suburban patronage, is a fruitful source of those usually slight illnesses which take away the margin of efficiency, especially among women shoppers and clerks who frequent them. And this because of the lack of standards of cleanliness in them which the present-day knowledge demands. One needs only to study the method of the few really conscientious ones to see what the others lack. In the little book

called "Home Sanitation," prepared by the Sanitary Science Club of the Collegiate Alumnae in 1887, a series of questions was appended to each chapter, each of which was to be answered by "Yes" if the conditions were satisfactory. If the question could not be so answered, the student of her own house was to look into the matter and see why not. In like manner we might formulate a series of questions to put to our eating places before we gave them our patronage. For instance: Do you have the floor wiped in the morning, not merely swept, so that the dust is all the morning settling again?

Do you inspect the dishes to see that finger-prints of unclean hands are absent?

Do you instruct the waitresses never to allow finger or thumb *inside* a glass or cup, even when taking it away after using? (Habit is too strong to allow of discretion.)

Do you instruct them always to take up spoon, knife or fork by the *handle*?

Do you inspect the waitresses' and cooks' hands to see that there are no lesions or sores? that their nails are cared for? One up-to-date establishment furnishes a manicure for its 300 employees.

Do you inspect the maids for loose pins or hair or shreds which might fall into the food?

Do you assign a special person to pick over all fruit?

Do you have a special inspector whose duty it is not only to examine the food delivered but to see that all left-over portions are looked over before being put away or used in other dishes?

The salary of this food inspector must be a large one to insure the knowledge and character, the high sense of honor which will protect the public from its own

ignorance as well as from employees' carelessness.

The increased cost of all these precautions will add one third to the price of many dishes and a large proportion of the eating places make their money by *not* incurring them. Why should they when their patrons do not appreciate the extra cleanliness?

The public is usually served as well as it deserves. It does not notice the little things that cost so much, why should they be done? Many years ago when the New England Kitchen had evolved a deliciously flavored soup, it was discouraging to further effort to have the men before whom it was set drench it with pepper and salt before tasting it.

There is a narrow enough margin in any case in food preparation and serving, with high rents and excessive breakage. One New York place made its profit in not wiping the tumblers, merely draining them.

If patrons are not willing to pay for extra cleanliness it shows that they do not know the penalty for unclean food; or, knowing, they do not care enough for their own bodily welfare to find out where to get clean food and then to be willing to support such places.

In sanitary matters ignorance is never safe and wisdom about cleanness is never folly. The criminal economy in "using up" tainted food should be stopped. It pays to throw away spoiled food just as it pays to burn infected rags.

One correspondent has said "it may be all right to buy a cheap suit, but it is never all right to buy a cheap sandwich."

Sickness is estimated to cause a loss of 20 days per year of school time of the average child; added to this loss is the cost of doctors' bills, extra supplies, etc.

It is safe to say that two thirds is caused by

lack of care of hands and in handling materials to be put in the mouth or brought in contact with eyes and noses. The habit of moistening fingers with saliva, of handling food, books and clothes, the dangerous habit of fingering the nose and then clutching other children's faces, of wiping moist hands on one's own and on other's clothes, of needlessly fingering door knobs, books, pencils, etc. (is it because we do not give enough occupation for children's hands?) — all this goes on without washing of hands, from morning till noon and perhaps till night.

A serious problem confronts the careful house-mother today in dressing the school child. Shall the clothing be wool and dark and heavy so that it need not be washed, or shall it be of cotton and light in color and texture and washed frequently? It costs more time for the latter and the over-worked mother is relieved when the clothes are even

metaphorically "sewed on for the winter." But hygienically there is no question. Frequently washed clothing is a safeguard, especially for school children. The crowded cloak room of a public school is a constant menace. The immediate increase of disease on the approach of cold, wet weather probably has a direct connection with the bringing out of last year's uncleaned clothing.

It may be good policy to have municipal clothes-cleaning establishments where school children's clothing may be subjected to naphtha cleaning each spring and possibly stored until needed. The shaggy tam-o'-shanter is quite as likely a conveyor of disease as the hair of cat or dog.

Personal cleanliness should be looked upon as a social obligation when considered as a preventive measure. The public has a right to demand that it may eat and drink and travel safely without danger from pistols or

microbes of its neighbors' carrying. Notification of certain infectious diseases is now demanded, and in the future when the full meaning of sanitary protection is understood, notification will be extended to unclean homes, restaurants, hotels, and steam-trains, many of which are now a disgrace to the twentieth century.

The whole body politic is interested not only in the carrying out of the laws which the sanitary expert has advised, but in the teaching of children right habits before wrong ones become fixed.

Our public schools may be the great centers for the teaching of personal cleanliness. The teachers, supported by the authorities, are authorized to exclude any child who is offensively unclean. In most schools the education of the parent is attempted by sending the child home to be put right. But the academic idea of the office of

the school is often firmly held, as expressively shown by the note returned to the teacher who had sent the child home with a request that he be cleaned. The reply read: "Willie ain't a flower, he is a boy; larn him, don't smell him."

For such the school shower-baths maintained in several cities is the only present remedy.

One schoolmaster has trained several generations of boys to clean their shoes in a room provided with brushes before going into the main building. If this were universal we should soon have clean houses.

The conservation of the human resources of the country demands that more attention shall be paid to removing unnecessary dangers from the path of the growing child. Both at home and in school he is assailed with dust and dirt beyond his elders since he is

nearer the ground and in more constant contact with things. "Hands off," is one of the most difficult but one of the most necessary lessons for a child to learn.

If it is objected that people have lived in dirt and apparently thrived on it, that some of the dirtiest looking children are the healthiest, we can only say that there are various kinds of dirt and that, fortunately, human beings as well as animals have a large resisting power when they are well fed, warm and happy. Such persons may carry pneumonia in their throats, tonsilitis germs in decayed teeth, or diphtheria germs in their noses for years and then some sudden chill or grief or anger may let down the defences.

