health are not long found co-existant with filthy habits amongst any class of the community.

I beg leave further to suggest, that the principles of amendment deduced from the inquiry will be found as applicable to Scotland as to England; and if so, it may be submitted for attention whether it might not be represented that the structural arrangements for drainage would be most conveniently carried out in the same form as in England, that is by commissions, of the nature of commissions of sewers adapted, as regards jurisdiction to natural or geological areas, and including in them the chief elected officers of municipalities, and other authorities now charged with the care of the streets and roads or connected with local public works.

The advantages of uniformity in legislation and in the executive machinery, and of doing the same things in the same way (choosing the best), and calling the same officers, proceedings, and things by the same names, will only be appreciated by those who have observed the extensive public loss occasioned by the legislation for towns which makes them independent of beneficent, as of what perhaps might have been deemed formerly aggressive legislation. There are various sanitary regulations, and especially those for cleansing, directed to be observed in "every town except Berwick and Carlisle;" a course of legislation which, had it been efficient for England, would have left Berwick and Carlisle distinguished by the oppression of common evils intended to be remedied. It was the subject of public complaint, at Glasgow and in other parts of Scotland, that independence and separation in the form of general legislation separated the people from their share of the greatest amount of legislative attention, or excluded them from common interest and from the common advantages of protective measures. It was, for example, the subject of particular complaint, that whilst the labouring population of England and Ireland had received the advantages of public legislative provision for a general vaccination, the labouring classes in Scotland were still left exposed to the ravages of the small-pox. It was also complained by Dr. Cowan and other members of the medical profession, that Scotland had not been included in the provisions for the registration of the causes of death which they considered might, with improvements, be made highly conducive to the advancement of medical science and the means of protecting the public health.

I have the honour to be,
Gentlemen,
Your obedient servant,
EDWIN CHADWICK.

APPENDIX.

1.—*Evidence of* MR. JOHN ROE, *Civil Engineer, on the Practical Improvement in Sewerage and Drainage tried in the Holborn and Finsbury Divisions of the Metropolis.*

You are the surveyor to the Holborn and Finsbury Commission of Sewers?—Yes, I am.

By profession you are an engineer?—Yes; I have been engaged as an engineer in the formation of canals and railways, and in the drainage incident to such works.

How long have you acted as surveyor to this branch of sewerage in the metropolis?—Nearly four years.

Have you observed the general state of the sewerage of the metropolis?—I have only seen some of the sewers of other divisions, but I am generally acquainted with the principle of their construction.

Is it generally the same as that in which you found the sewers in the Holborn and Finsbury divisions?—Yes, except that the forms differ in a degree; some are flat-bottomed sewers, others segment-bottomed. For a long time the Holborn and Finsbury divisions have used bottoms of a semicircular form.

The effect of a flat-bottomed sewer, it is to be presumed, when the water is shallow and the flow slow, is to leave a larger quantity of deposit?—Yes; it flows sometimes in a channel, leaving a deposit on each side; sometimes the water flows on one side, leaving a deposit on the other; but in all cases the flat-bottomed sewers occasion a larger amount of deposit with the same flow of water: it is more than one-half difference of the deposit which is left.

What proportion of the sewerage of the metropolis do you believe to be flat-bottomed?—I have not examined the other divisions, but I believe the greater proportion of the sewerage to be flat-bottomed. In the City they have built some of their sewers in a form nearly similar to those adopted in the Holborn and Finsbury divisions; that is, approaching to semicircular. In the Westminster division the invert is a segment of a circle, whose chord being three feet the versed sine is six inches. Most new sewers are making an approach to the better form by having segments.

Is it not the fact that in proportion as the bottom approaches a plane it approaches to the inconvenience of the flat-bottomed sewers, and weakens the force of the current?—Yes, in a degree, it does.

Are there any practical inconveniences, or is there any material increase of expense in building semicircular bottoms?—None; and if the sides are curved also it forms the stronger sewer for the same expense.

How are the sides of the sewers generally built?—As far as I am informed, they are built with upright walls. I know none but the new sewers in the Holborn and Finsbury divisions that are built with curved sides, though I have no doubt that if any new sewers are built under the superintendence of Mr. Walker, who is president of the Engineers' Society, he would build them with curved sides.

What are the disadvantages of the flat-sided sewers?—They are not calcu-

lated to afford the greatest strength. In clayey or slippery ground, where there is a pressure on the sides, they are more easily forced in. I have myself seen instances where expensive sewers have been forced in at the sides. The curved side gives the strength of an arch in resisting such pressure.

Is there any addition of expense in the construction of such forms of sewers as you describe?—Less expense; there is less brick-work required. As compared with some upright sewers with footings, the difference will be two shillings in first size sewers, and four shillings per foot lineal in sewers of the second size, in favour of the curved sewers.

In respect to the levels, how have you found the sewers?—They appear to have been entirely constructed with reference to the locality, to drain to the nearest outlet, and not on an extended view for the whole district, or with any view to sewerage on a large scale. In the Holborn and Finsbury divisions the Commissioners now adopt a series of levels suited from the lowest outlets to the surrounding districts.

Have you heard of any alterations made in the surrounding districts on the same principle?—I have heard of none as adopted generally. The City have lowered several of their outlets; and Mr. Donaldson, on the Westminster, has had the subject under consideration for some time.

What are the chief effects of the piecemeal town drainage without reference to extended levels?—Chiefly that when new lines of houses are built and require new sewers, either the old sewers must be taken up and re-constructed at a great expense, to adjust them to a new and effective sewerage, or the new sewers, if they are adjusted to the old ones, are deficient in fall, and they have greater deposits.

Does the existing form or system of sewerage answer fully and at the least expense the chief objects of sewerage in house and street cleansing, and the removal of noxious substances?—No, it does not, except where the outlets have been lowered, and the sewers continued at a proper level; great accumulations of deposit are occasioned in the sewers, and from their containing the refuse that was at one time deposited in the cesspools, the deposit is more noxious than formerly; the gas is more considerable, it escapes more extensively into streets and into the houses, where the drains are not well trapped. My opinion is that the general health of the men who work and have been accustomed to the sewers, has become still worse; they are more pale and thin, and lower in general health than formerly. The effect of the noxious gases upon men working in these places is to lower the general health. Since I have had the superintendence of the sewers, the men have encountered about half a dozen accidents by explosions of gas.

But is the health of these men who work in the sewers to be taken as a criterion of the health of persons who are not accustomed to such places?—I have had no means of forming a comparison, though I am of opinion that gases which they encounter without any immediate injury would be very injurious to the health of susceptible persons, or of any persons not habituated to it.

The first prejudicial effect of the defective system, then, is to occasion these noxious accumulations; how are they removed?—Formerly, in the Holborn and Finsbury sewers, and at present, I believe, in all other sewers, the streets were opened at a great expense and obstruction (they are so now, I believe, elsewhere); men descend, scoop up the deposit into pails, which are raised by a windlass to the surface, and laid there until the carts come; it is laid there until it is carted away, sometimes for several hours, to the public annoyance and prejudice. The contract price for removal from the old sewers without man-holes was 11*s.* per cubic yard of slop removed; where they have man-holes it was 6*s.* 10*d.* per cubic yard. This practice also involves injury and expense as respects the pavement; a street may be well paved when it is broken up for the cleansing of the sewers, but the portions of pavements so disturbed are never so well put down again; neither can accidents be effectually guarded against.

By what means may these effects be obviated?—In the Holborn and Finsbury divisions I suggested a plan of flushing the sewers, and of carrying off all the refuse by water. This plan has been adopted, and it is now in operation. The breaking up of the streets is avoided by the formation of side entrances; cast-iron flushing gates are fixed in the sewers; the ordinary flow of water in the sewers accumulates at these gates; the gates are opened, and the force of the water is sufficient to sweep off the deposit; and the system may be further extended.

What is the comparative difference in the expense of construction?—The cost of side entrances and flood-gates, as compared with the cost of man-holes, is from 6*d.* to 1*s.* less per foot lineal of the length of new sewers.

What other expense is attendant on this improved practice?—The main expense is the attendance of a man to shut and open the flood-gates.

The structural expense being lower, is the ultimate expense of cleansing lower also?—Yes; the expense of cleansing the sewers is about 50 per cent. less than the prevalent mode. Our expense of cleansing the sewers was about 1200*l.* per annum; we save 600*l.* of that, and expect to save more; but to this must be added the saving to the public of the cleansing of the private drains, formerly choked by the accumulations in the sewers. This saving, on a moderate calculation, is found to be upwards of 300*l.* per annum. There is also the diminution of the escapes of gas from the old and continued accumulations.

During what intervals are deposits allowed to remain on the old mode?—The average is in one set of sewers about five years, and in another about ten years.

During which time the public are subjected to all the escapes of gas from the decomposing accumulation?—Exactly so. It could not, however, go on so long but for heavy falls of rain or snow, which occasion partial clearances.

What is the effect of these accumulations upon the private drainage?—That the drains to the private houses are stopped: the first intimation of the foul state of the main sewer arises from complaints of individuals whose drains are affected; the accumulations in the private drains also occasion an expense to the individuals and much annoyance. By flushing the sewers this expense might be, and in the Holborn and Finsbury division it is, avoided.

Might not the price of sewers be reduced even below those you have now in use, the egg-shaped sewers?—With the radiated bricks, I think that the same capacity of sewerage may be secured with less thickness of brick-work. I have given in an estimate of second-class sewers at 10*s.* 6*d.* per foot lineal; which is 7*s.* 6*d.* per foot less than the common flat-bottomed sewer with footing.

In these main drains a man may go up to examine them. Admitting them to be necessary for the large towns, might not a smaller and less expensive drainage suffice for small towns and villages?—There are situations in courts, alleys, and small streets, where a less expensive form of drainage would suffice. In fact 18-inch drains for short lengths, costing, if made of radiated bricks, 4*s.* 6*d.* per foot, would suffice; they would act well in proportion to the goodness of the falls.

Have you found the system of cleansing the large drains by flushing with proper supplies of water equally applicable to small drains?—Yes, equally applicable. A gentleman has tried it on a private drain of 18-inch capacity, and 1200 feet lenghth, and it answers equally well. It is cleansed by the collection of refuse water from 30 or 40 houses.

Might not the drains from private houses be also cleansed in the same mode?—Yes, they might have a small and cheap apparatus for carrying away all ordinary refuse. If in the small drain a brick fell in, it could not be removed by the force of the small quantity of water which could be obtained in such a situation. In our large sewers the heads of water are in some cases strong enough to sweep away loose bricks.

Would it not be of advantage to the occupier, if the private drains were under the same general superintendence?—I conceive it would in manage-

ment. They are frequently put to great expense by getting persons to attend to them who really do not understand them. They are often now obliged to have recourse to the contractor's men. Private property is often drained through other private property, and when the drains are choked, if the parties are not on good terms they will not allow each other facilities for cleansing. Under the Finsbury local Act there is a power to enforce the cleansing of private drains, and by way of appeal that power is sometimes resorted to by private individuals.

May we not presume that the same principles of hydraulics, as to the advantages of a flow over a semi-circular bottom, are as applicable to small drains as to large ones?—More so from the flow of water being smaller; the greater necessity for keeping it in a body to enable it to carry away the common deposit.

Then there is a proportionate loss in having the private drainage made with flat-bottomed bricks or boards?—Yes, there is proportionate loss from the extra cost of cleansing. Semi-circular drains of tiles would be better, and cheaper than brick, for private houses.

Are there any other defects you have, as an engineer, noticed in the prevalent mode of constructing the sewers?—Yes, the prevalent practice is to join sewers at angles, frequently at right angles; this occasions eddies and deposits of sediment that would otherwise pass off with the water; it injures the capacity of the main sewers by obstructing the current of water along them: I ascertained by experiment that the time occupied in the passage of an equal quantity of water, along similar lengths of sewer with equal falls, was—

	Seconds.
Along a straight line . . .	90
With a true curve . . .	100
With a turn at right angles . .	140

The Commissioners of the Holborn and Finsbury divisions agreed to require that the curves in sewers, passing from one street to another, shall be formed with a radius of not less than 20 feet; it is also required that the inclination or fall shall be increased at the junction, in order to preserve an equal capacity for the passage of water, and of effect in sweeping away the deposit.

When by heavy falls of snow or otherwise the refuse of the streets is carried into such sewers, is there any difficulty in sweeping it away?—None whatsoever.

How are the gully-holes or entrances to the drains affected by such deposits?—Under the prevalent system the gullies and shoots are formed so as to retain deposit, on the principle that it is cheaper to get the deposit out of those than out of the sewers. The Commissioners in Holborn and Finsbury, having adopted the flushing principle, have also adopted a new description of gully and shoot, which I proposed to them for the purpose of conveying the whole of the deposit into the sewers; it is then washed away by the flushing.

In what number of years would the saving in cleansing sewers by flushing repay the expense of applying the apparatus to the existing sewers in the Holborn and Finsbury divisions?—In seven years.

What would be the expense of the construction of chimneys to remove the foul air from sewers?—The expense would depend upon the sort and form of chimney that might be used. A suggestion of Mr. Stable, one of the chief clerks of the Holborn and Finsbury commission, appears to meet the case at the least expense. He suggests that the pipes used to carry off the rain-water from the roofs of houses should be connected with the crown of the sewers; thus forming a chimney for carrying off the effluvia from the sewers, and also a conveyance for the rain-water into the sewers. The cost of connecting one such pipe with a sewer would, on an average, be about 3*l.* 16*s.* 2*d.*

Have you any doubt of the practicability of carrying all the surface cleansing of the streets into the sewers, and removing it by conveyance in water, as was proposed at Paris, instead of by hand labour and cartage?—I entertain no doubt whatever that it might be done, where there is a good

sewer and proper gully-holes and shoots; with a good supply of water these would carry away rapidly all the surface refuse; the experience of the sewerage in the Holborn and Finsbury divisions prove it.

How does it prove it?—At every opportunity the street-sweepers sweep all they can into the gully-holes, and it is swept away without inconvenience.

One practical witness states that the expense of the cartage alone of the refuse from a Macadamised street of half a mile, in the winter time in the metropolis, is 5*l.* weekly. What would be the comparative expense of carrying it away by the sewers?—It would save the whole expense of the cartage; it would be less than the present expense of sweeping and filling into the carts, and if there were a sufficient supply of water on the surface, the work might be conducted with great rapidity.

You are aware that one inconvenience of the existing mode of street cleansing, independently of the great expense, is the length of time during which the wet refuse remains to the public annoyance on the surface, until removed by the slow process of sweeping and cartage?—Yes; and the men would appear to delay for the purpose of the dirt being removed, by being washed by rain into the sewers.

Do you conceive that all the business of street cleansing and house draining might be consolidated advantageously to the public?—Yes, clearly so, and with great economy.

Have you, as an engineer, had experience in road construction?—Yes, I have, having taken the levels and surveys preparatory to an Act of Parliament being obtained for lowering the Long Compton Hills in Warwickshire; I afterwards constructed the new line of road on Mr. Telford's principle.

Considering the drainage of a new district: the under-drainage of the roads and houses and the surface cleansing, would not the public gain by putting the drainage, the road-construction, repair and maintenance of the roads, under the same management?—Yes, the public would get it done much better by one surveyor and one Board than by two. In the old districts, besides the double expense of officers, inconveniences arise from the want of unity between the contractors for the paving and the contractors for the drainage; there is always conflicting interests between the two, and the work is not in many cases done with the economy and expedition which would be practicable.

If the public, who may be ignorant of the science of sewerage and of what it may accomplish, make no complaints, and do not agitate for the adoption of any improved system, in how long a time do you think the improvements demonstrated in the Holborn and Finsbury divisions would reach the other end of the metropolis by the force of imitation and voluntary adoption?—From the apathy shown and prejudice against anything new, however valuable it may be as an improvement, and the various interests affected, such as the contractors for cleansing, I do not expect that they would become general in the metropolis during my life-time. The public are passive, and the adverse interests are active.

You know the description of persons engaged as surveyors of various descriptions in the rural districts and in the smaller towns?—Yes, I do.

Unless care be taken, is it to be apprehended that any new expenditure will be made on imperfect and unwholesome drains with flat bottoms and on false principles at a disproportionate expense?—Undoubtedly, except they have to act on rule, it will certainly be so throughout the country. The drainage that I have seen in the country districts is worse than in the metropolis.

