REPORT OF THE COMMITTEE ON DISPOSAL OF GARBAGE AND REFUSE.

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After a careful collection of statistics and visits to such cities that would throw the best light upon what your committee was asked to consider, it made reports in 1896 and 1897, in which the results of its investigations were embodied. Subsequently, and nearly every year, supplemental reports were submitted indicating whatever further progress had been made, describing the existing works, and particularly such as were characteristic of special methods of treatment, in order to show the progress more specifically.

At this time it should be said that the conclusions regarding the proper disposal of refuse materials are as yet not final and generally accepted, excepting as to a few phases of the subject. A desire having been expressed that the conclusions should be restated in the most recent light as to what is believed at present to be the best means of disposal for large and also for small cities, it is our purpose to submit such a statement and utilize in this connection the results of a recent discussion of the subject before the American Society of Civil Engineers. (Transactions Am. Soc. C. E., 1903, p. 95.)

This discussion revealed a fair unanimity of opinion, with the following results:

1. That the different local conditions demand different methods of collection and disposal.
2. That each municipality should select the method which after a careful study of the specific local conditions and a further careful investigation of the cost of securing satisfactory results, proves to be the most economical in construction and maintenance.
3. That the problem must include a consideration of the methods and costs of handling all of the several kinds of refuse, between the origin in the houses and on the streets and the points of final disposal; the four several kinds of refuse being 1, ashes; 2, street sweepings, including manure; 3, dry rubbish and 4, kitchen garbage, swill or slop.
4. That the garbage question has now reached a point where the proper solution of each case requires the aid of the engineering profession, just as the construction of sewerage and other sanitary works.

The problem before us is to effect a sanitary collection and disposal
of the above mentioned four classes of refuse at the least cost. We must therefore ascertain:

A. The objectionable qualities of each class as viewed from a sanitary standpoint, and by which we mean the potency of each class as a medium for the dissemination of disease germs, the avoiding of a nuisance, and the seeking of correction of nuisances involving, comfort and decency.

B. The cost of collection from the place of origin and delivery to that of final disposal, and the cost of the disposal itself, modified by any credit that may be due to a saleable value of any part or parts of the refuse.

With regard to the sanitary aspects, we may briefly refer to the different classes as follows:

1. Ashes in their collection and delivery produce dust, the remedy for which is the use of covered receptacles and carts, and, finally, a careful dumping, if necessary, with sprinkling.

2. Street sweepings including manure may contain a large or small amount of organic matter, some of which may break down rapidly and also contain disease germs, possibly those of the most prevalent city disease, namely, tuberculosis. Sprinkling, frequent sweeping and removal in covered carts constitute the most practicable remedy for the evils of improper collection.

The final disposal of street sweepings can be accomplished in several ways. They may be burned, or, under safe conditions, used for filling in lands. When containing a large amount of organic matter, they have also been used for fertilizing purposes.

3. Dry rubbish consists chiefly of wood, paper, straw, leaves, rags, leather, metals, stone ware, glass and sweepings from buildings. Dust with lurking disease germs is its dangerous element, but it also has a mercantile value in its pickings, which in New York City amounts to nearly $2,000 per week.

The collection should be in covered carts to prevent the escape of dust and to avoid odors and other nuisances. The final disposal can be safely accomplished either by dumping on land where practicable, or by cremation, the latter being of course preferable where it can be effected.

4. Kitchen garbage, otherwise called swill or slop, is the refuse chiefly from kitchens, markets and slaughter houses, and consists almost wholly of rejected animal or vegetable matter in solid and liquid form. It is easily broken down, and may produce very offensive odors. It also aids the propagation and growth of lower forms of life, and may through flies facilitate the dispersion of disease germs.
DISPOSAL OF GARBAGE AND REFUSE.

the other hand, it has a large commercial value, particularly in our country as compared with Europe because of our more wasteful habits.