This whole matter of cleanness may be looked upon as a sort of insurance carried against risks. Not every one is injured who travels on a railroad and yet many take out

policies. Not every house gets on fire, yet insurance is held to be a valid protection.

The risks of infection are great enough under the prevailing careless habits to make cleanness a good insurance policy.

[For aid in the preparation of the next two chapters acknowledgment is made to Mr. Royce W. Gilbert.]

CHAPTER III.

THE CLEAN CITY.

MUNICIPAL expenses for cleanness are incurred for the removal of wastes, namely, sewage, garbage, refuse and street dirt. There is also a certain proportion of the maintenance of water supply used for sewage transportation and street cleaning.

A considerable sum must be allowed for inspection of various kinds — factories, markets, etc., and for care of schoolhouses and public buildings.

The municipality is more and more taking upon itself the expenses for personal cleanliness, as public baths, and the collection of wastes.

The essentials of public health are recognized as clean air, clean water, clean soil, clean and wholesome food. When people

crowd into a limited space these must be secured by cooperation.

Most cities have provided clean water and have secured clean soil by a sewerage system. Clean food awaits clean air for the most part and depends upon the education of the people.

Clean air implies perfect garbage and wastes disposal, clean streets and alleys, and an atmosphere tolerably free from dust, smoke and noxious odors. In this direction the civic expense has gone about as far as the people will support it. More money must be spent (and more wisely spent) on street cleaning, on schoolhouse and public buildings cleaning, on smoke suppression; more stringent regulations as to throwing rubbish, ashes, etc., into the streets, beating rugs, etc. Expenses for municipal sanitation are already large, even for the imperfect service rendered, as the following illustrations show:

City.	Street Cleaning (Annual Cost).	Sew- age. (Inst.)	Garbage Dis. (Annual per Capita Cost).	Water Works. (Inst.)
New York.....	\$6,000,000	.....	\$1.50	\$123,012,000
Philadelphia....	1,273,282	.....	.....	37,971,959
St. Louis.....	.....	.....	.12	21,551,600
Buffalo.....	.....	.....	.045	9,424,000
Pittsburg.....	.....	.....	.29	7,667,800
Detroit.....	.....	.....	.21	6,313,757
Cleveland.....	.....	.....	.18	10,735,000

The refuse collected per capita in greater New York in 1906 was 1470 barrels, at a cost of \$1.50 for collection and final disposition. The great amount of "rubbish," for the most part of a combustible nature, expresses a waste due to the great consumption of paper, baskets, boxes, etc., which should serve as fuel, but which gas stoves render useless. As furnaces go out of use there will be more and more of such material to be disposed of outside of the house itself. The camp fire is a lesson in cleanness.

It seems to be desirable to install incinerators, properly constructed and run by skilled engineers at a sufficiently high temperature to burn the gases and not "fry" the garbage. Such plants cause no more offence than a furnace and boiler plant and should be so distributed over the city that short hauls would be required, lessening the expense.

Towns and factory villages will also profit by the extension of these smaller plants. A plant which may serve as an object-lesson to towns of 10,000 inhabitants is being installed at the Hudson Terminal Station, New York. Hospitals are again furnishing examples for colleges, groups of cottages, etc., in the installation of small but efficient plants.

In all cases sanitation must come first and any question of profit second; but in all well managed establishments utilization of the fuel for the running of electric lights or of machinery is a factor.

Within the past 25 years municipal outlay for clean water and sewerage systems has been accepted by the taxpayer as a necessity for public health. Clean schoolhouses and public buildings will soon follow. There is hope for clean air within the next twenty-five years.

If we say that the municipality has gone as far in civic expense as is wise, then the next step must be the education of the people to (1) use what the city is now willing to provide, and (2) they must be encouraged to ask for more. Some new catch-word often helps in arousing public opinion and the author proposes *Instructive Inspection* as the next thing in civic cleanliness. A corps of trained men and women (the women are an especially important factor, as will be seen) provided by the city, not only to see that the regulations are carried out but to instruct the ignorant, incompetent and bewildered house-

holder how to carry them out. Newspaper science will not avail those who do not read, and the class of housewife who needs this personal instruction does not read. Public lectures and class demonstrations do not reach the crowded quarters, and too often they are impracticable in application to the peculiar conditions in which every household finds itself.

It is only by sympathetic acquaintance, backed by the power of the law, that an inspector can exact that intelligent obedience which will soon become a habit and no longer need the support of instruction.

The complaints of philanthropists of the misuse of provided helps to cleanliness show the need of this personal instruction, and it must be of a sort the burly policeman with his club cannot give even if he would. A pleasant, friendly-faced woman with a dampened or oiled dustcloth is more to the

purpose. Our laboratories could now furnish such inspectors at short notice, and an expenditure of \$10,000 a year for five years per 100,000 inhabitants would revolutionize any city, however proud of its present condition it may be. I say five years because hand in hand with this effort will go a teaching of the reasons for such regulations as to cleanliness, and examples of how they may be carried out in all the public schools. The time is ripe for a recognition of sanitation as a fourth "R" in the school curriculum.

The importance of an educated public, educated by instructive inspection or otherwise, is almost universally recognized, as the following quotation indicates:

"The most vigorous sanitary surveillance on the part of the municipal health office, together with all agencies engaged in the struggle, cannot avail without the cooperation of an educated public, alive to the seriousness

of the problem and the best methods of its solution." (Extract from the Second Annual Report of the Consumptives Hospital Department of the City of Boston, 1908.)

The tax upon the community for municipal cleaning, honestly performed, is not a heavy one when shared by all. The tax upon the individual householder who tries to keep his own premises up to a safe standard under present lax conditions is tenfold greater. But the levy of sickness is a far heavier burden on the one who does not, as will be seen in Chapter IV.

The condition of one's own kitchen and the habits of one's own employees are usually unknown factors unless the housewife takes part in all the daily tasks. She has become so discouraged under the burdens imposed by the increasing difficulty of keeping outside dirt from her premises that she has shut the kitchen door and looked after the front hall

with an inherited tradition of the housewife that the best foot forward is the best policy.