Have you found the sewerage produce any effect in the drainage of the surrounding land?—Yes, we have found it lower the water in the wells, often at great distances. For instance, in forming a sewer in the City Road we found that it lowered by four feet a well nearly a quarter of a mile distance. The only remedy we could advise to the parties was to lower the well: they did so. We afterwards had occasion to lower the same sewer three feet, when the well was lowered again in proportion; so that the construction of the sewer, in this instance, drained an area of 40 or 50 acres on that side, and perhaps further. The water is sometimes in such quantities and so strong in

the land springs as to require openings to be left in the side of the sewer for its passage.

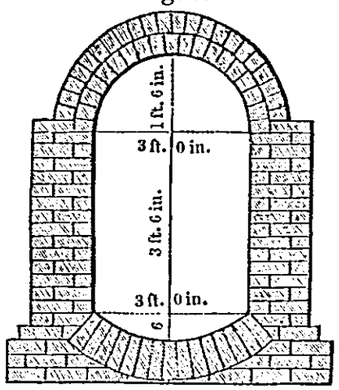
Are there any fees taken in the Holborn and Finsbury divisions?—None.

Do you think the system of the payment of officers by fees objectionable?—Yes, highly so.

Have you met with instances where the drains have not acted, owing to the inadequacy of the supplies of water?—I have not had my attention called particularly to any private drain, so as to notice whether it did not act owing to an inadequate supply of water, but taking the question on the broad principle of the effect of a sufficient supply of water to drains or sewers as beneficial in keeping them free from deposit, I beg to state that I have noticed the effect on sewers of the same form and having the same fall or inclination, and I have found that where there has been an adequate supply of water no deposit has remained in them, whereas where the supply of water was inadequate, deposit has accumulated so much as to render cleansing necessary in a few years: the effect must be the same in private drains."

[Figure 1 is a representation of the form of the common sewers built in the Westminster division. It is a transverse section, representing, on a scale of a quarter of an inch to a foot, a sewer of the larger sort, the greatest height being five feet six inches and the width three feet. The smaller sewers are made of the same form, but only five feet high and two feet six inches wide. It chiefly differs from the more common form of sewers in not having a perfectly flat bottom.

Fig. 1.



The following figures, 1, 2, are representations of the sewers in the Holborn and Finsbury division of the metropolis, on the same scale as the above. The part in which the joints are marked in the cut is, according to the directions, to be worked in blocks with cement.

Fig. 1.

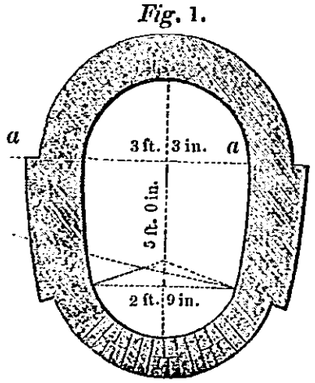
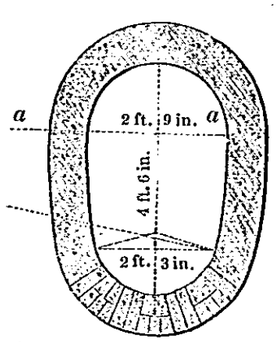


Fig. 2.



The sides of these sewers form the curves of large radii struck from the centres on the lines *a a*, the radius for the larger size being about 13 feet, and that for the smaller size in proportion.

The spaciousness of the sewerage in the Westminster division of the metropolis has been an object of pride; and it is stated that the commissioners have walked in procession down one main sewer prepared for the purpose. It was the glory of Rome that some of its cloacæ were so large that boats and chariots might pass through them. All this, however, appears to have been mistaken in principle, and in ignorance of the mischiefs of the generation of gases and of the principles of hydraulics, and their application for the attainment of the objects in question. Mr. Smith, of Deanston, who has introduced the greatest improvements in land drainage, advances the general principle, that the size of sewers should be so adjusted as to have them always as full as possible, with a quick flow; and he contends that the drainage of a city might and should be so constructed as to give rise to as little occasion for men to go through the main drains as there is for men to go through the main pipes for conveying supplies of water. He would make the drains narrow. "Their transverse section should exhibit an oval or egg-shape, having the vertical diameter at least double the length of the horizontal. The bricks used should be made on purpose, with radiating sides." "Care should be taken to make the building water-tight and air-tight, and to prevent the foul water and effluvia passing into the contiguous soil. Where land drainage is to be received, special openings can be made at intervals to receive it. All private drainage should pass into the sewers under ground by well-secured channels or pipes. Strong clay pipes, of an oval section, hard burned, and with a good arrangement for secure jointing, might be cheaply procured for the purpose." It may be said that there is scarcely any drainage, even in the opulent districts, that at present meets these conditions. E. C.]

2.—*Evidence of* Mr. John Darke, *Contractor for Cleansing, as to the Obstacles to Cleansing, and the Conversion of the Refuse of the Metropolis to Productive Use.*

What are the practical difficulties you find in the way of the cheap cleansing of the streets and houses of the metropolis?—The great difficulty of the cleansing of the metropolis arises from the want of proper receptacles for the filth. There is no filth in the metropolis that now, as a general rule, will pay the expense of collection and removal by cart, except the ashes from the houses and the soap lees from the soap-boilers; and some of the night-soil from the east end of the town, where there happen to be in the immediate vicinity some market-gardens, where it can be used at once, without distant or expensive cartage. The charge for removing night-soil from the poorest tenements may be about 1*l.* per tenement. One house with another, the expense may be said to be in London about 10*s.* per year, as the cesspools may be emptied once in two years. One house with another they will not produce more than a load of refuse from the cesspools, which, not being compoed, there is great absorption of the liquid refuse. I have given away thousands of loads of night-soil; as we have no means of disposing of it, we know not what to do with it.

What is the distance from the metropolis at which refuse is used?—The expense of cartage of course increases with the distance. The average extent of use of it as deposit does not exceed three miles from the Post-office district in the city of London. Some night-soil has been dried, packed up in the returned sugar hogsheads, and sent to the West Indies for use as manure.

Is it not conveyed away from London by canal?—We do not at present, but it might be. There is a penalty in the local Act of 5*l.*, for depositing it on the wharf.

Cannot you convey such manure by railway?—No, there is no mode of conveyance provided. The charge, I believe, is a halfpenny per mile, but that is

for the use of the rails only; and the company do not favour the transit of manure, and the farmer or contractor who would convey it must provide engines for himself, which again would not pay. Night soil has not yet been used systematically, and there are no places provided for its reception.

Might not the refuse be disposed of to better advantage than it now is?—The refuse of a great portion of the metropolis might be disposed of to immense advantage, but it must be by operations on a scale beyond the power of private capitalists. The sweepings of the paved streets is good as manure: on grass-land it is nearly equal to horse-dung; but it contains so much seed that it scarcely does on ploughed land for immediate use. It produces great quantities of herbage; every year, however, it improves, because the weed is lost from it and the manure is left. When the streets are dry, and it will pay for transit, we sell a few loads. The sweepings from the Macadamized roads consist so much of granite that it is of very little use indeed; and in general the street-sweepings are mixed up with other manure for sale.

3.—*Evidence of* Mr. John Treble, *Contractor for Cleansing, as to the Obstacles to Cleansing, and the Conversion of the Refuse of the Metropolis to Productive Uses.*

You have been engaged in the cleansing of the metropolis, have you not?—Yes; I have been engaged, and my father before me, in the general cartage of materials, and also in extensive business as a nightman, but I have now retired from business.

What is the usual expense of emptying cesspools?—The full price to respectable private houses is 15*s.* per load, but the contract price is about 10*s.* per load. The period of emptying is dependent on whether there is any drainage from the cesspool, or whether there are any land-springs. Some would require to be emptied twice or three times a-year, whilst others would go two or three years without being filled. About 1*l.* per annum per tenement would perhaps be the expense one with another.

Where the cesspools are relieved, is not the ground about saturated?—Yes, it is; in digging the foundations of old houses for new buildings, the earth is found to be saturated. We have frequently to empty one person's place because it is found that the soil has penetrated through to the neighbours' houses.

Does not this moisture affect the condition of the house?—Yes, and it would be good economy for the sake of the house, and keeping a dry foundation, to have water-closets and good drainage from the house to the sewers.

By having the water-closets, the expense of the removal of the soil, annually or otherwise, would be saved?—Yes; and the expense of the dearest water-closets bears no proportion to the annual expense of cleansing, though water-closets I think might be constructed at a less expense, on a more simple plan, than they now are. They might be constructed on a principle to receive the rain-water and all the liquid refuse from the houses, which would increase the cleansing.

To effect cleansing on this principle, it will of course be necessary to have the water laid on in the house?—Of course it will. It would greatly assist the cleansing, if the water-companies were required to draw their plugs once at least in the fortnight. It would cleanse their own pipes, and assist in the cleansing of the sewers. The company would say that that would be a great waste of water, but a sufficient body of water might be obtained for the purpose in a quarter of an hour.

Does not the soil bear any value as a manure?—In general it bears no value to the nightman as a manure. One hinderance to any removal to a distance is, that, by the police regulations, cesspools can only be emptied in the night within certain hours. This prevents cartage to any great distance, and cartage is very dear. Some nightmen have paid 6*d.* per load for the liberty of depositing it. The object of the nightmen is to get rid of the soil early, and return with the cart to complete the emptying in one night. Formerly, before the new police were so much about, the men would empty the cart in any bye street or place where they could; they would, when it was in a liquid state, empty it down the sewers; they do so now when they have an opportunity, and return to complete the job. Formerly the site of the New London University was a place in which the refuse was deposited; so was the site of the new row of grand houses in Hyde Park Gardens. I think the site of Belgrave Square was another place of deposit; but those places being built over, there is now much difficulty in getting rid of the refuse.

What is the expense of cartage in London?—As a contractor, for the use of a cart, a man, and horse a-day, I used to charge 9*s.* the day for carting stone and rubbish. My successor did it for 7*s.*, but I saw his name yesterday in the Gazette. The cost of the man's work and the horse will amount to 6*s.* or 7*s.* in London.

What distance do your carts in full work travel in London?—A good day's work to send a load out and return empty would be about ten miles; over hilly parts not so far.

Is the street refuse of the paved streets valuable as manure?—Yes it is; but it is only worth removal when it can be easily carted, that is, when it is in a dry state. The contractor being obliged to cleanse the streets in a given time, it would not pay to have such a number of carts as to complete the cleansing within the time and carry the refuse to a distance. They get rid of the refuse at the nearest place of deposit. In dry weather they have less to do and can turn their carts to account. The refuse is then dry, and it rides well, and may be sold to an advantage, and it sometimes fetches half-a-crown a load.

At what distance from the place of work would it be delivered at that price?—At about three miles distance; not exceeding that.

Is none of the refuse of the metropolis carried further as manure?—Yes; some of the farmers who bring produce to market return with their carts loaded with dung to greater distances.

Is not canal conveyance used?—Much of the street cleansing is taken down the canals.

Do the contractors in general pay for the deposit of the refuse of streets?—They would pay if they could get places of deposit near their work; but all the places out to the outskirts, where any refuse whatever could be deposited, are built upon.

Do not the men sometimes get rid of the surface sweepings into the sewers?—Yes; they do when it is in a liquid state, and when they are not watched.

Do you happen to know what is the expense of cleansing a street of a given length?—I once contracted to remove the stuff from Bond-street away; each cleansing took four teams and two stands, as it is called; or two teams and one stand, that is, two two horse carts, and one single horse cart standing to be loaded two days in the winter time. The cost of cartage in the winter season for cleansing that street was about 5*l.* for each cleansing. It was cleansed less frequently than weekly: that street is Macadamised. In the summer time the expense would be less than one-half. The expense of cleansing the whole of Marylebone, that is, the expense of cartage, is about 2,200*l.* per annum, the parish finding the sweepers.

4.—*Extract from the Report of* Fourcroy *and others, showing the Calculation of the Extent of Pollution of the Seine from the Discharge of the Refuse of the Streets of Paris.*

"Not to neglect the details into which the Ministry desire us to enter,

we observe that the maximum of daily street-sweepings is, in winter, 684 cubic metres; the mininum is 410; the average is 547.

"On the other hand, the velocity of the waters of the Seine, measured at their lowest level, being 6 decimetres 5 centimetres a second, and the profile of the Seine, measured also at low water, at the bridge of the Revolution, being 118 metres, we observe that there results, supposing an uniform velocity in the whole mass, a flow of water of 76 cubic metres a second; and in one day a flow of water 9,600 times greater at low water than the most considerable volume of the street-sweepings of Paris for the same space of time. This volume of water would be 16,015 times greater than that of the street-sweepings, if compared with the minimum of these last; that is to say, with the sweepings in summer, or the time at which the waters of the Seine are lowest. Any error in the calculation, arising from the inequality of the velocity in the different parts of the column formed by the current, is too amply compensated by other circumstances to need our consideration.

"To this is to be added, that the season when the street-sweepings are greatest, necessarily accords, all other things being equal, with the period when the water is highest and most rapid, as the period of low water answers to that when the refuse is least; and admitting the preceding calculations, the volume of water would be more than 16,000 times greater than the street-sweepings; and this proportion would increase considerably when the water is highest, by reason of the double proportion of height and velocity.

"It is to be further considered, that a great portion of these sweepings, being insoluble in the water, would become precipitated, and unite with the mud; that a larger portion still, deposited unequally on the two banks, would never reach the bleaching-grounds, or the places where the water is drawn, and that consequently their possible relation to the water used in the city, reduces itself to a quantity excessively small, and absolutely inappreciable."

5.—*Communication from* Captain Vetch, *of the Royal Engineers, on the Structural Arrangements of New Buildings, and Protection of the Public Health.*

Dear Sir,—Agreeable to promise, I forward the following observations on the improvement of large towns, as affecting the health, economy, and comfort of the inhabitants, and so far as these depend on structural arrangement.

The points requiring the attention of the engineer and architect may be stated as follows:—*complete ventilation, complete drainage*, ample sewerage, ample supply of water, and lastly, a ready and good communication between the various portions of the town.

I should have commenced my observations with the subject of drainage as the first in point of order were a new district or town to be built, but as both drainage, and ventilation, and communication, &c., depend so much on the arrangement of the streets, it may not be superfluous to premise something on that head. It will be sufficiently obvious that where towns are constructed on a regular plan with straight streets, the communication, ventilation, and drainage is comparatively easy, and far more effectual than under contrary circumstances; but it unfortunately happens that our large towns contain many narrow, crooked streets, with little or no arrangement, and though it may not be practicable materially to mend what we now find so bad, we cannot fail to perceive that a little timeous system and arrangement would have avoided many evils we now complain of, with a less structural expense and a much improved value of property to the owners.

Many or most of the towns, both in British and Spanish America, are

formed on regular plans, commencing with a square as a nucleus, to the faces of which the streets (as they rise) are made parallel, so that whatever may be the extent of the town the increments take place in regular order, until stopped by some natural obstruction; and though it may be true we cannot now enjoy the good effect of any such original precaution, yet as respects the extension or future increments of our cities and towns, much benefit may still be derived by resorting to system; and though we cannot now remodel what has been built by proceeding regularly from a central point to the circumference, yet we may adopt an external line or periphery as a basis of operation for the construction of the future extension of the town on a regular plan or system.

It is fortunate for the metropolis that there existed some large landowners in its vicinity, as the families of Bedford, Grosvenor, and Portman, whose taste and spirit corresponded with their means, and that large portions of the increments of London consequently possess all the advantages that a well-considered system of utility could require; and the benefit of such a circumstance will be best felt by contemplating what effects a contrary proceeding would have produced; and further, the plans pursued by the above-named families have not only been highly beneficial in themselves, but they have served to stimulate the small proprietors in their vicinity to the same useful ends; and what seems to be wanted from the authority of the state is the means of ensuring such beneficial measures in all cases, or at least protection against antagonist or vicious proceedings in the owners of land adjoining towns.

It will not fail to be remarked that the increments of London just alluded to have been constructed chiefly for the abodes of the wealthy, who can generally protect themselves, and remove from any noxious neighbourhood. But the state, as the natural guardian of the poor, is the more called upon to interfere with its authority to see that the streets and houses intended for the labouring classes are constructed on comfortable and sanitary principles.