It is generally conceded that the collection of garbage should be made by the use of water-tight and covered receptacles and wagons, and that it should be frequent; in warm weather daily, and in cold weather may be less often.

The final disposal of garbage is now generally effected in the following ways:

a. Feeding to Swine.

This method prevails to-day in many of our cities, chiefly in New England. If garbage is kept from other refuse which would injure the food qualities, and if collected daily, there should be no objection to this practice either from a hygienic or commercial standpoint. If practicable, it yields a greater revenue than any other method of disposal. We should, however, limit it to conditions where disease germs may not reasonably be expected to enter and where odors of putrefaction, or otherwise, will give rise to no annoyance. Experience has shown it to be practicable in small cities, and in the case of hotels and eating-houses of large cities.

b. Dumping on Land.

When not mixed with other refuse by which it can be diluted, dumping is objectionable on account of subsequent putrefaction. When mixed with other matter, as ashes and dry rubbish, it will depend upon local conditions as to whether it would be objectionable or not. When mixed with dry refuse, burning is frequently resorted to, but is seldom satisfactory.

c. Dumping into Large Volumes of Floating Water.

Opportunities for a satisfactory disposal in this manner will be rare, and advantage should not be taken thereof, if other means of disposal are available.

d. Plowing into Soil.

This method will be rarely satisfactory in this country, on account of the expense of properly doing the work. In Europe it is considered favorably in several cities, because it can satisfactorily dispose of disease germs and odors, and because the gradual nitrification of the organic matter produces a fertile soil.

e. Extracting Grease.

Under this head we have the so-called reduction process as adopted in a large number of American cities. It is especially available in our country because of our wastefulness in the use of food products. In Europe the process is nowhere used, because the amount of grease
left in the garbage and which could be extracted is too small to justify the expense of extraction.

The objection to this method is chiefly confined to the odors which may escape from badly managed plants, which are generally operated as a business undertaking for profit, and where the conflicting interests will naturally involve the constant danger of a nuisance. It is practicable, however, to conduct such works without offense, particularly when remote from human habitations.

Almost the sole advantage of this process lies in the profit to be derived from the sale of its products.

f. *Cremating the Organic Matter.*

By far the largest number of cities, and particularly the smaller ones, dispose of their garbage by cremation. The advantage of burning is the destruction of all foul matter, including all pathogenic micro-organisms. The objections are the odorous fumes and dust which are apt to escape from the chimney. This escape, however, is not a necessary result of the process. In Europe such burning of the refuse is the commonly adopted method, and is used even in well-built-up parts of the cities. It is not offensive when the furnaces are properly designed and operated. In our country both design and operation differ more or less from the European furnaces, generally to our disadvantage, as has been frequently reported. It will be necessary, and it is entirely practicable from an engineering standpoint, to construct our furnaces to suit our own conditions, which produce refuse that slightly differs from similar material in Europe, and which difference has been improperly claimed as the cause for the different designs.

In order to decide upon the best manner of disposing of the refuse of any city, granting that under suitable conditions any of the above mentioned methods may be practiced to satisfy the sanitary demand, if the necessary price is paid, the following requirements appear to be necessary.

The city should ascertain the cost of each one of the most practicable methods from those mentioned above, when developed to a point of satisfactory efficiency, both as to construction and maintenance. The least expensive one will then be the preferable method. Such an investigation may prove that some two or three, or perhaps all four, classes of the refuse can be treated economically if mixed and disposed of by the same process. In a number of small cities of this country, as well as generally in England, this combined disposal is the most preferable one when it is effected by burning. In the case of New York it is stated by the street cleaning commissioner that the
most economical method for that city is a different disposal for each of the four classes of refuse.

Wherever it is found economical to extract grease from the garbage, a separate disposal of a mixture of the other classes may also be economical.

In conclusion, it may now be said that while there are several methods of satisfactory disposal, every one will not be the best for all cities. Each city should therefore study the question as related to its own special conditions, and from the large experience both in Europe and at home, select what is found best for itself.