As before said, to be clean is, today, to be in such a condition of house and person as to be of no danger or offence to one's neighbors or one's self.

The needs of city and state supervision are today insistent, whereas fifty or seventy-five years ago they were not. Then, if a ship brought disease, only the immediate locality was exposed, for there was slow communication. Today a passenger landing in New York may be in St. Paul or Helena before the disease develops, and perhaps he has scattered seeds all the way. In a crowded quarter, close contact in halls, alleyways, restaurants and street cars all demand greater care in cleanliness of both person and quarters. Dust in streets, refuse in shops, smoke in the air, all demand removal by expensive means.

National and state expenses for sanitation, which is always cleanliness, have increased. Cuba and Manila and Panama are examples of efficient governmental expenditures with convincing returns.

Enforcement of laws forbidding the unnecessary deposit of filth in streets and public places, together with the quick and thorough removal of all dirt, no matter what its origin, would in a short time so reduce the cost of house-cleaning, as well as the loss occasioned by preventable disease, that the average citizen would soon perceive the economy of the necessarily higher taxes and gladly pay them. Two or three illustrations will serve.

“Not so very long ago the city of Vera Cruz, in the low-lying coast country of Mexico, was one of the sickliest spots on the continent, and because of its high death-rate it was given a wide berth by natives and foreigners alike,” said Julian D. Appling of

Chicago. "The old, sinister reputation of Vera Cruz has been entirely obliterated, thanks to the talents and good offices of one man, an Englishman by the name of Samuel Pierson. What Pierson did was the simple act of installing a flushing system by which the streets of the city got a daily washing. The streets once so dirty and prolific of disease now get a thorough cleansing every twenty-four hours, and the water, after performing its service, is carried away by a perfect sewerage plant. Since the installation of the street baths yellow fever has become a thing of the past. Once a scourge, there has not been a case of it in Vera Cruz for the last five years, and the town that of yore was shunned has become a veritable health resort, people coming there to get back their health from the higher sections of the republic."

"Cleanliness never hurt anybody or gave

him typhoid. The death rate in Rome has fallen from 30 per 1000 to 10 per 1000 since it raised its street cleaning expenditure from \$15,000 a year to \$280,000 a year. Hamburg had thirteen cholera epidemics between 1831 and 1873. The city was cleaned up along with other German cities and now the German physicians are praying the government to limit the supply of medical students. Cleaning up helps to destroy the flies' breeding places, and the flies carry half the disease into the groceries."

The cost of clean air is being learned through the tuberculosis campaign. Dirty air means tuberculosis, throat troubles, eye diseases and some contagion. In large cities about 15 per cent of all deaths are due to tuberculosis. In Boston, in the first week in January, 1907, 24 per cent of all deaths were due to acute lung diseases and phthisis; 6 per cent to other preventable diseases. This, if

average, indicates a loss to the city of Boston of invested capital of \$37,000,000 in 1907.

There is also danger of food contamination from filthy dust, as many investigations have proved. A careful examination of fruit purchased in the open market was made in the Strassburg Institute of Hygiene (*Archiv. für Hygiene*, 1902): 200 grams of strawberries yielded to rinsing water 2,000,000 living germs, raspberries 4,000,000, grapes 8,000,000, currants 11,000,000, cherries 12,000,000. Dr. Ehrlich recommends washing in running water, or if in a bowl washing for 5 minutes. A wash water of 0.5 per cent citric acid solution is also recommended. Of course there may not be disease germs among these millions, but in a city where expectoration is practiced and refuse is allowed in the street it is hardly possible to find street dust wholly free from infection.

The necessity of clean water is agreed upon

although its cost is from two to ten times that of plain water.

The extension of municipal utilities includes public baths, now found in most of the enterprising cities of the country. Philadelphia maintains fifteen. The cost of a modern bathroom with all its appurtenances and the perfect care of it, together with the water tax, is about one dollar a day. If used by five persons, 20 cents a person, or 60 dollars a year. This is beyond the reach of the wage-earner who cannot add this to his cost of shelter. The kitchen sink furnishes the sole water tap, and here if anywhere personal washing is done, teeth are brushed, and on Saturday night perhaps the children are tubbed with much effort and contrivance. Such conditions are not conducive to sanitation. In the country, room may be made to provide some amelioration of these hardships, but in the crowded city

tenement recourse must be had to the public bathhouse for the elders of the family, thus relieving the pressure on the resources.

These municipal bathhouses are yet to be perfected, but those of Milwaukee, Wis., seem to have approached the right level. There are three, each costing about \$24,000 as first outlay, and for annual maintenance about \$5,000. They are patronized by about 600,000 persons, each bath costing the city 2.5 cents. No better investment could be made. There are shower baths as well as a swimming pool and a limited number of tubs.

In Newark, N. J., the operating expenses are given as about 6 cents a bath.

Brookline, Mass., installed a municipal plant at an initial cost of \$43,000. The annual maintenance is \$7,600, of which \$5,230 is provided by a charge on five days in the week of 10 cents a bath, leaving \$2,370

as the municipal cost for the 50,000 baths taken. Boston maintains several public baths, especially salt-water privileges for summer.

Later statistics would show a still more favorable outlook as to numbers.

Next to municipal bathhouses the laundry question should be taken up, especially the cleaning of outer clothing so quickly soiled by contact with the many sources of dirt if the individual goes about on street cars and in shops. There is reason to believe that this must come. The small house is not fitted to carry on cleansing processes. Not only is the space small and the opportunity for drying nil, but the dry cleansing which sterilizes — naphtha cleansing — is dangerous in the small apartment. In the suburban home it is only knowledge and skill that are lacking. Some will say, furnish mechanical help instead of human labor to do the work.

It is true that there is a field for invention of mechanical apparatus to install in the detached house with land to make the operation of cleaning easier and therefore more certain to be performed.