Most of our large towns have increased upon small, irregular nuclei, and received their increments chiefly from buildings erected along the roads branching into the country, presenting so many main streets radiating from a centre, but leaving the intervening spaces to be irregularly and imperfectly filled up at subsequent periods as chance or necessity directed, and in this manner has arisen the great defect (to be generally observed) of a good lateral connexion between the great radiating streets.

So great indeed is the above defect that it is often difficult to pass from one site in the skirts of a town to an adjacent one without passing towards the centre of the town by one radiating street and returning by another; this defective construction of towns is the natural result when they extend without any reference to a general plan or public convenience, and the mode which, in my opinion, would best restore the condition of a town so constructed to a commodious and useful state would be as follows:

I would propose, in the first instance, to connect all the radiating streets of the town by straight lines drawn as near to the mass of buildings in the town as the vacant or unbuilt ground would admit of; this operation would have the effect of inclosing the town in an irregular polygon, upon each side of which, as a normal line, I would propose to lay out the future streets, one series of which would be parallel to the normal lines, and another series would be perpendicular to them, and in this manner the future increments of the town would proceed on a fixed and uniform system, and would render the lateral lines of communication as effective as the others, and would afford at the same time increased facilities for ventilation and sewerage, and for the supplies of water, gas, &c.; and proceeding on this system, it may fully be anticipated that the building sites would become much more valuable to their owners than if they remained to be laid out by individual caprice on a disjointed plan. It would be valuable in most

cases that the normal polygon should be formed into a series of streets of ample dimensions, fit for the reception of public buildings, particularly schools; and occurring (as it would do) as the nearest great lateral line of communication to the irregular mass of the town, it would serve to do much of the duty in way of communication and ventilation which the interior mass had left undone, and was unable to effect, and might answer as the great respiratory of the town, and would be well adapted to serve, if wide enough, and planted, for alamedas, or public walks.

In London, the line of the New Road and City Road furnishes almost the only sample the metropolis possesses of polygon lines of communication, and the utility of the sample is duly felt and appreciated. In Paris the line of the Boulevards presents a favourable specimen of the convenience and comfort of such a construction of streets.

The advantage of adhering to system in laying out new towns, or additions to old towns, will be much enhanced when we take into consideration the means of supplying water, gas, &c. to the houses; and as the application of science and machinery becomes more extended in administering to the comforts of towns, it is manifest the more regular the field of their action the more efficacious and economical will be the results. On the score of ventilation, as well as for other conveniences, it is important the streets should intersect and not abut on each other, that the currents of air may have free escape.*

One of the greatest evils arising from towns extending at caprice, without reference to any general plan, is the vast expense that subsequently arises when necessity demands communications to be made through crowded masses of buildings; such events are of frequent occurrence in the metropolis and other large towns, and so great is the outlay to remedy what might have been avoided, that no measures proposed for the improvement of towns merit such deep attention as these; and it has sometimes occurred to me, that instead of applying the funds to enlarging the leading thoroughfares, the object would in many cases be better served by forming entirely new communications through the worst constructed and less costly sites. In this manner we should have two good communications instead of one; we should open the means of communication, ventilation, and sewerage to places where at present they exist most imperfectly, and we should expunge from the map of the town a number of noxious, ill-ventilated ruinous buildings, the seats of dirt, disease, and demoralization.

Annexed is a plan of the town of Birmingham, on which is traced a study or design for the future increments of that town on the principles above proposed, which will serve to illustrate the views of the writer. The figure P P P P represents the normal polygon.

Increments.—It is hardly to be expected that any very uniform plan of building can be rigidly adhered to; moral as well as physical difficulties may demand departure from regularity in the construction of the future increments of a town, particularly where the field to be occupied is extensive; but so long as the general principles are adhered to, and the new streets proceeded with, upon a general preconceived and authorized plan, all the needful objects may be attained; and it has occurred to me that the mode most likely to give satisfaction to the inhabitants would be for the municipal authorities to offer a premium for the best design for the extension of the town, and of leaving the selection to the majority of the ratepayers.

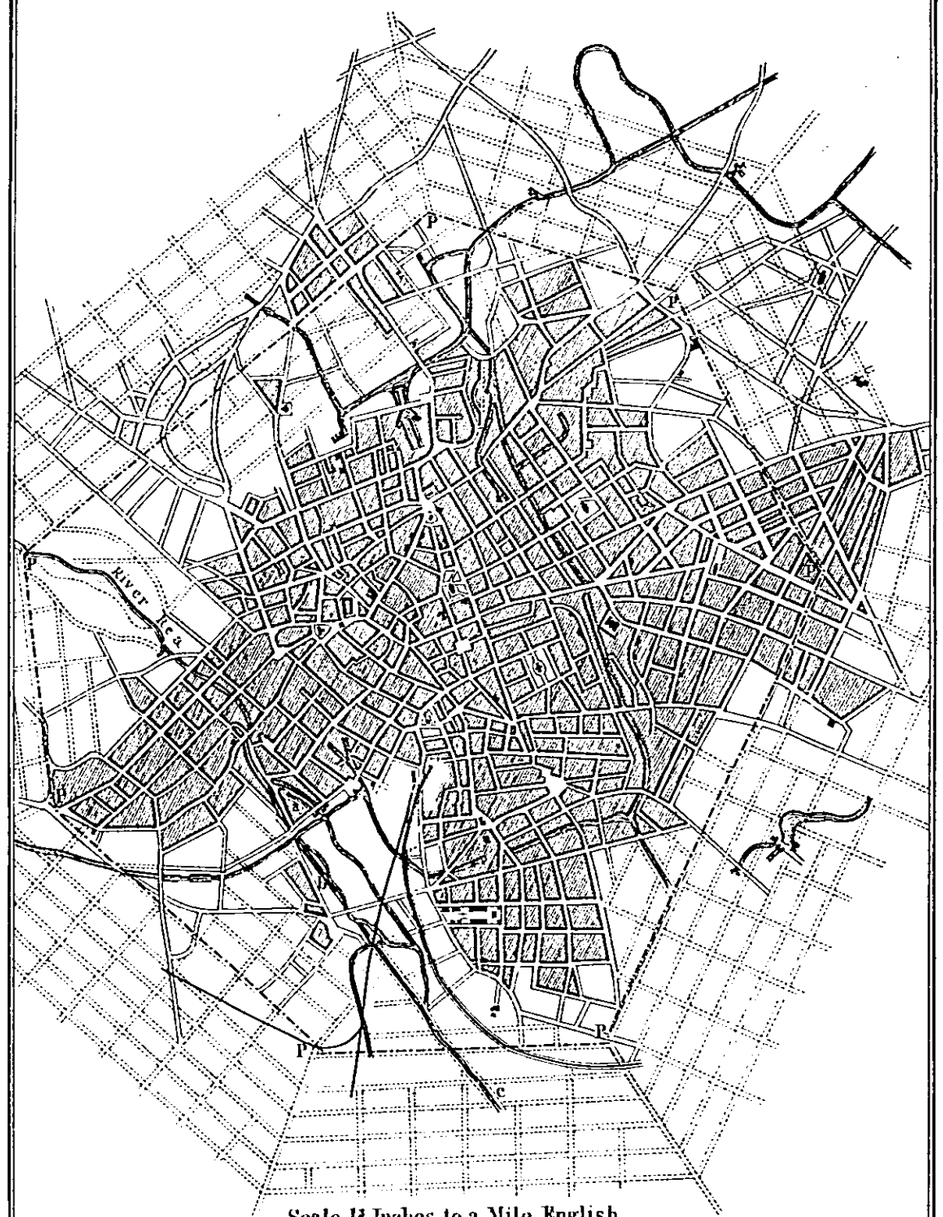
Proprietors of large spaces of ground, or a combination of small ones, might also claim and be authorized to form and execute their own plans,

* After the great fire of London, had the plan of Sir Christopher Wren been adopted for the reconstruction of the City, that circumstance would have saved the great expenses which have lately been incurred in rendering the communications commodious; but no price could now achieve the conveniences and facilities which his plan would have conferred on the inhabitants during the long interval.

TOWN OF BIRMINGHAM,

To illustrate the mode proposed for constructing the future increments of an irregular Town, upon principles of general convenience and utility.

P P P. *Normal Polygon of Construction.*
a *Mill Pond.*
b c. *Line of New Cut proposed for River Rea.*



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provided always that they were previously submitted to examination and approval by properly constituted authorities.

It has been omitted to mention, that towns built on a regular plan, and upon sanitary and commodious principles, are much less liable to the accidents of fire, and the consequent loss of life and property; and when such do occur, the facility of extinguishing them is much greater; and one might also venture to predict that it will be found that the new town of Edinburgh has suffered less from fire than any other town in Great Britain.

Prevention against fire is a subject well meriting consideration when treating of the improvement of towns. It would seem that fires more particularly occur in large public and private buildings, as for instance, the Albion Mills, the theatres of Drury-lane and Covent-garden, the Houses of Parliament, the Great Armoury in the Tower, Royal Exchange, &c.; and it would be well to provide that all such buildings should be detached, as well as manufactories and all buildings containing steam-engines: but previous to legislating on the subject it would be desirable to collect the statistics of conflagration, which might readily be obtained from the fire-insurance offices.

Ventilation.—In new towns, or the increments of old towns, good ventilation will be best secured by attending to the principles laid down for the construction of such.

The noxious ingredients which must exist more or less in the atmospheres of all large towns may be dissipated by currents of air, or diluted by access to large open spaces, while the origin of the evil may be much reduced by a good system of sewerage.

For the removal of noxious vapours existing in crowded towns the following points deserve attention:—

1. The conversion of blind alleys into thoroughfares.

2. The continuation of leading streets through blocks of houses on which at present they abut.

3. The opening of wide and straight streets through the meanest, most complex, and crowded parts of cities; this will prove the most important measure for meeting the object in view; and what merits the next consideration is the preservation of such good and healthy avenues as already exist free from encroachments: for it has happened in the metropolis while exertions were making in some districts to open wide streets, in other districts a contrary system was at work. The New and City Roads, the most commodious avenue in the vicinity of London for length, width, useful and healthy communication, is in a constant process of invasion, as may be noted more particularly in the vicinities of Tottenham-court Road and King's-cross; and unless some measures are taken to preserve this noble respiratory of the metropolis, it is to be feared in a short time its character will be entirely changed.

4. Another mode of improving the air of towns is to open squares, or public walks, or gardens, by the removal of some of the buildings, by which means a reservoir of pure air is created, and in this manner the city of Seville was essentially benefited; the streets are there numerous, narrow, and dirty, but the city, abounding in large convents, the removal of some of them, and the conversion of their ample sites into piazzas or squares, afforded the air and space so much required for the public health.

In London there are some institutions that might be advantageously removed to the suburbs or skirts of the town, such as the Charter-house School and the Fleet Prison, and their sites converted into open squares; but if such operations are too costly and difficult, we may at least guard against the converse operation, viz., the covering of open sites with masses of buildings. Thus we have seen in recent times the gardens of Lincoln's-inn and Gray's-inn invaded; and we had lately a proposition to convert Lincoln's-inn-square into piles of buildings, and to demolish what no art can supply, the finest reservoir of air which the metropolis offers to a crowded neighbourhood.

5. The circulation of pure air would be much increased by pulling down all dead walls, and by substituting iron railings in their stead; and too much credit cannot be given for what has already been effected in this respect in the neighbourhood of Knightsbridge, &c.

6. The prohibition of all burials in the metropolis and other large towns, and the consequent diffusion of unwholesome effluvia.

Drainage and Sewerage.—As towns become more crowded, the value of good drainage and sewerage as a sanitary measure becomes the more apparent; and as the means of draining the site of a town above and below the surface is to be effected in part by the same means as the sewerage or removal of the liquid filth, the subject becomes of great importance, and second only to the choice of the site of the town and distribution of its streets; and if a *due regard to system* has been shown to be so desirable in the one case, it is no less so in the other, and before any buildings are commenced the plan of drainage should be matured.

In order to arrive at a good system of drainage for a piece of ground intended to be built upon, or in a town where the sewerage requires improvement, a necessary step in the process would be to add to the plan of the town lines of equal altitudes, drawn at every two or three feet of elevation, which would present at one view the means of comparing the levels over the whole extent of the town; they would show the deepest valleys where the main sewers would most conveniently run, and the most efficient mode of combining the several classes of drains, so that the declivities might be turned to the best account; in addition, the plan should be so far geological as to show the boundaries of the strata, as a body of marl or clay often upholds a quantity of water which might prove injurious as a building site if not previously tapped.

A notorious instance of this nature occurred at the village of Moseley, near Birmingham. Preliminary to carrying the Gloucester Railway through the village, in deep cutting, it had been ascertained by trial shafts that the bottom consisted of quicksand, which rendered it difficult either to construct a tunnel or to support the slopes in open cutting until the water was removed; and for this object a drift or level was brought up from a distance of a quarter of a mile through a bed of marl; the miners proceeded for some distance perfectly dry until they reached the quicksand, when the water flowed into the drift at the rate of 253 cubic feet per hour, or 77½ gallons per minute, and the wells in the village in a short time were laid dry, and had to be deepened at the expense of the Railway company. It so happened in this instance that the level of the quicksand was so deep that the surface of the land had not been affected by the pending up of the water below; but if it had been otherwise, the measure resorted to would have proved as useful to the land as it was to the Railway.

In laying out a plan of drainage and sewerage when a river or brook passes through or alongside of a town, it will naturally become the main drain of the place, and be the normal line from whence the second-class sewers would diverge; but it not unfrequently happens when such a brook is small and becomes the *cloaca maxima*, that, being left open, and insufficiently supplied with water in the summer season, it constitutes, instead of a benefit, a serious nuisance to the inhabitants; instances of this kind may be observed at Edinburgh, Birmingham, Coventry, Camberwell, &c. &c. It also happens at many towns that a stream passing through or by them is dammed up to turn a mill just above or below the town, or even in the middle of it, by which means the current useful to clear away the filth is diverted, the water in the bed of the stream into which sewers are discharged is left stagnant, while the vicinity of the town is rendered wet and unwholesome from the pent up water.

At Birmingham the Rea Brook is dammed up in its course through the town to supply a mill. In the very excellent sanitary report of the town by Dr. Hodgson and other medical gentlemen, it is stated that "the river Rea may be considered the cloaca or main sewer of the town, but

that its condition is very bad;" the report also states, "that the stream is sluggish, and the quantity of water which it supplies is not sufficient to dilute and wash away the refuse which it receives in passing through the town, and that in hot weather it is consequently very offensive; and in some situations in these seasons is covered with a thick scum of decomposing matters; and this filthy condition of the river near the railway stations is a subject of constant and merited animadversions, and that it requires especial attention lest it should become a source of disease, &c."

The *cloaca maxima* of Birmingham differs from that of ancient Rome; that whereas in the latter art was employed to effect what nature had left undone, here art has been employed to obstruct the useful course of nature. I quite agree with the sanitary report as to the present noxious state of the brook; and even those who travel on the railway may at times be very sensible of the effluvia when crossing it.

I am inclined to differ from the sanitary report as to insufficiency of the water of the Rea for cleansing its own bed; but that report has not adverted to the fact of the abstraction and diversion of the water of the Rea from its natural bed to turn a mill, a fact which will amply account for the deficiency and sluggishness of the current in the very places where the contrary condition is most wanted.

From my inspection of the locality, I am inclined to believe that the descent of the Rea and its quantity of water in passing through the town of Birmingham is sufficient under good arrangements for the efficient and wholesome sewerage of its bed.

If we take a distance of half a mile above the weir and half a mile below it, that is, nearly from Morley-street to Lawley-street, I consider I shall be justified in saying there is a descent of about 14 feet, for I find a slight weir in Floodgate-street; at the dam itself the fall is about eight feet, and from thence for a considerable distance downwards the fall is considerable.

Above the weir the stream for a short distance is sluggish from want of declivity, and the water being pent up, keeps the houses there wet or damp, while below the weir the bed of the Rea being left nearly dry, the filth from the sewers which discharge there must stagnate, while at the same time the water of the Rea passing through the mill-race with a good body and current, applies to no act of cleansing.