There is no lack of competitors for business, such as laundry and baking, but they are not subject to inspection and the careful housewife does not care to run the risks of contagion. There is no more disheartening experience than to make a tour of the so-called laundries, cleaning dens as many of them are. Social betterment demands an awakening of the social conscience on these points and a development of machinery which shall be satisfactory.

The problem of transportation of small packages of laundry is a serious one; but surely American invention, if once turned to the subject can as successfully cope with it as with tunnels under rivers.

We hope we have shown that it is not the insignificant problem it has been considered, for tendencies toward group living and community support of cleaning establishments and buildings-care companies are closely following the lines of baking kitchens and ready-made clothing.

All these will demand careful inspection and regulation for sanitary and economic results.

CHAPTER IV.

THE COST OF UNCLEANNESS.

“THERE are four great wastes today, the more lamentable because they are unnecessary. They are preventable death, preventable sickness, preventable conditions of low physical and mental efficiency, and preventable ignorance. The magnitude of these wastes is testified to by experts competent to judge. They fall like the shades of night over the whole human race, blotting out its fairest years of happiness.” (A. A. A. S., Ithaca Meeting, J. Pease Norton, Ph.D., 1906.)

The state and the city besides private philanthropy are obliged to provide an increasing number of hospitals for the treatment of diseases. Barring accidents, most of these diseases are preventable and a

large portion are due directly to unclean habits.

The support of the thousands of physicians comes from the same source. That is, doctors' bills in great measure represent the cost of unclean methods of living.

The city employs inspectors to see that its rules are enforced. It maintains fumigating and disinfecting apparatus, and in a dozen other ways incurs expense. There are also to be noted the loss to the state in losing its capital in human beings by untimely death; the loss to the individual and the state in the labor of those sick for weeks and months; the loss in working and, especially, in thinking power by the discouragement and despair consequent upon sickness and death: by the lack of ambition and will to work.

Professor Norton estimated the saving to the country by a condition of good health of

sums now spent in illness and its adjuncts as follows:

	Per Annum.
1. An increase of 10 years in length of productive life of the workers would mean a value of.....	\$2,640,000,000
2. A saving in the burden of death expenses.....	120,000,000
3. A saving in the burden of sickness...	500,000,000
4. A saving in the burden of crime.....	100,000,000
	\$3,360,000,000

The deaths from preventable diseases due to dirty air, soil and water have averaged in cities about 700 to 1000 per 100,000 inhabitants. Each death means also the *sickness* and recovery of others, expense for medicine, nurses, etc., and is frequently reckoned as a cost to the state of \$10,000. This is an economic waste—unproductive effort—of \$7,000,000 to \$10,000,000 for every 100,000 persons.

Vital statistics show the virtual suppression of many contagious diseases, as smallpox and scarlet fever. If some, why not all?

The spectacular results of cleanliness are shown in the safety with which surgical operations are performed under antiseptic conditions. It is simply cleanliness in the full sense of the word. Fifty years hence it will be most amazing to read accounts which prove that intelligent people did not put two and two together and banish dirt altogether. One becomes a pessimist when one realizes how slowly practical knowledge filters to the man in the street and the woman in the home.

A large proportion of all these preventable diseases are to be prevented, not by any miraculous change in climate or therapy, but by just plain cleanness — soap and hot water, and especially clean hands and the deposit of refuse in the right place. This will cost each person and each family a certain sum of money and a very considerable expenditure of time and attention, but the

cost of neglecting these precautions is shown by the expense involved in the prevalence of these diseases of uncleanness.

The advances in medicine and surgery have increased the length of human life, but sanitary science has not yet lessened the total of *sickness*. That has increased, with a consequent loss of total efficiency. These losses in efficiency show themselves in various ways: in diseased children, unable to take advantage of the education offered; in wage-earners doing half a day's work; in the lassitude and dejection of thousands of people suffering from close air in cars, halls and houses; in the prevalence of tuberculosis, pneumonia, tonsilitis, typhoid fever, cerebro-spinal meningitis, scarlet fever, measles, trachoma and other eye diseases. All these are communicated because of uncleanness in person, house or city, because of bad habits in both officials and individuals.

“Science has been applied to many processes of manufacture, but in matters of health and disease, of marriage, of education, of economic methods, of social organization, we pursue our course largely by the guide of habit, tradition or blind impulse.” (From the *American Journal of Theology*.)

There is no need of going into details. Each reader can supply for himself plenty of illustrations when he once opens his eyes to what is going on around him.

Communicability by contact rather than by air-borne germs is now granted as the most frequent source of infection. Therefore contact of soiled hands is above all to be prevented and especially in the preparation and serving of food. The things permitted in kitchens and restaurants are past belief. Supervision must be demanded.

It has been well said that we lack imagination because we do not see that for one-tenth

what we pay for hospitals and dispensaries we could learn to make them superfluous. The slowness with which sanitation is taken up is explained by one writer on the basis that cure is always dramatic and prevention rarely so. We see philanthropists pay for monumental foundations to relieve spectacular cases when for a tithe of the sum more cases could be *prevented*, not only for one year but for all time. Optimists look forward to the virtual extinction of disease, but it will be only after children are taught cleanly habits from the very first, brought up in clean homes, and sent to clean school-houses through clean streets.

No exact estimate of the cost of disease can be made, but a sum of \$212,000,000 has been given as the cost of tuberculosis, \$150,000,000 more for typhoid fever. To these add the dirt diseases of children, the throat diseases due to dust, and a score or two more, and we

have, at a low estimate, \$500,000,000 wasted in unnecessary sickness due to unclean ways, besides the loss in earning capacity and the depressing effects of it all, for one of the worst evils is the general discouragement, depression, disgust with life which is a sure accompaniment of filthy surroundings. *Sickness* is much more wearing than death. The cost of despair is never reckoned. The person may not be conscious of it, but there is an undoubted effect owing to that something referred to earlier which in man responds to clean surroundings.