The mill-pool is extensive but shallow, and there the filth from above accumulates. When the pool is filled with water it is worked off by the mill, but the gratings prevent dead dogs and such like matter from passing, and are there left to fester at low water.

The remedy is as easy as the evil is great; all obstruction being removed from the course of the brook and the water restored to its original bed, the object would be effected; as to the value of the mill-power which would thus be subverted, it cannot be a matter of much amount in a place where coals and steam-engines are so cheap, and where the constant and regular work of the mill must be an object of some importance.

In applying a remedy to the great evil under notice, the engineer should not be content by merely restoring matters to their original and natural state, but in so populous a town should apply all the aid which art can bestow to assist natural circumstances. The bed of the Rea should be formed with an uniform descent through the town and for some distance below it, by dredging in some places and filling it in others with coarse gravel or broken stones; or, better still, if funds will afford it, by forming an inverted arch of stone or blue bricks to give full effect to the scour of the stream; further, the engineer would render the course of the brook through the town as straight as circumstances would permit by cutting off loops and sinuosities. In this manner, and by reserving the whole body of the water of the Rea for cleansing its own bed, I have no doubt that this main sewer of Birmingham would become as conspicuous for its wholesome and efficient action as it is now for the contrary.

About a mile above the town of Birmingham, there is another mill which I am disposed to think would act rather beneficially than otherwise, in removing the filth from the bed of the brook in its course through the town; for in summer weather when the stream is scanty, by pooling it up and letting the water down with force at intervals, the effect is much increased. Whether the stream of the Rea be so deficient in summer as to require this process, I would not now give a positive opinion, but there are many somewhat analogous cases where the stream in summer is not sufficient and where the pooling up and flushing off at intervals could not but prove of great utility; and if I have now brought the case of Birmingham into considerable detail, it is owing to the circumstance of its exemplifying certain conditions that are common to a great number of towns, and which, in a sanitary point of view, and more especially in regard to the poorer classes of the community, are the most urgent for remedy of any that have fallen under my observation.

In the town of Haddington, a mill-dam crosses the river Tyne in its passage through the place and into the mill-pool; the main sewer is discharged with a diminished and sluggish descent; and on occasion of floods in the river, the water passes up the sewers and occasionally lays the lowest part of the town under water. It would not be difficult to direct the main sewer into the bed of the river below the dam or weir, and by the additional declivity give some current to the water of the sewer, which from the pending up of the river at its present outlet has rendered it almost stagnant, so much so, that in hot weather, and where it is not covered over, the exhalations are very offensive; but was the sewer improved by the alteration mentioned, still the pooling up of the river for the mill keeps the lower part of the town damp, and even subjects it to partial inundations.

One of the medical officers reports, that when "fever has been at any time prevalent in the town, it has been most so in a portion of it called the Nungate,* lying close by the river, when during the summer and autumn it is occasionally almost stagnant, and where there is a considerable decomposition of vegetable matter."

Another medical gentleman, speaking of the main sewer, says, "this small burn is a receptacle of the privies and refuse of vegetable matters from the houses near which it passes; and in those parts where it is uncovered, it forms an excellent index of the weather; previous to rain the smell is intolerable."

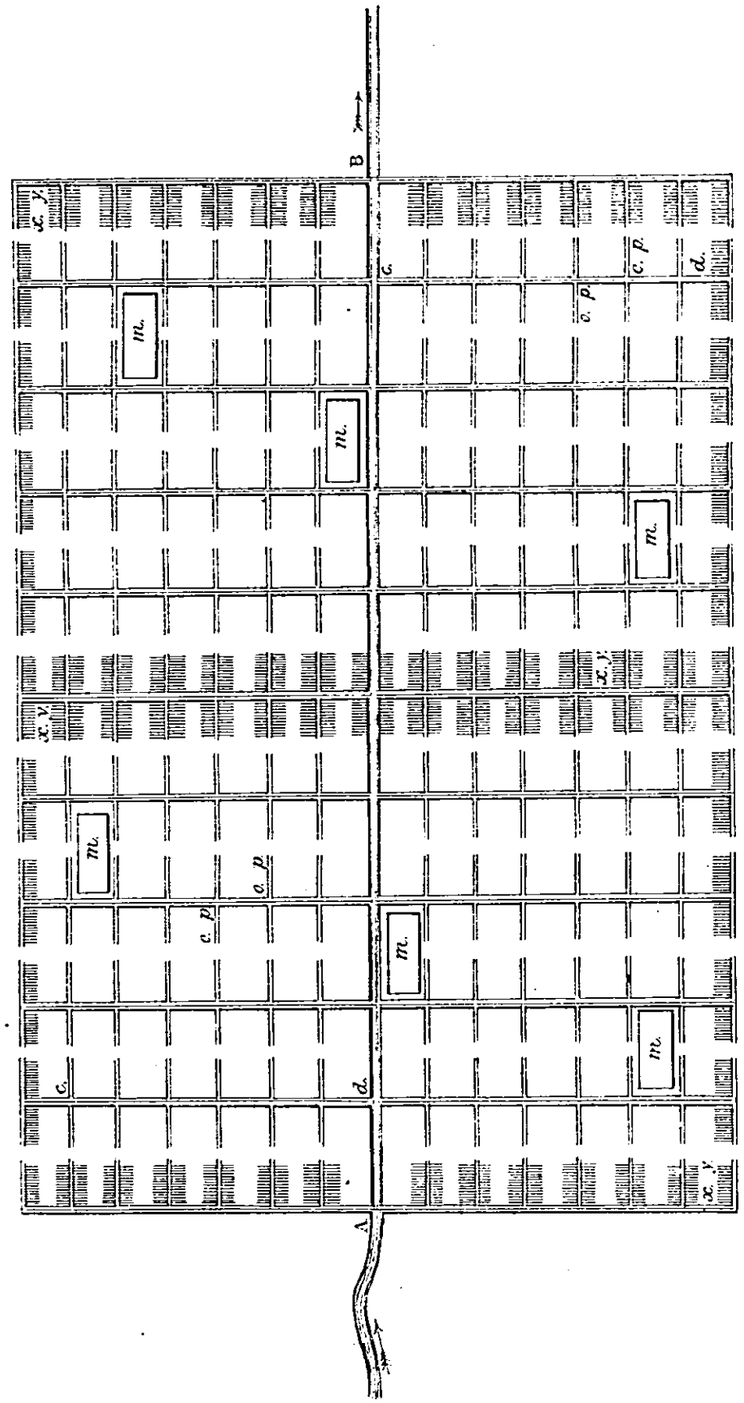
The same gentleman proposes as a remedy that another small burn, having a parallel course at a short distance, should be turned into the sewer to aid the sewerage. From my knowledge of the locality, the recommendation, I should say, is judicious, but in this manner, though the supply of water would be increased, the declivity or rather want of declivity of the sewer would remain the same, and could only be improved by removing the mill-dam, or directing the sewer into the bed of the river below it, as already mentioned. Unquestionably from the pending up of the river, the lower part of the town is at present very ill drained, and it is somewhat remarkable that it was the first site in Scotland visited by the Asiatic cholera.

In reference to the two cases cited and to others of a similar nature, it should be remarked, that the vicinities of the nuisances are chiefly inhabited by the poorer classes, and who from want of influence in their own parts are the more necessarily thrown under the protection of state regulations.

The sewers of a city or town may be conveniently divided into four classes:—First, the main drain or sewer, and this, whether natural or artificial, being fixed, becomes the basis of the system, and upon it the second drains or district class will be directed: these again will receive the third class or street drains; and lastly, the house or fourth class drains, will be discharged into the street drains. In small towns, only the third

* The Nungate is situated along the edge of the mill-pool.

PLAN OF SEWERAGE.

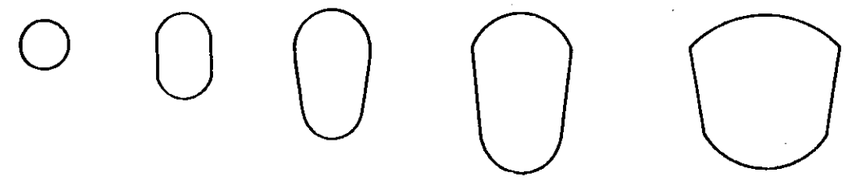


A.B. *First Class Sewer, or Main Drain.* | *o.p. Third Class Sewer, or Street Drain.*
c. d. Second Class Sewer, or District Drain. | *x, y. Fourth Class Sewer, or House Drain.*
m. m. Blocks of Houses.

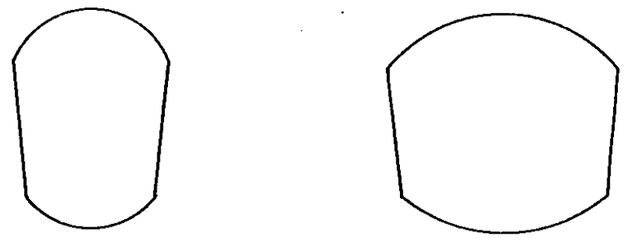
Sanitary Report P. L. C.

STREET SEWERS *(o.p.)*

DISTRICT SEWERS *(c. d.)*

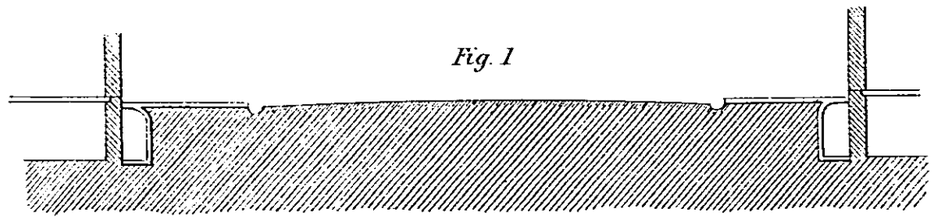


MAIN SEWERS (A.B.)



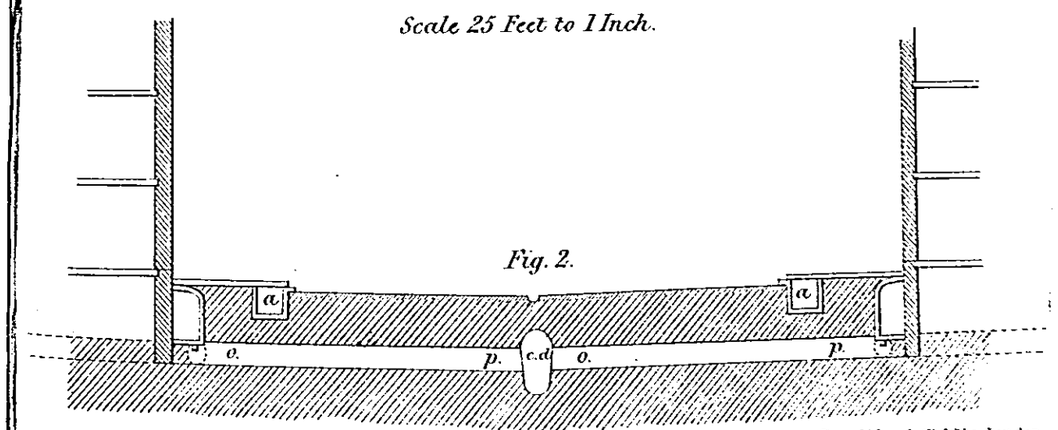
Scale ¼th Inch to one Foot.

Fig. 1



Scale 25 Feet to 1 Inch.

Fig. 2.



Standidge & Co. Lithe, London.

and fourth class drains will be required; in large towns, three classes of drains may be necessary; and in great cities, all the four classes will be required.

With respect to the form of the drains, when bricks are used as building materials, the bottoms of the drains will be best formed of inverted arches of blue bricks, as forming a cheap, hard, and durable surface, and giving every facility from the form, for the scouring force of the water to remove the filth brought into the drain; but whether the curve of the bottom shall be a semicircle or a segment will, I apprehend, depend on the size of the drain. For very small drains a circular form would be the cheapest and best; the next size would be more advantageously constructed of an oval or egg shape, but still of bricks. Drains of a still larger size, viz. the second class, may be conveniently made either of brick or stone, arched and counter-arched at top and bottom with battered sides, either straight or curved; the counter-arches or curved bottoms will conveniently become flatter as the drains increase in capacity to afford greater room for the accumulated water to pass without rising and flooding back into the feeders.

The first and second-class sewers must be deep seated to receive their respective tributaries or feeders, with some overfall; and though a sufficient width for large drains may generally be procured, it is difficult in many cases to command enough of depth, another circumstance that can best be obviated by flattening the arches both at top and bottom; but in large drains, where there is a body of water, the scourage will be sufficient, without resorting to deeply curved bottoms.

When bricks abound as a building material, they are particularly convenient for the construction of deep sewers and drains, from the facility of handling in confined spaces; but it is important their quality should be of the best, since if they scale and decay, great expense must be involved in the repair of the drain. The Tipton, or blue brick, is the best for the face-work of drains.

In parts of the country where stone abounds, bricks are often little known, and the resources of the district must be made use of; where the blue lias limestone occurs, I have found it a cheap and excellent material for forming culverts and drains of all sizes; and it was used largely for that purpose on the Birmingham and Gloucester Railway.

Annexed is a sketch of the sections of drains varying in form according to their size. The batter which I found most useful and convenient for wall-sided drains was 1 in 9, either curved or straight; the first is the best form in theory, but in small works I found the bricklayers' and masons' work more accurately to the straight batter; and the last is, from its simplicity, better adapted to receive any sluices or flush-gates that may be necessary.

Annexed is also a sketch to show the distribution of drains in a town supposed to be built on a regular plan, with a pretty uniform descent towards an axis, which constitutes the site of the main drain; each class of drains consisting of several sizes, it would be most useful as well as economical that the drain of a particular class (if large) should commence with the smaller size, and discharge or terminate with the greater size, a plan that would aid the sewerage of the water.

In a system of drainage, it is necessary to consider that the greater the body of water, or in other words, the class of the drain, the less declivity is sufficient; and the converse, the less the body of water, or class of drain, the greater declivity is required; in the first case, the hydraulic depth compensates for the want of declivity; and in the second case, the declivity compensates for the want of hydraulic depth; the multiplication of these qualities being a function of the velocity or force of the current, due attention to the above is important in economizing or turning to the best account the declivity for the drainage of a large town.

Having arranged the system of sewerage for a town, the next object will

be to render it as extensively useful as practice will admit of; and from the experiments and practice of Mr. Roe, the surveyor to the Holborn and Finsbury Commission of Sewers, we are warranted in the belief that a good system of sewerage, aided by a sufficient supply of water, will, in most localities, be sufficient to remove all the dirt which arises in the streets, without the necessity of cartage, and also all the filth of private dwellings which is at present led through drains or pipes, or which by the aid of water may be practised more extensively in future.

We have first to consider the conveyance or discharge of the street dirt into the main sewers, and the discontinuance of the present expense, and annoyance of using carts for that purpose, at least with some few exceptions.

It is pretty obvious, that if the mud of London, like water, could be made to flow through the drains, much trouble and expense of cartage would be saved; and it does happen that the street-dirt of London is so diffusible with water, that with a little arrangement such a mode of cleansing may be followed; indeed it is highly probable that at present more than one-half of the whole mud is carried off by the rains in that manner.

The mud of London, and other great towns in England, may be assumed in wet weather* to arise, in three-fourths of its amount, from the grinding or abrasion of the paving-stones, the remaining one-fourth part consisting of soot, shop-sweepings, and cattle dung.

The dirt arising from the detritus of the stones may be obviated in two ways; 1st, by substituting for the green-stone forming the carriage-way, quartz-rock, or quartzose stones. The green-stones contain hornblende and felspar, which grind, like all argillaceous stones, into fine mud or powder mixable in water, whereas quartz rock retains when ground the form of clean sand, neither soiling nor capable of forming mud in itself. The Lickey Hills in Worcestershire are composed of quartz rock, and the roads in their vicinity show its excellence as a material for road making. The quartz rock, however, of the island of Jura is much purer, and that island contains an inexhaustible supply already broken by nature into sizes nearly fit for laying on the roads; and Small's Bay in the island of Jura would form a convenient loading place, and by means of a jetty and tram-way vessels might be laden at a small expense, and much of the country supplied with the best of all materials for road-making. The substance of the stone is hard and durable, and consequently suffering little by abrasion; and it would be well worth while to try the experiment of Macadamizing one of the leading streets of London with this material, as the means of forming a good road, and at the same avoiding the creating of a great quantity of street dirt.