The circumstances most in the public eye just at present are those in connection with milk. Clean milk is a clarion call. One of the most recent and striking proofs of cause and effect is the suppression of Malta fever, by which during the last twenty years fourteen to fifteen thousand English soldiers and sailors of the garrison at Malta

have suffered. The fever is of long duration — 120 days in the hospital being the average and two or more years being frequently required for recovery. An average of 624 soldiers and sailors in the hospital for 120 days means about 75,000 days of *sickness*. Late investigation showed the fever germs to be present in fifty per cent of the goats on the island, and ten per cent were found to be secreting and excreting the micro-cocci in the milk. This milk had formed a conspicuous part of the dietary of the garrison, and upon its banishment the fever disappeared, showing conclusively the carriage of the disease by the milk.

Estimates of infant mortality due to unclean milk may be had in every community, as is shown universally when clean milk is substituted. Milk products, as cream and butter, are ready carriers of disease.

Ice cream has been found to contain as many as 50,000,000 bacteria per cubic centimeter when made under fairly clean conditions. In a Philadelphia investigation, 80 per cent of the 68 samples were found to contain streptococci. The source in most cases was probably the cream used.

Adequate inspection has always disclosed dangerously filthy conditions and nauseating habits of handling in a too large proportion of ice-cream shops. A year or two since the superintendent of a club house visited a dealer to arrange for a regular supply. The man, baring his arm, plunged his hand well down to stir up the beautifully smooth-grained mass. Needless to say, he did not get the contract, but he is still doing business.

Wherever we turn and whatever product we find to be a carrier, it comes back to the human carelessness and ignorance of what

cleanness, real chemical and bacterial cleanness, means.

It can be shown that human efficiency does have a money value. The worker in the rice fields or on the sugar plantation weakened by the hook-worm disease adds very little to the capital of the state in his short working life, for he has little energy to spare above that necessary for mere existence. The well-trained laborer in full working efficiency should give 300 days a year of active profitable work at \$3 a day and be worth to the state more than his keep. The skilled artisan should bring in three or four times as much income with little more cost of living, and a slightly greater cost in education. Education is the great producer of values. The engineer in the broad sense is the man who, at present, holds himself in truest esteem as a valuable servant of the state, for it is in engineers' offices and homes that we

find the best examples of clean surroundings and the least sickness and loss of time due to depressing lack of cleanliness. Would that we could say as much of college halls and dormitories. The total days of sickness in the community have increased, it is said, even though the death rate has lowered.

The one thing we are sure of is that it is our duty to give the child a fair chance. Twentieth century civilization belies itself if it does not. Knowledge of what clean air, water and food may do for the race is now at hand. Why not use it?

That the plea for greater care of the children is not a merely æsthetic and sentimental one is proved by the recent careful investigation in New York, reported in the *Quarterly* of the Am. Statistical Association, Vol. X, June, 1907, entitled "The Physical Welfare of School Children." A few of the results will be noted: 84 per cent of

backward children need physical treatment. Only 10 per cent were suffering from malnutrition. The effects of bad air, dirt and unsanitary housing are the most prominent. The gross ignorance and neglect of parents is shown in the statement, page 290: "Almost to a child of the 990 re-examined in March and April, conditions were more serious than in October and November when the parents were notified."

Dental defects and neglect of daily care loom up as probably frequent causes of many throat and stomach diseases. The new crusade against bad teeth has its foundation in lack of care in cleansing the mouth and teeth from fragments of food, and in washing out the mouth completely after eating candy. The sweet residue becomes a waste product, at once setting up fermentation and weakening the protective enamel of the teeth, allowing entrance to germs.

Dr. Woodbury writes: "At no period of life is there greater need of a clean mouth, sound and healthy teeth and perfect nutrition than during the years of childhood."

"The earlier the child acquires the habit of keeping the teeth and mouth clean, the more certain the reward of growing up into a strong, healthy and wholesome man or woman."

"A foul mouth and decaying teeth add to the chances of catching infectious diseases."

The report wisely recommends (page 302) that "Hygiene should be so taught that children will themselves cultivate habits of health and will see clearly the relation of health and vitality to present happiness and future efficiency."

One reason why children are more affected is that they are nearer the ground, close to things; they inhale germs that do not rise to their elders' level. Note the slow settling

of moulds, quicker settling of bacteria, also the stirring up of heavy dust which never rises to the head level of adults. Moreover children have less resisting power. House dust to which the younger children are exposed is a prolific source of contagion. Another reason is that noted under personal cleanliness, the ready contact among children.

Children are particularly liable to collect and carry sticky materials. They are active, always handling objects, usually with moist hands. They have not outgrown the habit of mouthing all objects. They are not always provided with handkerchiefs and never with a sufficient supply. They are for the most part friendly creatures and contact with comrades is constant. It should not be surprising, therefore, to find that a large proportion of children in school contract undesirable if not dangerous diseases. The report of school inspection shows this

conclusively. The study of the New York schools worked up by the Statistical Association referred to above gives some startling figures and the conclusion is drawn that if the conditions found are typical (and there is good reason to believe they are) there must be 12,000,000 in the United States suffering from some malady which is preventable. Furthermore, by far the largest number are, undoubtedly, the victims of just plain uncleanness. Such diseases are pediculosis, contagious sore eyes, contagious skin diseases, tonsilitis, nasal catarrh, etc.

The invention of self-acting drinking fountains to avoid the common cup is a step, but the railway ice-water tank is still a menace to all thirsty children. Cracked mugs in restaurants, fruit from street stands, etc., are sources of danger.

Washable gloves are to be desired as protection from soiled door handles.

An unusually instructive outbreak of typhoid fever due to unclean hands and objectionable methods of milk testing occurred in a suburb of an eastern city in April, 1908. More than 400 cases were reported within six weeks and were, for the most part, directly traced to the contamination of the milk by one man who for two weeks was suffering from ambulant typhoid. During that time he went about his business tasting the stoppers of the milks cans, it was said, and handling the cans with undoubtedly contaminated hands — “the average milkman’s hands do not receive the same degree of care as those of an operating surgeon.” He paid the penalty with his life, but the cost to the community was fifty lives and the loss of power and time for four hundred more sick and the time and cost for nurses to care for them. This number meant a money loss to the community of at least \$300,000, to

say nothing of the disturbing and distressing effect on thousands more. There is a probable tracing of this first case to the handling of milk bottles by those in care of an imported case.