The other mode of avoiding the formation of mud is the substitution of wooden pavements; of the success of these I have little doubt, though for the present many failures have occurred, either from the foundation not having been truly and firmly laid, or from the blocks of wood not being massive enough. The greatest objection to wood pavements at present is the slipping of the horses, but this I believe might be obviated.

The question, however, at present is to get rid of the street dirt, such as it is; and for that purpose I apprehend it would only be necessary in wet weather during rains that the street-cleaner should sweep the dirt into the kennels, and aid the water by stirring the mud, to carry off the material in a state of diffusion; in dry weather, the opening of pipes with hose attached would serve the same purpose as the rains, and at the same time aid the sewerage at the time most required. After a short but heavy fall of rain, the cleansing effect of the water is fully perceived: and if any means could be devised of saving the rain-water that falls on the houses and in the streets, so as to apply it in considerable quantities at intervals, it is probable that the rain-water would be amply sufficient for all the purposes in question.

* In dry weather the abrasion of the stones is much less.

I have heard of the plan pursued by the West Middlesex Water Company for cleansiug their reservoir at Kensington, at little expense, by diffusing the muddy deposit in water, and allowing it to run off in pipes.

In the city of Guanaxuato in Mexico, a similar mode of cleansing has been long practised; a splendid tank of ample dimensions contains the water used by the inhabitants; the tank is supplied by mountain torrents, which bring down a considerable quantity of mud or silt, and which makes a deposit in the bottom of the tank, which is formed by a fine dam of masonry crossing a narrow valley, and provided with sluices. The rainy season commences in the latter part of June, and a short time previous the ceremony of emptying and cleansing the tank is gone through; a kind of fair and holiday is held on the ground, to which most of the inhabitants resort; the sluices are opened, and as the water recedes, the watermen, boys, and all those who relish the fun, get into the tank and keep stirring up the silt with sticks and spades, &c., and in this manner the mud is annually carried off by the remaining water of the past season, a subsidiary tank serving for use until the principal one is replenished.

By some sort of a similar process it is alleged that much of the mud-banks of the Thames above the bridges have been removed, viz., by the action of the paddle-wheels of the numerous steam-boats running there. Some of the effect observed must be owing to the greater scour of the tides since the removal of Old London-bridge, though some part may also be due to the steam-boats.

For the purpose of giving more aid to the surface-water in cleansing the streets, and at the same time for keeping the footways and houses drier and more free from mud, I should propose (at least as an experiment) a different structure of the carriage-way, viz., to make it incline to a centre kennel, instead of to two side ones. At present, in many places, the centre of the carriage-way is elevated above the level of the shop doors, and at the same time we often find the footway but three inches higher than the kennel; and it is pretty obvious from this arrangement, in dry weather, the dust will blow from the more elevated carriage-way on to the footways, and into the shops and areas; and in wet weather the water and mud being chiefly accumulated in the side gutters, the carriage wheels and horses' feet will distribute it plentifully on the footways, and not unfrequently on the passengers, and all tending to keep the houses damp and dirty, whereas it is obvious that, was the descent constant from the houses* on either side to the centre of the street, these evils would be avoided, and it will be no less evident that all the surface-water flowing to one common channel would possess more force and convenience for running the street dirt into the sewers. I am inclined to believe that the carriage-ways are getting gradually elevated above their proper level, from the contractors for paving not excavating deep enough for the foundation of the pavement.

Annexed is a sketch, showing in juxta-position the form of the street-ways as at present, and as proposed to be; the street is supposed to be a shop-street, 90 feet wide, having two areas of three feet each, two footways of 12 feet, and 60 feet of carriage-way; on the section of the proposed plan a fall of six inches, or 1 in 30, is given from the shop door to the edge of the pavement; there is then a descent by two steps of six inches each to the carriage way; and lastly, a descent of 1 in 30, or of one foot to the kennel in the centre of the carriage-way. The kennel may either be open or covered; if the latter, it must have many gratings. In the city of Mexico the kennel is chiefly in the centre of the street, and covered by large flat stones.

On the proposed plan, if we suppose a step from the foot pavement to

* Scotland Yard, Finsbury Circus, and the north side of St. Paul's Churchyard afford partial illustrations of this arrangement.

the floor of the shop or house, the latter will be elevated about 3½ feet above the gutter, whereas at present we often find it not more than six inches, and it will readily be admitted that such a difference in the disposal of the surface-water cannot but keep the houses much drier and more cleanly.

By having one gutter in the centre of the streets instead of two, (one at each side,) we remove two sluggish and inefficient kennels, which are the source of damp to the pavement and to the houses, and we create one which is at a distance and doubly effective.

The subject of street pavements having been introduced as the means of surface-drainage, it may be remarked how difficult it must ever be to keep them in good order so long as they are liable to be broken up whenever water or gas-pipes require altering or repairing, besides the extreme annoyance occasioned during that operation; and though it may not be possible to obviate the inconvenience in all cases, yet I conceive the evil may be reduced to very narrow limits by resorting to system, and I would suggest that under the foot pavements passages should be formed, lined with brick-work or masonry, as a common receptacle for all the water and gas-pipes, having the flagging over the passage so laid as to be easily lifted in case of need, and being provided at intervals with side entrances for inspection and all such repairs as could be effected without raising the flagging. The position of the gas-pipes under the foot-pavement would be convenient for the street and shop lights, and the water-pipes would be then equally so for the use of the houses. But in respect to the sewer of the street, I should propose to place it near the centre of the carriage-way, as more distant from the dwellings, but as equally convenient to both sides of the street. (See the section for new form of carriage-way.)

Having noticed the subject of diminishing the amount of street mud, and of conveying the same into the sewers, as well as that portion of the house filth which it may be practicable to discharge into them, we have next to notice the mode of further disposing of the matter thus lodged in the sewers. The practice has hitherto been (in a great degree) to accumulate the filth in cesspools, and at intervals of five to ten years to open the sewers by breaking into them, or to get access by man-holes left for that purpose, and then drawing out the semiliquid contents of the cesspool by means of a windlass and buckets; but in the Finsbury division the surveyor, Mr. Roe, has had the merit of introducing a very superior, less expensive, and less offensive mode of operation. Finding that the surface-water did not generally enter the sewer in sufficient quantity and with sufficient force to carry off the more solid contents, he contrived, by sluices or flush-gates, to dam up the water to a certain height, and then, by opening the same, to obtain a force of water sufficient for the purpose; and the working of this new plan is said to be highly satisfactory, the filth being prevented accumulating in the sewers, and, as a necessary consequence, then choaking their feeders, the house drains; and in this manner also the filth is removed at less expense, and without any annoyance and noxious effluvia which attend the old practice.

Mr. Roe has adopted also side entrances to the sewers instead of man-holes, for the inspection and repair of the flushing apparatus. The chief expense beyond the first cost of Mr. Roe's plan is the attendance of a person to open the flush-gates; but it is probable that some contrivance may be found by which the pent-up water on reaching a certain point may be able to open its own gate. It has, however, occurred to me, in respect to this mode of flushing off the filth, that, instead of damming up the water in the sewers, and forming them into reservoirs, the purpose might be more easily and more effectually performed by accumulating the surface-water from the gutters into reservoirs before entering the street or district drains; a greater head, or force of water, might thus be obtained, while the sewers themselves would always be open and free from the obstruction of the sluices and pent-up water,

In respect to the final deposit of the filth of London and other great towns, it does seem a pity that so much valuable manure should be lost to the land, and be discharged into rivers to their contamination and obstruction, if any practicable and innocuous plan can be hit upon to avoid the alternative.

One plan has been suggested of receiving the contents of the sewers into pits, and then by means of steam-power and a sufficient supply of water, forcing the matter of the sewers in a diluted state through iron pipes into the country, and then applying it to irrigate the land in the same liquid state. It would require much calculation to form an accurate estimate of the cost and profit of such an undertaking; but there can be no doubt if the matter was so applied it would prove exceedingly valuable in enriching the land to which it was applied, as we may judge from what has occurred in the vicinity of Edinburgh from a similar kind of irrigation.

At Edinburgh, however, the liquid manure being conveyed from the town for a distance in open ditches or sewers exposed to the sun and atmosphere, it undergoes such a fœtid decomposition as to render the operation no common nuisance to the public. But such effects would not occur (at least to the same extent) if the matter was conveyed in close pipes with a plentiful effusion of water; and it is known that animal carcasses, when kept constantly exposed to fresh supplies of water, do not suffer corrupt decomposition, but are changed into a fatty matter. It seems necessary also that a certain degree of heat and exposure of surface should be present to originate and promote fœtid decomposition, as it is well known that in the pits in Paris, where so many dead bodies were thrown, the result was not a fœtid decomposition, but a change of the animal matter into adipocire, a comparatively inoffensive substance; we may therefore expect that the discharge of the contents of the sewers in pipes, excluded (as they would be) from heat, and copiously charged with water, would be comparatively free from noxious exhalations.

Another plan of reserving the contents of sewers for the purpose of manure would be to continue the sewers to some distance from the town, and then to discharge them into a series of covered catch-pits, allowing the water to filter off after depositing the solid particles; when the first series of pits were deemed sufficiently charged, the sewers might then be discharged into a subsidiary series, until the matter in the first had become sufficiently consistent for cartage. Upon the first plan of proceeding, the liquid manure could only be applied to land quite near at hand, and fit for irrigation; on the second plan the manure might be conveyed to a distance and applied to arable land.

It will be evident the great importance of applying such quantities of manure as the sewers supply to useful purposes, but it is no less evident that no system can be introduced to effect the object until preceded by satisfactory experiments of cost, profit, and efficiency. Some localities might offer facilities for one mode of action, and some for another; and it is much to be desired that parties may be induced to make experiments on both plans; and it is to be noted that though the expense of raising the liquid manure from pits or tanks would be necessary in some cases, yet in many situations no such operation would be necessary.

On the subject of purifying the air of sewers, and of preventing the escape of foul air by any crevices or chinks, I have heard of the ingenious contrivance of erecting a tall chimney and connecting it by a pipe with the crown of a sewer, for the purpose of creating such a draft up the chimney as would occasion an indraft at any leak that might occur in the ramified mass of drains of the district to which the chimney belonged. It appears to me that there are some objections to this plan; but not being acquainted with all the details, I shall avoid entering into any controversy on the subject, further than stating that I should rather propose an opposite

process for purifying the air of sewers. I would recommend that they should be kept excluded as much as possible from external heat and ascending columns of air; but at the same time I would endeavour by all means to send down as copious a flow of water as practicable; and in London, though the Thames water may not be proper for domestic purposes, it would be sufficiently pure for watering the streets and cleansing the drains; and the supply being inexhaustible, its application would only be limited by the cost of steam power and iron pipes.

In conclusion, I have to express my obligations to yourself for the useful hints you have afforded me on several of the subjects above treated of, and to say I shall be happy if any of the observations I have submitted should prove conducive to the ends in view.

I remain, dear Sir,

Yours truly,

JAMES VETCH.

Edwin Chadwick, Esq.,
&c. &c. &c.
London, 1st March, 1842.

6.—*Evidence of* GEORGE GUTCH, *Esq., District Surveyor, on Shifting and Building of Inferior Tenements in the Suburbs to avoid the Provisions of the Metropolis Building Act.*

Is there any distinction in the character of the buildings built out of the limits of the Metropolitan Building Act, or out of the limits of your own district as surveyor?—Yes; there is a less expensive description of buildings built out of these limits. In the adjoining parish of Kensington, there are tenements run up four stories in height with only a nine-inch wall from the top to the bottom, whereas in any parish under the Building Act the walls of the same description of houses would be required to be 18 inches thick in the basement and 14 inches upwards: this, however, is not a sized house for the occupation of the poorer classes. At the Potteries, Notting Dale, Kensington, however, there is a nest of houses huddled together without party-walls and without drainage; many of them are built of wood and four-inch work, and of such materials as would not be permitted where the Building Act is in force. This is with reference to houses which are contiguous to each other.

Have you not seen instances where sewers are made and drains in action where the state of the premises is nevertheless dangerous?—Yes; only recently the parochial officers of Paddington inspected the workhouses and buildings belonging to the Kensington union, when we found the drains formed but not trapped, and the inmates exposed to the foul air from the drains themselves. I have read Mr. Oldfield's statement, and I think it very true and very important.

7.—*Estimate by* MR. HOWELL, *of the Cost of Structural Arrangements of Sewerage, Drainage, Water-tank, and means of House Cleansing for Labourers' Tenements in the Metropolis.*

FEET		£.	s.	d.
55.	Drain and digging, with pantile bottom, three courses high, arched over and cemented .	4	2	6
10.	Small drain from water pipe	0	10	0
46.	Sup. slate slab cistern, 4 ft. by 3 ft. 9, and 2 ft. deep, holding 150 gallons . . .	4	12	0
62.	Three-quarter pipe to serve cistern, including joints and fixing	3	2	0
12.	Ditto ditto yard ditto	0	12	0
	Two three-quarter cocks—10*s.*; one cock-ball and boss—8*s.*	0	18	0
	Carried forward . . .	13	16	6

FEET.		£.	s.	d.
	Brought forward . .	13	16	6
7.	Inch standing and under waste . . .	0	10	6
	1¾ washer and waste	0	2	6
	Pan closet, with basin, &c., complete . .	3	10	0
	Strong D. trap—20*s.*, service box—10*s.* 6*d.* .	1	10	6
	Cover to cistern	0	15	0
		20	5	0
	Deduct 7½ per cent. if done at contract prices .	1	10	0
		18	15	0

From the above estimate the following items should be deducted, as appertaining to the present objectionable system:—

	£.	s.	d.		
Cesspool	1	0	0		
Roof of privy and ceiling . .	0	15	0		
Drain, say 65 ft.	3	5	0		
Water-butt and stand . . .	1	5	0		
Service pipe, 40 ft. . . .	2	0	0		
Cock and ball—8*s.*; waste pipe—7*s.*	0	15	0		
	9	0	0		
Less 7½ per cent.	0	13	6		
				8	6 6
				10	8 6

8.—*Description or Specification of* MR. LOUDON'S *Agriculturist Model Cottage.*

The plan and elevation which I have given are intended for an Agricultural labourer in the north of England or in Scotland, where it is customary to have the sleeping room on the ground floor. The walls are supposed to be 18 inches thick, and the roof thatched, as being the warmest covering in a cold bleak country. The front entrance is by a porch, which contains a step-ladder to the garrets, which, being lighted by windows in the gable ends, may be used as sleeping places for grown-up children, while the younger children may sleep below in the same room with their parents. *a*, is the kitchen; *b*, the sleeping room; *c*, the back kitchen; *d*, the pantry; *e*, the dairy, if the occupant should have a cow, which is generally the case with agricultural labourers in Scotland; and *f*, a place for fuel, for poultry, or for a furnace to heat a flue passing under the floors of the two rooms in the direction of the dotted line *g*, the smoke escaping by the upright flue *h*. The highest point of the sleeping-room floor is at *g*, and of the kitchen floor at *i*; the highest point of the pantry floor is at *d*, and of the dairy floor at *e*, and from these four points the floors gradually slope at the rate of 1 inch to 7 feet to the sill of the back kitchen door at *m*, so that no water can stand in any part of these floors; and hence, when they are being washed with a mop in the direction of the slope the water will readily flow towards the back door.

A place for wood or other fuel, or for a pig or rabbits, according to the taste or circumstances of the occupant, is shown at *n*; a privy at *o*; a tank for liquid manure, communicating with the privy, at *p*; and a pit for ashes and solid manure at *q*. Both these pits may have movable roofs.

The surface of the yard slopes from the entrance door *r*, to the liquid

manure tank *s*. The back kitchen is entered by one step; the terrace in front at *t* is entered by three steps, and the door of the porch by a half-step.

The garden is only partially shown, the portion omitted being a parallelogram of sufficient length to constitute the contents of the whole ground allotted to the cottage, one-sixth of an acre. It is surrounded by a hedge, which may be shown architecturally to give an appearance of design and taste on the part of the occupant.

The slope of the terrace may be covered with grass or flowers, strawberries or ivy. The narrow border next the hedge may be planted with flowers, and the larger compartments in front of the porch with gooseberries, raspberries, currants, and dwarf apples. The culinary crops are supposed to be grown in the back compartment, only a portion of which is shown at *w*.

A B, is the elevation of the front hedge.
C D, a part of the side hedge.
E F, a section on the dotted line *E F*, to a double scale.
G H, a section on the dotted line *G H*.
The upper part of the drawing is an isometrical view.

9.—*Statement of the Requisites of Cottage Architecture, by* J. C. Loudon, *Esq.*

"The *essential requisites* of a comfortable labourer's cottage may be thus summed up:—

1. The cottage should be placed alongside a public road, as being more cheerful than a solitary situation; and in order that the cottager may enjoy the applause of the public when he has his garden in good order and keeping.

2. The cottage should be so placed that the sun may shine on every side of it every day throughout the year, when he is visible. For this reason, the front of the cottage can only be parallel to the public road in the case of roads in the direction of north-east, south-west, north-west, and south-east; in all other cases the front must be placed obliquely to the road, which, as we have previously shown, is greatly preferable to having the front parallel to the road.

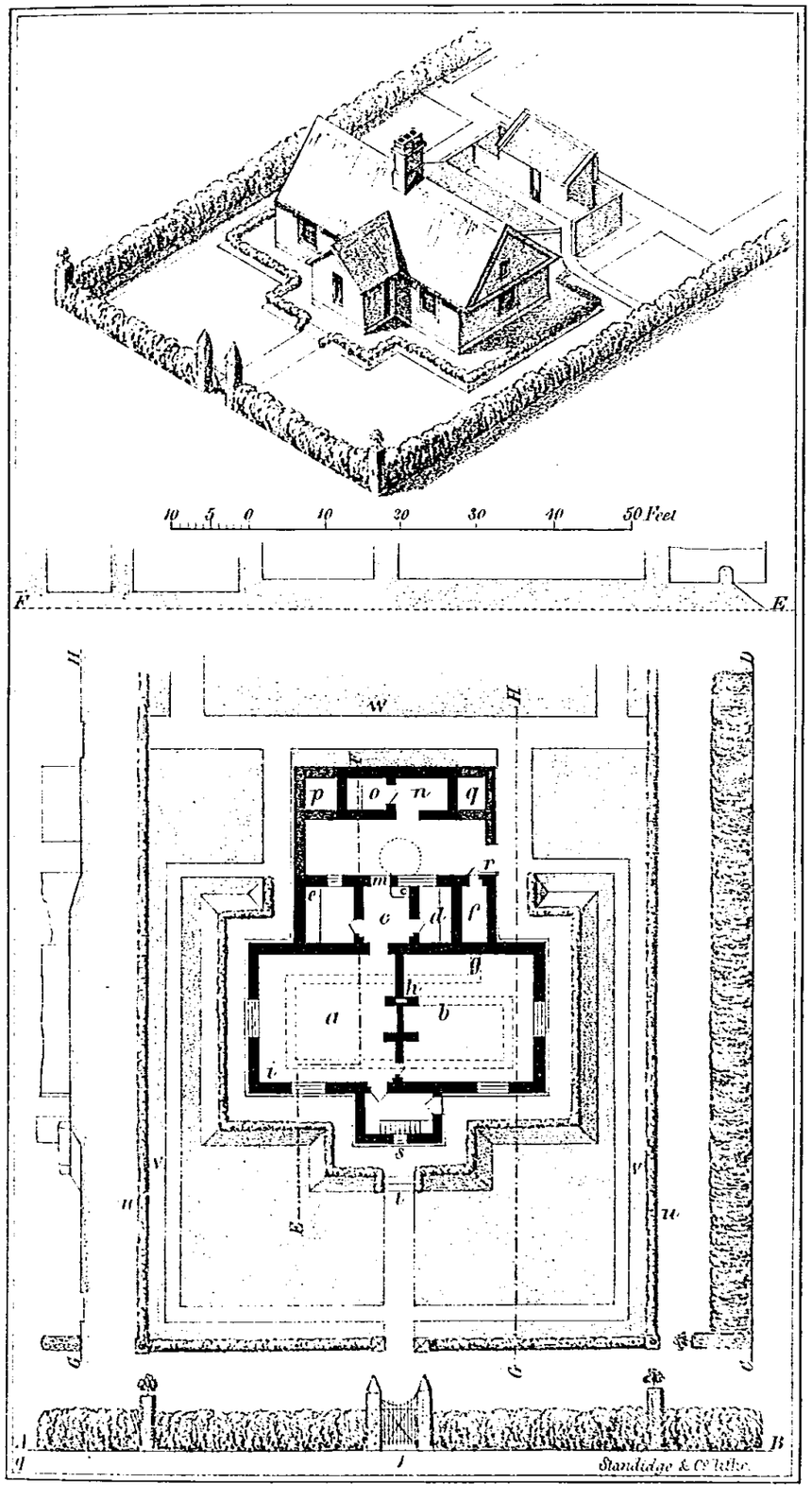
3. Every cottage ought to have the floor elevated, that it may be dry; the walls double or hollow, or battened, or not less than eighteen inches thick, that they may retain heat; with a course of slate or flagstone, or tiles bedded in cement, six inches above the surface, to prevent the rising of damp; the roof thick, or double, for the sake of warmth; and projecting eighteen inches or two feet at the eaves, in order to keep the walls dry, and to check the radiation of heat from their exterior surface.

4. In general, every cottage ought to be two stories high, so that the sleeping-rooms may not be on the ground floor; and the ground floor ought to be from six inches to one foot above the outer surface.

5. The minimum of accommodation ought to be a kitchen or living-room, a back kitchen or wash-house, and a pantry, on the ground floor, with three bed-rooms over; or two rooms and a wash-house on the ground floor, and two bed-rooms over.

6. Every cottage, including its garden, yard, &c., ought to occupy not less than one-sixth of an acre; and the garden ought to surround the cottage, or at all events to extend both before and behind. In general, there ought to be a front garden and a back yard, the latter being entered from the back kitchen, and containing a privy, liquid-manure tank, place for dust and ashes, and place for fuel.

7. If practicable, every cottage ought to stand singly, and surrounded by its garden, or, at all events, not more than two cottages ought to be joined together. Among other important arguments in favour of this arrangement, it may be mentioned, that it is the only one by which the sun



can shine every day on every side of the cottage. When cottages are joined together in a row, unless that row is in a diagonal direction, with reference to a south and north line, the sun will shine chiefly on one side. By having cottages singly or in pairs, they may always be placed along any road in such a manner that the sun may shine on every side of them, provided the point be given up of having the front parallel to the road; a point which, in our opinion, ought not for a moment to be put in competition with the advantages of an equal diffusion of sunshine.

8. Every cottage ought to have an entrance-porch for containing the labourer's tools, and into which, if possible, the stairs ought to open, in order that the bed-rooms may be communicated with without passing through the front or back kitchen. This, in the case of sickness, is very desirable, and also in the case of deaths, as the remains may be carried down stairs while the family are in the front room.

9. The door to the front kitchen or best room should open from the porch, and not from the back kitchen, which, as it contains the cooking utensils and washing apparatus, can never be fit for being passed through by a stranger, or even the master of the family, where proper regard is had by the mistress to cleanliness and delicacy.

10. When there is not a supply of clear water from a spring adjoining the cottage, or from some other efficient source, then there ought to be a well or tank, partly under the floor of the back kitchen, supplied from the roof, with a pump in the back kitchen for drawing it up for use, as hereafter described in detail. The advantages of having the tank or well under the back kitchen are, that it will secure from frost, and that the labour of carrying water will be avoided.

11. The privy should always be separated from the dwelling, unless it is a proper water-closet, with a soil-pipe communicating with a distant liquid-manure tank or cesspool. When detached, the privy should be over or adjoining a liquid-manure tank, in which a straight tube from the bottom of the basin ought to terminate; by which means the soil basin may always be kept clean by pouring down the common slops of the house. No surface being left from which smell can arise, except that of the area of the pipe, the double flap, to be hereafter described, will prevent the escape of the evaporation from this small surface, and also ensure a dry and clean seat.

12. The situation of the liquid-manure tank should be, as far as possible, from that of the filtered-water tank or clear-water well. It should be covered by an air-tight cover of flagstone, and have a narrow well adjoining, into which the liquid should filter through a grating, so as to be pumped up or taken away without grosser impurities, and in this state applied to the soil about growing crops.

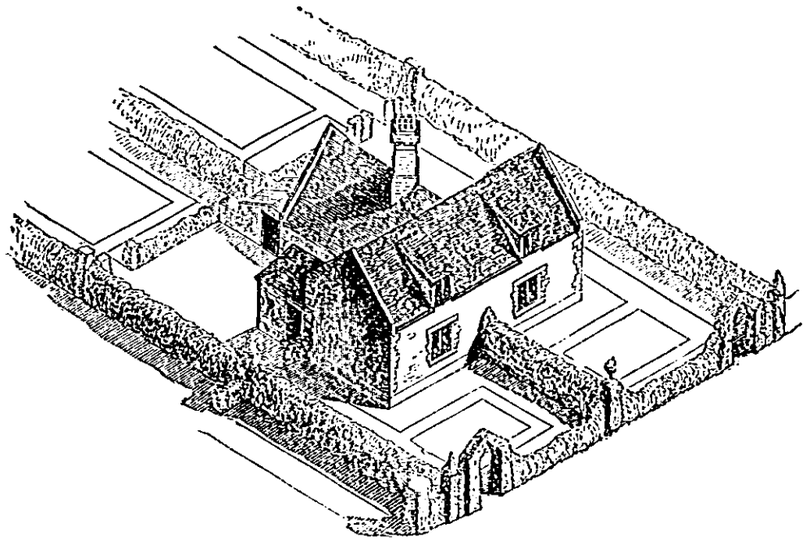
13. In general, proprietors ought not to entrust the erection of labourers' cottages on their estates to the farmers, as it is chiefly owing to this practice that so many wretched hovels exist in the best-cultivated districts of Scotland and in Northumberland.

14. No landed proprietor, as we think, ought to charge more for the land on which cottages are built than he would receive for it from a farmer, if let as part of a farm; and no more rent ought to be charged for the cost of building the cottage and enclosing the garden than the same sum would yield if invested in land, or, at all events, not more than can be obtained by government securities.

15. Most of these conditions are laid down on the supposition that the intended builder of the cottage is actuated more by feelings of human sympathy than by a desire to make money; and hence they are addressed to the wealthy, and especially to the proprietors of land and extensive manufactories or mines."

The following is the view of a double mechanic's cottage, from Mr.

Loudon's collection, similar to the agricultural labourer's model cottage, of which a view has already been given.



Besides the details of construction, such as are exemplified in the report, that appear deserving of attention, there are details in the furniture of cottages, and particular descriptions of furniture by which it appears that much improvement may be effected. For example, an important improvement in the box bedsteads used in Scotch cottages has been suggested by Dr. Wilson, of Kelso. It consists of a curtain-rod and curtains, which may be drawn out about three feet from the front of the bed, so as to form sufficient space between the curtain and the bed to serve as a dressing-room. It is observed by Mr. Loudon, that some of the Leith and London steamers had the berths in the ladies' cabins fitted up in this mode some years ago; and it is a principle applicable, and, it is unnecessary to say, necessary for the preservation of decency in double-bedded rooms, as well as in those cottages where the box bedstead is used. The following is a copy of the plan of the improvement given by Mr. Loudon.

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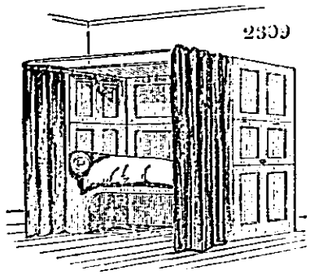

Another part of Dr. Wilson's improvements in these beds consists of the hinging a part of the roof of the bed, so that it may be opened like a trap-door at pleasure for ventilation, and the hinging of the boards at the foot and at the back for the same object, and for giving access to a medical attendant. Mr. Loudon expresses a hope that these improvements form one step to getting rid of box bedsteads altogether. They are noticed here as exemplifications of the moral ends which may be gained in structural arrangements, which incur inconsiderable expense, and only a little care at

the outset. Other detailed improvements may be made subservient to structural economy. The following is an exemplification thus described by Mr. Loudon:—"It is a matter of some difficulty, in small cottages, to place the shutters to the windows on the ground floor in such a manner as to answer the purpose, and yet be out of the way. The following plan has been adopted in some buildings of that description, which have been lately erected. The shutters are hung on hinges in such a manner as to fall down into a recess below the window during the day-time; and consequently they are quite out of the way when not wanted for shutting up the house, or for temporary purposes. The idea suggested itself that shutters be occasionally used as a table or ironing-board; and to effect this end, two movable bars as supports were let into mortices in the floor, and made to abut against similar mortices made in the ledges on the under side of the shutters. The two cornices were slightly rounded, and the upper surface was left plain without paint. Two swing iron or wooden brackets might be used instead of the wooden bars, as they could be folded back into the recess also.

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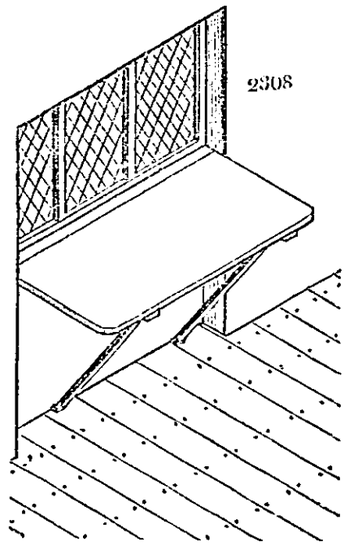


10.—*Specification of the Cost of Erection, Weekly Rents, Interest on the Capital invested, and the Numbers of Tenements and Cottages occupied by the Poor and Labourers; taken from Returns made by the Relieving Officers of their respective Districts, in 24 Unions in the Counties of Cheshire, Stafford, Derby, and Lancaster.*

—	No. 1. Lowest Class of Cottages, average 1s. 3d. per Week, or £3. 5s. per Year, allowing for Repairs, &c.			No. 2. Second Class of Cottages, average 2s. 3d. per Week, or £5. 15s. per Year, allowing for Repairs, &c.			No. 3. Third Class of Cottages, average 3s. 6d. per Week, or £9. 2s. per Year, allowing for Repairs, &c.			Population.
	Number of Tenements or Cottages.	Average Cost of erecting each Cottage.	Interest on the Outlay or Capital invested	Number of Tenements or Cottages.	Average Cost of erecting each Cottage.	Interest on the Outlay or Capital invested	Number of Tenements or Cottages.	Average Cost of erecting each Cottage.	Interest on the Outlay or Capital invested	
		£.	Per Cent.		£.	Per Cent.		£.	Per Cent.	
Congleton .	1,168	47	7	2,035	66	$8\frac{11}{20}$	395	94	$9\frac{14}{20}$	26,377
Macclesfield	2,481	38	$8\frac{1}{2}$	3,864	60	$9\frac{11}{20}$	2,557	84	$10\frac{17}{20}$	50,639
Stockport .	3,457	28	$11\frac{12}{20}$	5,032	53	$10\frac{17}{20}$	6,436	98	$9\frac{6}{20}$	68,906
Altrincham	1,200	49	$6\frac{13}{20}$	1,352	79	$7\frac{6}{20}$	540	101	9	30,139
Northwich	1,615	52	$6\frac{1}{4}$	2,121	75	$7\frac{11}{20}$	212	89	$10\frac{4}{20}$	26,906
Nantwich .	1,994	47	7	1,158	74	$7\frac{3}{4}$	471	108	$8\frac{5}{20}$	30,992
Lichfield .	1,281	34	$9\frac{11}{20}$	1,227	68	$8\frac{9}{20}$	320	148	$6\frac{1}{20}$	22,749
Newcastle .	1,502	57	$5\frac{14}{20}$	1,135	78	$7\frac{7}{20}$	251	136	$6\frac{14}{20}$	16,476
Stoke-upon-Trent . .	2,181	45	$7\frac{4}{20}$	5,610	60	$9\frac{11}{20}$	946	90	$10\frac{2}{20}$	37,220
Woolstanton and Burslem	2,292	50	$6\frac{1}{2}$	2,993	90	$6\frac{8}{20}$	295	150	$6\frac{1}{20}$	23,567
Tamworth .	1,278	47	7	376	69	$8\frac{7}{20}$	134	117	$7\frac{16}{20}$	12,175
Cheadle .	1,438	40	$8\frac{3}{20}$	805	67	$8\frac{12}{20}$	169	101	9	14,473
Uttoxeter .	672	29	$11\frac{4}{20}$	471	40	$14\frac{8}{20}$	..	..	..	12,837
Burton-upon-Trent . .	2,100	40	$8\frac{3}{20}$	1,270	90	$6\frac{6}{20}$	125	115	$7\frac{17}{20}$	24,667
Leek . .	1,281	47	7	650	63	$9\frac{1}{20}$	104	86	$10\frac{12}{20}$	18,387
Chapel-en-le-Frith .	713	60	$5\frac{8}{20}$	215	79	$7\frac{6}{20}$	95	123	$7\frac{8}{20}$	10,448
Hayfield .	270	50	$6\frac{1}{2}$	534	80	$7\frac{4}{20}$	627	140	$6\frac{1}{2}$	9,493
Glossop .	142	60	$5\frac{6}{20}$	559	80	$7\frac{4}{20}$	1,050	90	$10\frac{2}{20}$	9,631
Bakewell .	2,519	58	$5\frac{12}{20}$	424	87	$6\frac{12}{20}$	74	146	$6\frac{1}{4}$	25,879
Chesterfield	1,969	45	$7\frac{4}{20}$	2,618	70	$8\frac{4}{20}$	128	105	$8\frac{11}{20}$	34,246
Belper . .	3,324	40	$8\frac{1}{20}$	2,542	67	$8\frac{12}{20}$	661	107	$8\frac{1}{2}$	33,388
Derby . .	1,035	45	$7\frac{4}{20}$	2,855	75	$7\frac{11}{20}$	1,026	155	$5\frac{17}{20}$	25,484
Salford .	680	53	$6\frac{1}{20}$	3,741	46	$12\frac{1}{2}$	5,445	75	$12\frac{1}{20}$	52,366
Chorlton-upon-Medlock . .	527	44	$7\frac{8}{20}$	2,463	54	$10\frac{11}{20}$	4,261	83	$10\frac{19}{20}$	46,465
	37,119	40*	8	46,050	65	$8\frac{3}{4}$	26,322	92	$9\frac{3}{4}$	663,890