Whichever way one looks there is this same direct connection between uncleanness and the spread of disease. C-E. A. Winslow expresses it: "Food, fingers and flies cause typhoid."

APPROXIMATE COST OF UNCLEANNESS, AS SHOWN BY TYPHOID.

Place.	Year.	Population.	Deaths.	Cases.	Loss to City.
Philadelphia	1902	1,350,000	588	5006	\$2,157,090.
	1903		957	8701	3,552,285.
Pittsburg. . .	1902	350,000	463	3355	1,572,000.
	1903		474	3662	1,710,870.
Ithaca, N. Y.	1903(3M)	13,000	82	1350	379,360.
Butler, Pa....	1903(3M)	18,000	111	1348	437,430.
Columbus, O.	1904(4M)	140,000	166	1640	625,980.
Watertown, N. Y.	1904(3M)	25,000	44	582	176,970.

Each death estimated at	\$3,000.
Each funeral estimated at	30.
Each loss in wages estimated at	40.
Each cost for nursing estimated at	35.

As a further illustration of the economic costs of typhoid fever consider the following study in two wards of Pittsburg, Pennsylvania.

An abstract with statistical appendix of a report by Mr. Frank E. Wing of a study of 194 cases of typhoid fever at Pittsburg, states that there were 11 deaths and 183 recoveries. The actual loss in wages was estimated at \$12,459, but the cost was augmented by the expense of caring for the patients in hospitals and homes, also by the cost of funerals. The total amount aggregated \$24,345, the same being the cost of less than half the cases of typhoid in two wards during one year. There were 5,637 cases in the whole city during the same year. Typhoid has prevailed at Pittsburg for twenty-five years, and its annual cost to the community on the above basis would amount to several hundred thousand dollars. Besides the money loss is the loss of health

which often follows typhoid fever, and the effect on the comfort and strength of the patient, which the disease lessens. The study clearly indicates the drainage of the vital forces of the community which typhoid fever causes.

The case of tuberculosis is similar. Fingers first, dishes second, and, undoubtedly, flies third, make the list of causes. The extremely infective character of the sputum and the constant expectoration necessitates the use of handkerchiefs or cloths, which soon become saturated and are of little protection. It is probable that the hands of nine tenths of the patients who are about, waiting on table — a frequent occupation for delicate persons — sewing, caring for children, etc., are constant sources of infection. Just now the war against dirt includes the fly, which has been proved to be as universal and as dangerous a carrier of typhoid as the

mosquito is of malaria. The fly that does not wipe its feet is not to blame for the filth it walks over. That danger is of man's own causing. Man himself permits excreta from diseased persons, stable manure and garbage heaps to become breeding and feeding places for the well-intentioned insect, which as a scavenger tries to help in cleaning up refuse. It is not the fly's fault that it finds fruit uncovered in the market, food on the table of the unscreened kitchen or dining room. If children's eyes and noses were clean they would not be so infested. If their mouths were not sticky with candy or jam, flies would not persistently collect on them.

It is man's fault and not the fly's that it is a serious menace to the community.

In both these cases, as in a crusade for clean markets, the help of the housewife must be had. In the school and in the home, education as to the positive dangers of

unclean habits must penetrate. The Ceremonial Law of the older religions must find a substitute in Statute Law enforced by teaching inspectors. It is not enough to say "do this" and "do not allow this." Ways and means must be shown possible, even in close quarters. Hence instructive inspection must follow in the line of instructive district nursing.

Would that the ancient Hebrew practice of thorough cleaning once a year, just before hot weather, and the disposal of everything which cannot be cleaned could be more generally followed. The first-of-May garbage removal might be made still more effective.

The city with enforced laws is becoming more healthful than the country, which still clings to tradition and refuses to believe in germs. The inspection demanded of milk-producing farms is bound to have a reactive effect, and the teaching of domestic economy

in the rural school should complete the needed revolution in ideas.

Some standards of human efficiency must be worked out, so that it will be plain to the average man whether he is doing a day's work or not. When we have the records of Dr. Richard C. Cabot's 50,000 healthy Americans, we may find not only his wished-for result, how they keep themselves well, but how much they accomplish.

To indicate some possibilities, the following comparison may be made: A wage-earner today receives say \$2 a day 250 days in the year for 25 years, from the age of 20 to 45, a total of \$12,500. Interest at 4 per cent means just what he earns—\$500 a year. If he were sound and vigorous he might work 300 days in a year at \$3 a day and from 20 to 60 years of age, bringing up the total to \$36,000, which at 4 per cent would yield \$1440, or \$540 profit to the state,

to be expended in bringing up a family, and in paying a share of city and state expenses instead of being a burden as the other man and his family are. Carrying the same idea through the range of salaries, it will be seen that the life earnings should show an excess over expenses to be left in some form of well-educated children or of works of hand or mind.

We are not making a plea for greater expense in cleaning merely for the sake of æsthetic values, but to make life more effective.

If a city of 500,000 has 500 needless deaths in a year, and if each life is worth \$5,000, the loss of capital is \$2,500,000. If each death means 750 days' loss of time at \$2 a day, the state loses a total of \$3,250,000, besides the no less real loss of efficiency of friends. It is fully conceded among employers that strength and power to work is lacking very

generally among those who offer their services.

Those who do not work for wages — students, professional men, salaried officials, housewives, if measured up to a standard of full efficiency would fall far short; a few are conscious of it, most have no means of testing themselves. This point is considered by the author in another place. The point raised here is only how much actual uncleanness has to do with this loss in economic value.

A farmer would weed out his stock very quickly if he got no better returns than the state is getting from its human property. If any teaching of modern science is to be of value, the human agent is to become more efficient in the use of it. The research worker in his laboratory is in danger of being smothered in the amount of practical knowledge which no one will take away and use.