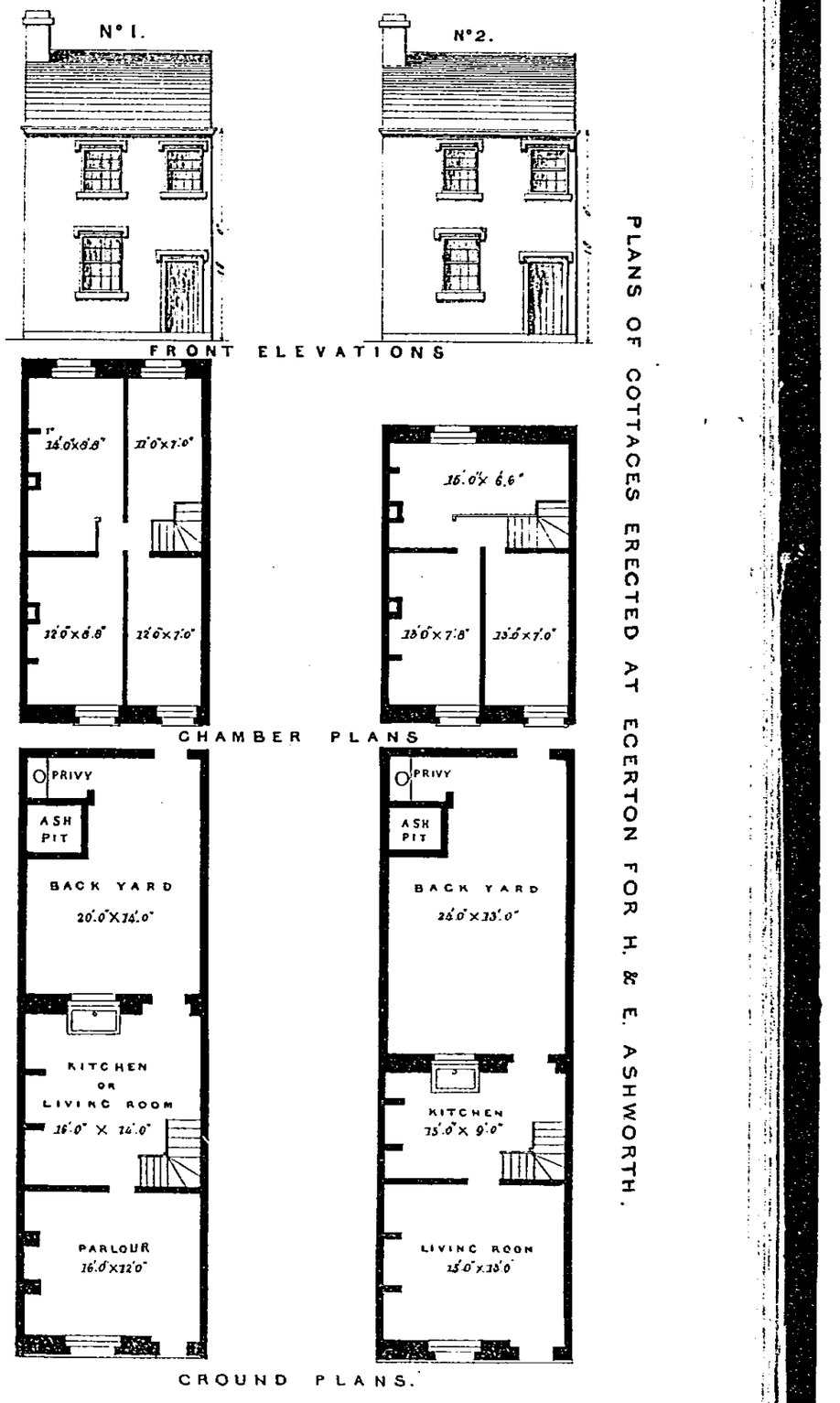
* General Average.

11.—*Tables of the Expense of building Cottages, and Repairs, in England and Scotland.*

ENGLAND.	Cost of Erection of Cottages.		Cost of Repairs.	Rent of Cottages.			
	Two-roomed.	Four-roomed.		1. Cottages with only one Room.	2. Cottages with one Room on the Ground Floor, and a Chamber or Bed-room above.	3. Cottages of the same Description as No. 2, with a Back-house or Wash-house annexed.	4. Cottages with four Rooms, two below, and two above.
Norfolk, 22 Unions .	40*l.* to 80*l.*	60*l.* to 150*l.*	4 to 40 per cent.	10*s.* to 100*s.*	1*l.* 10*s.* to 5*l.* 5*s.*	2*l.* to 6*l.* 6*s.*	3*l.* 5*s.* to 9*l.*
Suffolk, 15 Unions .	30*l.* to 125*l.*	60*l.* to 180*l*	2 to 20 per cent.	20*s.* to 2*l.* 15*s.*	2*l.* to 6*l.*	3*l.* to 6*l.*	3*l.* to 8*l.*
Chester, 5 Unions .	20*l.* to 80*l.*	25*l.* to 120*l.*	10 to 30 per cent.	1*s.* 6*d.*	1*s.* 6*d.* to 2*s.* 6*d.*	2*s.* 6*d.* to 4*s.*	..
Derby, 7 Unions .	20*l.* to 100*l.*	40*l.* to 120*l.*	2½ to 20 per cent.	..	..	..	..
Lancashire, 2 Unions .	30*l.* to 50*l.*	30*l.* to 55*l.*	10*s.* to 40*s.*	..	..	..	..
Stafford, 9 Unions .	20*l.* to 80*l.*	40*l.* to 100*l.*	4*s.* to 40*s.*	..	..	..	..
Gloucester, 3 Unions .	About 62*l.*	..	10*s.*	..	.	5*l.* 10*s.* to 6*l.*	..
Hereford, 1 Union .	„ 62*l.*	..	..	..	..	..	..
Monmouth, 5 Unions .	„ 62*l.*	..	..	..	..	..	..
Worcester, 4 Unions .	„ 65*l.*	..	..	..	..	..	..
Gloucester, 3 Unions .	„ 70*l.*	..	..	..	..	4*l.*	..
Hereford, 8 Unions .	„ 45*l.*	..	..	..	..	3*l.* 10*s.*	..
Brecknock, 1 Union .	„ 45*l.*	..	..	..	..	3*l.* 10*s.*	..
Radnor, 2 Unions .	„ 45*l.*	..	..	..	..	3*l.* 10*s.*	..
Salop, 2 Unions .	50*l.* to 55*l.*	..	10*s.* to 12*s.*	..	..	3*l.* 13*s.* 6*d.*	..
Worcester, 6 Unions .	50*l.* to 55*l.*	..	10*s.* to 12*s.*	..	..	3*l.* 13*s.* 6*d.*	..
Northumberland 7 Unions .	30*l.* to 50*l.*	..	3*s.* to 5*s.*	2*l.* 5*s.* to 4*l.*	..	..	..
Durham, 8 Unions .	50*l.* to 70*l.*	..	10*s.* to 15*s.*	4*l.*	2*l.* 10*s.* to 6*l.*	..	..
Cumberland, 1 Union .	50*l.*	..	3*s.*	..	3*l.* 5*s.*	..	..
Durham, 2 Unions .	45*l.*	60*l.*	..	..	..	4*l.*	..
Cumberland, 4 Unions .	30*l.* to 45*l.*	..	7*s.*	..	2*l.* 12*s.* to 3*l.*	..	..
Bedford, 5 Unions .	15*l.* to 60*l.*	20*l.* to 120*l.*	5*s.* to 20*s.*	..	..	..	2*l.* 10*s.* to 4*l.*
Bucks, 1 Union .	40*l.* to 60*l.*	..	9*s.* to 10*s.*	..	..	..	2*l.* 12*s.*
Hertford, 4 Unions .	40*l.* to 70*l.*	50*l.* to 120*l.*	20*s.* to 30*s.*	..	..	..	2*s.* 6*d.* per week.
Northampton, 6 Unions .	30*l.* to 100*l.*	50*l.* to 150*l.*	5*s.* to 20*s.*	..	..	..	..
Stafford, 5 Unions .	20*l.* to 60*l.*	35*l.* to 100*l.*	7*s.* to 45*s.*	..	..	..	2*l.* to 4*l.*
Warwick, 7 Unions .	20*l.* to 70*l.*	50*l.* to 140*l.*	6*s.* to 40*s.*	..	..	..	..
Worcester, 2 Unions .	10*l.* to 50*l.*	45*l.* to 150*l.*	10*s.* to 12*s.*	..	..	..	..

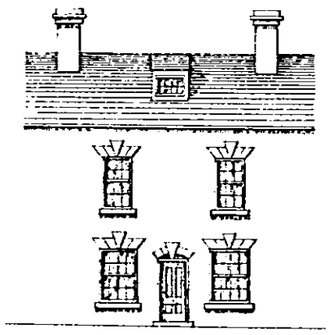
11.—*Tables of the Expense of building Cottages, and Repairs, in England and Scotland*—continued.

SCOTLAND.	Cost of Erection of Cottages, &c.	Cost of Repairs.	Rent of Cottages, &c., per Annum.	Proportion of Rent paid by Labourer to his total Expenditure.
Aberdeen . .	Houses for 6 families, 250*l.* to 300*l.*	1*l.* per year	Garret or cellar, 25*s.* to 30*s.*; room and closet, 50*s.* to 80*s.*; two rooms, 5*l.*; ditto and closet, 6*l.*; cottages, &c., 4*l.* to 6*l.*	From 8 to 14 per cent.
Aberdour . .	. .	..	One or two rooms, 1*l.* to 2*l.*; cottage, 2*l.* to 3*l.*	About 4¼ per cent.
Arbroath . .	60*l.* to 80*l.* . . .	2 per cent.	3*l.* to 6*l.*; garrets, 20*s.* to 30*s.*	From 11 to 16¼ per cent.
Alloa . .	Houses for 3 families, 200*l.* to 300*l.*; Cottage, 20*l.* to 30*l.*	..	One apartment, 1*l.* to 3*l.*; two ditto, 3*l.* to 5*l.*; 1*l.* 10*s.* to 3*l.* cottage.	From 10 to 12½ per cent.
Andrews, St. .	. .	..	1*l.* to 1*l.* 15*s.* each room .	About 8¼ per cent.
Ayr	About 30*l.* . . .	..	1*l.* 10*s.* to 4*l.*	About 8¼ per cent.
Carluke . . .	Tenement for 2 families, 60*l.* to 70*l.*	¼ per cent.	One room and closet, 50*s.*; one room and kitchen, 70*s.* to 80*s.*	From 5 to 12½ per cent.
Coldstream . .	40*l.*	..	2*l.* 10*s.* to 3*l.*	About 10 per cent.
Cupar, Fife, &c.	30*l.*	..	1*l.* 10*s.* to 2*l.* 10*s.* . . .	About 10 per cent.
Douglas . . .	. . .	..	1*l.* 10*s.* to 2*l.*	. .
Dundee . . .	60*l.* to 80*l.* . . .	5 per cent.	One room, 2*l.* to 2*l.* 10*s.*; two rooms, 3*l.* 10*s.* to 5*l.*	From 6¾ to 21¼ per cent.
Dunfermline .	80*l.* to 90*l.* . . .	..	1*l.* 10*s.* to 6*l.*	From 10 to 11 per cent
Earls Ferry .	15*l.* to 30*l.* . . .	..	1*l.* to 2*l.*	About 5 per cent.
Elgin . . .	. .	..	1*l.* to 5*l.*	From 12½ to 14 per cent.
Cowgate . . .	. .	..	2*l.* to 4*l.*	. .
Edinburgh . .	. .	..	1*l.* to 5*l.* 4*s.*; 2*l.* to 4*l.* for one apartment; one room and kichen, 3*l.* to 5*l.*	From 6 to 25 per cent
Forfar . . .	70*l.* to 110*l.* . .	1 per cent.	Two rooms, 2*l.* 10*s.*; ditto and closet, 3*l.* 15*s.*	From 12½ to 14 per cent
Forres . . .	. .	..	1*l.* 10*s.* to 5*l.*	About 12½ per cent.
Fraizerburgh .	. .	..	2*l.* to 3*l.*	From 16½ to 20 per cent.
Glasgow . . .	Tenements for 16 families, 800*l.* to 1200*l.*, room and kitchen for each.	..	One room, 2*l.*; room and kitchen, 3*l.* to 7*l.*; two rooms and kitchen, 6*l.* to 9*l.*	From 7¼ to 33 per cent.
Haddington .	. .	..	1*l.* to 1*l.* 10*s.*	About 5 per cent.
Hoddon . . .	10*l.* to 25*l.* . . .	2½ to 6 per cent.	About 2*l.*	From 8 to 10 per cent.
Inverary. . .	. .	..	10*s.* to 5*l.*	From 10 to 20 per cent
Inverkeithing .	. .	..	2*l.* to 3*l.*	From 6½ to 14 per cent.
Inverness . .	30*l.* to 80*l.* . . .	..	From 1*l.* to 3*l.* a room .	About 10 per cent.
Irvine . . .	30*l.* to 40*l.* . . .	..	2*l.* to 3*l.*	About 10 per cent.
Kirkcaldy . .	Two rooms, 40*l.* .	..	One room, 30*s.* to 40*s.*; two rooms, 3*l.*	From 6 to 10 per cent.
Kirkwall . .	50*l.* to 60*l.* . . .	..	1*l.* to 2*l.* for one room .	From 6 to 16 per cent.
Lanark . . .	40*l.* to 50*l.*, for two families.	..	2*l.* each apartment . .	About 10 per cent.
Leith . . .	. . .	..	2*l.* 10*s.* to 6*l.*	. .
Lesmahagow .	50*l.* to 60*l.* . . .	1 per cent.	2*l.* to 3*l.*; attics, from 26*s.* to 32*s.* 6*d.*	From 14 to 16½ per cent.
Lillisheaf . .	. .	..	1*l.* to 3*l.*	About 10 per cent.
Lochmaben . .	20*l.* to 50*l.* . . .	..	1*l.* 10*s.* to 3*l.*	From 8 to 16¼ per cent.
Melrose . . .	60*l.* to 80*l.* . . .	..	4*l.*	About 16¼ per cent.
Montrose . .	30*l.* to 40*l.* . . .	..	1*l.* 10*s.* to 2*l.*	About 10 per cent.
Portobello . .	. .	..	2*l.* 12*s.* for a room . . .	About 10 per cent.
Queensferry .	30*l.*	1 per cent.	1*l.* to 1*l.* 10*s.*	From 4 to 5 per cent.
Renfrew . .	Tenement of four houses, 300*l.*	..	6*l.*; 2*l.* to 3*l.* 10*s.* . . .	About 14 per cent.
Selkirk . . .	60*l.* to 70*l.*, two apartments.	..	2*l.* 10*s.*	From 10 to 12½ per cent.
Stewarton . .	House for two or three labourers, 100*l.* to 120*l.*	..	2*l.* to 3*l.*	From 6½ to 7¼ per cent
Tain	10*l.* to 20*l.* . . .	..	10*s.* to 3*l.*	About 5 per cent.
Wigtown . .	15*l.*	..	1*l.* 10*s.* to 2*l.* , . . .	About 7¼ per cent.