Because a man can exist and move about half alive, he is satisfied not to ask if he can do more; if he is living up to the light he has. *Is he doing the best he knows how to do? If not, why not?* It is now for all the people to take the means offered to make a clean place to live in and to keep it clean by personal effort, in order that mankind may rise another degree in the scale of efficient life — a degree which will bring joy and not sorrow, freedom and not bondage, satisfaction and not discontent, aspiration toward a still higher life and not despair over the past.

“What are you going to do, my brother men, for this higher side of human life? What contribution are you going to make of your strength, your influence, your money, your self, to make a cleaner, fuller, happier, larger, nobler life possible for some of your fellow men?” (Henry Van Dyke.)

CHAPTER V.

THE WAY TO FUTURE CLEANNES.

THE way to future cleanness lies through the utilization of existing organizations to their fullest extent through more effective cooperation of all possible agencies and through an education of all the people in the dangers of uncleanness.

This effort will demand time and persistent energy, line upon line, precept upon precept, in season and out of season, rather than much money at first. Money is wasted if used under unskilled direction for indefinite purposes. Personal efforts by those intelligent altruistic persons who have leisure and a social conscience will go further today than heavier taxes.

Personal example will also tell at this stage when imitation seems the ruling motive.

Civic associations must not only work for beautiful architecture, for the planting of vacant lots, but for the suppression of the flying newspapers and of the open garbage pail. They must not only look after the main thoroughfares traversed by strangers but watch the passageways and back alleys where the pernicious germ bides its time. Only this week the writer passed through a crowded city quarter on Friday when the refuse barrels were in rows on the sidewalk, according to city ordinance. What was not contemplated was the picking over of these barrels by hundreds of children closely clustered about the rows, scattering much of the collected stuff into the gutter and carrying away a dirty portion.

There should be possible some influence to prevent this *undoing* of the weekly cleaning. Local associations among the children of a neighborhood to foster civic cleanness as

well as civic pride would go a long way toward cleaner alleys, and, incidentally, cleaner hands; for how shall children keep their hands clean in such occupation, which seems to be a great amusement as well? There is time and effort enough used for improvement, only it is misdirected in its application.

From time immemorial it has been a common custom "to wash the outside of the platter clean" to "put the best foot forward." The author found great satisfaction in the cleanness of a western city on a recent visit until a short cut took her through the market to a less frequented thoroughfare. There signs of public neglect were as apparent as in the main streets of most eastern cities of unsavory reputation. Civic pride is easily satisfied when it rests on appearance. Therefore there must be constant vigilance for the enforcement of law which is educational, and

much voluntary work by those whose leisure enables them to work for race improvement.

Nothing pays better in the end than cleanness, if nothing costs more in the beginning. Village improvement societies have made more tidy commons and "heater pieces," but they have not sufficiently looked after the schoolyards and out-houses. They have not furnished the children of the consolidated school with hot water and towels. These children leave home early in the morning, often hastily, as the wagon calls, handle each other's books and clothes and at noon eat their cold luncheon and go back to their books, all with most insufficient means of cleaning. Here is a most valuable piece of civic work awaiting some agency, perhaps a woman's club, in addition to that discussed elsewhere, — the hot luncheon.

The rural community must also be reached, for it is the habits formed in the country

that demoralize the city in so many cases, as has been pointed out so clearly by a recent writer. One or two careless persons on a farm do not attract attention if they drop tools and wastes anywhere, but a hundred of these crowded into a city street litter it intolerably.

The recent appointment by the President of a committee of five to frame a report on the social, sanitary and economic phases of farm life, with a view to betterment of conditions is a direct recognition of the fact that the country has not kept pace with the city along those lines of cleanliness in habit and ideal which everywhere make for social and economic gain.

The importance of improvement in rural sections is emphasized by the first paragraph of the President's communication: "No nation has ever achieved permanent greatness unless this greatness was based on the well-

being of the great farmer class, the men who live on the soil; for it is upon their welfare, material and moral, that the welfare of the rest of the nation ultimately rests."

That the city should be cleaner than the country is not logical, not practical, and will eventually prove not supportable. Instead of being a training school of cleanliness where unclean immigrants from the country learn cleanly habits, and while so doing retard the progress of civic cleanliness, the city should be rather a workshop where the country worker, already trained in clean methods and possessing a high ideal of cleanliness, could put his training into actual practice and so further the cause of sanitary improvement.

The country is the logical place to begin, and it is certainly easiest to get rid of wastes where there are acres of land to bury them in. It is some trouble and takes time,

therefore it will not be done unless the value of it is realized. Nothing needs developing so much in country life as wise utilization of time and the orderly, systematic arrangement of work. Time is the one thing man cannot "make," as he does money.

The rural cleaning league is a much needed association. The work it might do is indicated by the success of natural history associations, bird study clubs, etc. Such groups in the city and country alike, as educational agencies under the stimulus of cooperative effort, are exemplified by the National Consumers' League, the American League for Civic Improvement, Farmers' National Congress, American Good Roads Association, and the increasing number of improvement and publicity leagues of cities and states.

An instance of a lack of private organization for public good is in the matter of street-

car ventilation. "The public is served as well as it wishes to be," is often the retort when reforms are urged upon such public carriers as street cars and railroads. It is too true that a large proportion of patrons have no idea of sanitary conditions and hold all efforts to better the methods of transportation as an insult to them by the minority. A few years since a city was stirred to its depths by such a struggle between the citizens who knew the dangers of close air and those who wanted to be warm even in a foul and steamy atmosphere and the street railway company who could not ventilate and warm its cars without a greater expense than it was willing to incur. Here was an excellent illustration of the universal fact that "it costs to be clean."

The educative value of law as a maker of custom and habit is at the bottom of much of the movement for public ownership, in the

hope (however vain) that the right and most universally good things will be done regardless of cost in money. For the basis of all these movements for betterment of general conditions is a belief in the value of human life and energy — the most precious possession of the world when used in forwarding human progress — the least valuable of animal forces when used in merely brutal directions.

This belief is also the motive behind the great evolutionary movement in public education now going on. The school physician and nurse, the school bath and playground, the attention being paid to hygienic instruction, have made a good beginning. They do not yet go far enough in prevention. The school lunch is good, but running hot water, towels and drinking cups must follow, for educational as well as sanitary reasons.

A FEW REFERENCES

Bashore's Sanitation of a Country House.
John Wiley & Sons.

Gerhard's Guide to Sanitary House-inspection. John Wiley & Sons.

Second Annual Report of Consumptives' Hospital Department, City of Boston.

The Cause and Prevention of Consumption.
Illinois State Board of Health.

The People's Disease—How to Prevent It. William R. Woodbury, M. D.

Price's Handbook on Sanitation. John Wiley & Sons.

Sanitation in Daily Life. Ellen H. Richards. Whitcomb & Barrows.

Woodhull's Notes on Military Hygiene.
John Wiley & Sons.

The Value of Pure Water. George C. Whipple. John Wiley & Sons.

Papers of the American Public Health Association.

Clean Water. Allen Hazen. John Wiley & Sons.

Assainissement et Salubrité de L'habitation. Deuxième Congrès International. Genève. 1906.

Home Sanitation. Edited by Ellen H. Richards and Marion Talbot. Whitcomb & Barrows.

The Healthful Farmhouse. Helen Dodd. Whitcomb & Barrows.

Principles of Sanitary Science and the Public Health. W. T. Sedgwick. Macmillan & Co.

INDEX

Air, clean.....	17, 49, 50, 60, 78
close.....	100
Bath facilities, cost of.....	12, 62
Bathhouses, municipal.....	63, 64
Budget, the family.....	1
Care companies.....	22, 66
Cement floor.....	18
Clean air.....	17, 49, 50, 60, 78
cost of.....	18
Clean city.....	49-66
food.....	50, 78
habits.....	73
hands.....	43, 70, 86, 95
house.....	1-29
cost of.....	7, 9, 10, 11, 12
to keep.....	9
markets.....	87
milk.....	74, 75, 83, 84
soil.....	49
streets.....	49, 51, 60
teeth.....	80
water.....	49, 50, 53, 61, 78
ways of working.....	30-36
Cleaning.....	4
house.....	10, 25
Leagues.....	99
municipal.....	56, 66
street.....	59
weekly.....	94

Cooking.....	4
Cleanness	3, 4, 27, 77
as insurance.....	47, 48
education in.....	30
future.....	93, 101
moral value of.....	31, 33
municipal expense for.....	49, 56
of body.....	32
pays.....	96
personal.....	30-48, 32, 36, 44, 47, 49, 81
results of.....	70
standards of.....	38
street.....	49, 51, 60
Children and disease.....	81, 87
Clothing.....	43, 44
Civic associations.....	94
Civic pride.....	95
Compressed air.....	21
Cost of bathrooms.....	12, 62
cleanness.....	27
cleaning.....	3
clothing.....	3, 34, 44
despair.....	74
disease.....	69, 73, 90
food.....	2
keeping clean.....	29
laundering.....	35, 36
mechanical appliances.....	23
Cost Series.....	2, 3
Cost of shelter.....	3
typhoid.....	85
unclean habits.....	88
uncleanness.....	67-92, 33, 71, 84, 91
Crowding.....	1, 57, 62

Deaths, needless.....	90
Diphtheria level.....	7
Dirt	5, 6, 17, 21, 31, 33, 46, 47, 49, 56, 58, 64, 70, 86
prevention of.....	6
Dirty air.....	60, 69
fruit.....	61
soil.....	69
water.....	69
Domestic economy.....	88
Science, schools of.....	28
Dust.....	11, 14, 15, 16, 19, 57, 61, 73, 81
Dust cloth.....	54
Duster, feather.....	17
Educated public.....	55
Education.....	53, 77, 93, 101
Educative value of law.....	100
Economic theory.....	23
waste.....	69
Economics.....	1
of consumption.....	23
Efficiency, human.....	3, 71, 89, 91, 92
Feather duster.....	17
Fly.....	86, 87
Furnace.....	15, 19, 20, 51
Garbage.....	50, 52
Glasses, finger prints on.....	37, 39
Hands, care of, inspection of	40, 43
off.....	47
unclean.....	37, 39
unwashed.....	38
Home economics.....	28
sanitation	39
Hook worm disease.....	77
House, care of.....	4

House cleaning	14, 19, 21, 58
the clean	1-29
the social unit.....	3
Hours used in house cleaning.....	9
Household Aid Co.....	24
Housekeeping, aim of.....	27
Housewife.....	8
Ice cream.....	76
Income.....	1, 5
Insect pests.....	13
Inspection.....	66, 81
instructive.....	53, 88
Inspectors.....	21, 40, 54, 55, 68
Laundry	9, 11, 15, 36, 64, 65
cost of.....	11, 35
municipal.....	64
Leagues.....	99
Malta fever.....	74, 75
Milk.....	74, 75, 83, 84
Monolith floor.....	19
Motor, electric.....	20
Municipal bathhouses	63, 64
Expenses for cleanness.....	49, 51, 53, 56
New England Kitchen.....	41
Plumbing.....	12
Restaurants.....	38, 45, 72, 82
Refuse barrels.....	94
Shower bath.....	46
School children.....	43, 44, 78, 81, 82
loss of time	42
physical welfare of.....	78, 79
School lunch.....	101
public.....	45
trade.....	26

Schools of Domestic Science	28
Street cleaning	51, 59, 60
Street car ventilation	100
Tasting spoon	37
Teeth	79, 80
Tuberculosis	86
Typhoid	73, 83, 84, 85, 86
Uncleanness, cost of	67-92, 71
diseases of	71
Unclean habits	83, 97
hands	37, 39
methods of living	68
Unwashed hands	38
Value of health to the individual	89
to the state	90
of human life	101
Vacuum cleaner	10, 28
Ventilation, street car	100
Wastes	67
of human life	31
Woman's Education Association	24
Yellow fever	59

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