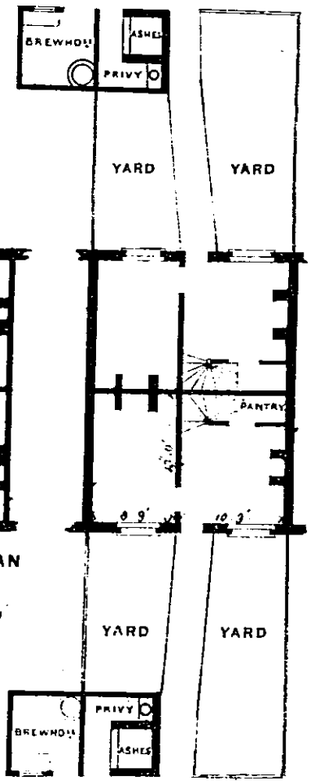


k.

ELEVATION AND PLANS OF HOUSES, IN CREAT RUSSELL STREET, BIRMINCHAM



ELEVATION OF ONE HOUSE.



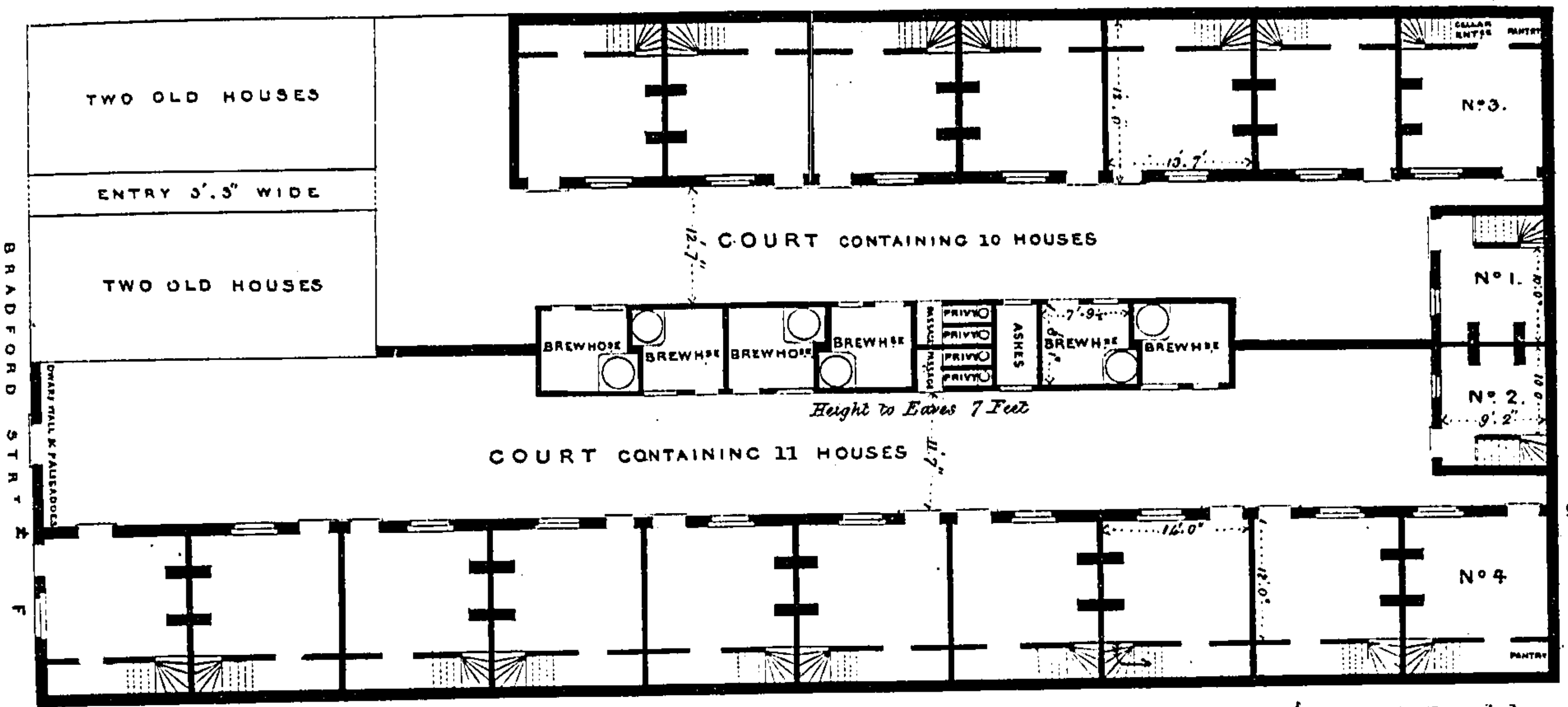
Mem. One Brewhouse and one Privy to every four Houses.

FIRST FLOOR PLAN
2 HOUSES.
Height of Rooms 7' 9"

SECOND FLOOR PLAN
2 HOUSES.
Height of Rooms 5' 2"

CROUND PLAN
2 HOUSES
Height of Rooms 8' 3"

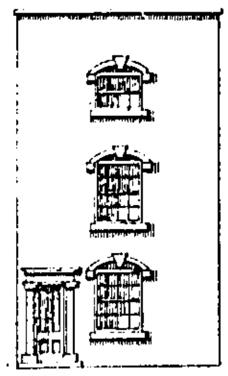
GROUND PLAN OF TWO NEW COURTS OF HOUSES IN BRADFORD STREET. BIRMINGHAM.



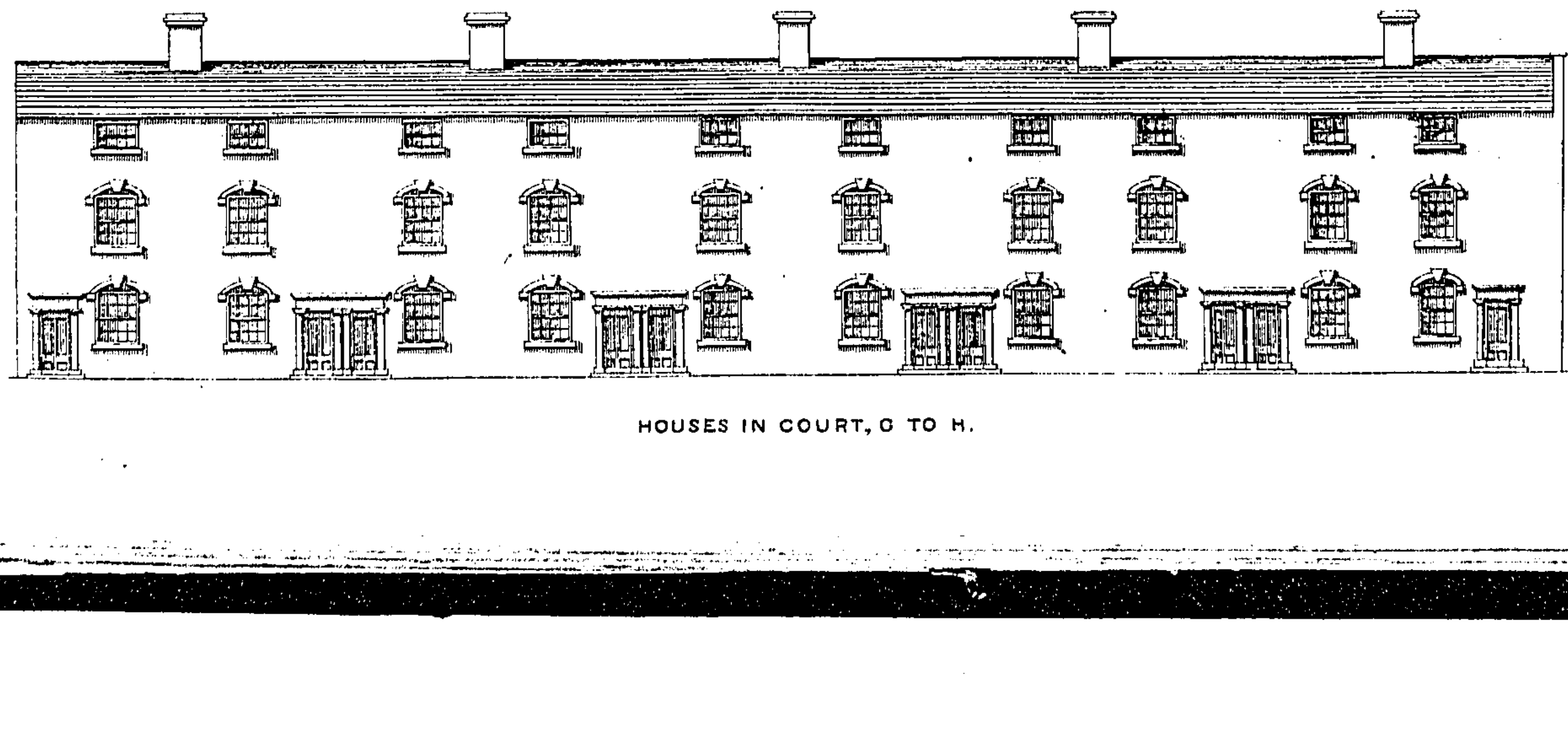
Houses No.s 1 & 2 are two stories, & are without cellars. Rental 2/- per week. Houses Nos 3 & 4 are let for 3/- per week. The whole of the other new houses, which as well as the houses 3 & 4, are three stories in height and have all cellars, are let for 3/6 per week.

HEIGHTS.	ft. in.
Ground Floor Rooms	7 . 8
First Floor Do	8 . 0
Second Floor Do	7 . 2

ELEVATIONS OF HOUSES, IN BRADFORD STREET: BIRMINGHAM.



FRONT HOUSE F.



HOUSES IN COURT, G TO H.

Standidge & Co Litho. London.

12.—*Examination of the* Rev. Thomas Whateley, *Cookham, Berks, on Cottage Allotments, and the keeping of Pigs by Cottagers.*

It appears that a great part of the land of your parish is common, and that a portion of the population borders upon the common. What is the state of that population as compared with that which is too far removed from the commons to enjoy any of their privileges?—The persons who live in the immediate neighbourhood of the commons are evidently much poorer than those who live at a distance.

To what do you attribute this?—I attribute it to their depending upon a precarious and uncertain income; and I am sure, from all the observation I have been able to make, that a poor man's best subsistence will always depend upon constant work and good wages, and that he never works for so bad a master as when he works for himself. And all employments, such as attending sheep, geese, &c., besides the precarious nature of the return made by them, usually impair his habits of steady and patient industry, and frequently give him a turn for poaching and pilfering, and engender other irregular and demoralizing habits.

But may not the children of the cottager, while he is engaged in steady and patient industry, be usefully and profitably employed in taking care of a pig or geese on the common?—No. The reason which applies against the father doing so, namely, the bad desultory habits engendered, applies with greater force against the children doing so. If they are old enough to be able to attend to these things, they are usually old enough to be employed in some rural occupation for which wages would be earned. Many mistakes are prevalent with respect to the profits from keeping cows, sheep, geese, pigs, &c., for I do not believe that any of these are really profitable; and though I am glad to see a pig as an appendage to a cottage (if the cottager's employer has no reason to be sorry), because the pig serves as a sort of savings' bank to the labourer; for if the labourer had not the animal, he would not put by, and out of his reach, from day to day, the money which the pig costs him in fatting; yet it is notorious that a labouring man pays more dearly for his bacon than he would do if he purchased it ready prepared to his hand.* Nor would he be the better

* Mr. Terry, who is a very extensive farmer in Cookham, and was present during this inquiry, explained this, and, in corroboration of Mr. Whateley's evidence on this point, stated that he, as a farmer, could not make any profit by growing pigs beyond a certain size. The only advantage which he had from keeping them was in using them to collect the refuse corn, which would otherwise be trodden under foot at the barn-door and rendered unmarketable; the office of the pig was to gather up this refuse, and convert it into a marketable commodity, pork. To fat the pigs beyond a certain size required more than the refuse of the farm-yard; and, therefore, would not pay the farmer. It was, therefore, the practice of the farmers to sell the pigs to the millers, who were enabled to fat them on another description of refuse. Now if the labouring man kept a pig, as he had no farm-yard, and no refuse to feed it with, he must either buy the food or steal it. If he were honest and bought the food, his pork would, as Mr. Whateley has stated, cost much more than he could buy it for. A pig could only be kept on the produce of such a piece of land as a labourer could not well cultivate whilst he attended to his other duties. In this state of things, the temptation to pilfer for the support of the pig was considerable. Other witnesses incidentally corroborated this statement, and I found that with many farmers the circumstance of a labouring man having a pig was an objection to giving him employment. The Rev. Mr. Faithful, of Hatfield, Herts, stated, as the result of his observation, that the keeping of pigs was decidedly not profitable to cottagers; and such was the temptation to steal which their possession of pigs created, that he had known a labourer, who had a pig given to him, to steal from the donor the wood to make its sty, the straw to litter it, and the food to feed it. The farmers ridiculed the prevalent statements as to the small cost at which pigs could be kept,—statements commonly made to the gentry by roguish rustics, who profited by these delusions; a pig was not accommodating enough to fatten on less for the cottager than for the farmer.

A friend,

clothed or cheaper shod if he took the operation of the Manchester weaver or the Nottingham shoemaker into his own hands.

But may not a labourer attend to the management of pigs or cows after the hours of work?—I think not, because a good labourer usually works by the great, and has done as much as his strength will allow when he returns home; and because nothing is gained by feeding cattle upon commons, where the cattle have nothing else to depend upon. The very worst master a poor man can work for is himself.

You say that the reason which applies against the father attending to pigs, geese, &c., on commons, applies equally against the children being so, *i. e.*, the idle habits engendered; and that if they are old enough to be able to attend to these things, they are usually old enough to be employed in some rural occupation, for which wages would be earned. Now would not the children be employed by farmers in the same sort of labour, namely, in looking after cattle; and if so, why is it that the care of cattle on the common for the other is worse or more demoralizing than the care of the same sort of things for the farmer?—I conceive that I have answered this question before. If a farmer sends his pigs or other cattle into open fields or commons, and requires the assistance of a child to watch them, they are turned out only for a change, but are never in this part of the country kept upon the commons.

Do you think allotments of land to the labourer beneficial; and if so, what quantity may be usefully occupied by him?—I do not think allotments of land to the poor beneficial. I had rather see the allotments gathered into one large one, a farm, and the labouring man employed at good wages, by a superintendent managing the whole at his own risk and for his own interest, in the share to which his undivided and greater attention and anxiety justly entitle him, that is, by a thriving farmer. The poor man must be a poor master, and he had better serve a rich one.

What do you believe would be the consequence of too large allotments of land being made to the labourers?—That the poor man could not cultivate it. The wealth of his employer is the poor man's safeguard against want. I approve of the practice of a benevolent farmer in my parish, who is accustomed to give to his labourers a headland of his field as a bonus to industry. He says he will make it worth the while of his labourers to be honest and diligent towards him, by letting them feel that they will have a suitable return from him. If what are called "ample allotments" are given, it appears to me to be a sort of wholesale almsgiving, attended with more than the usual mischiefs attendant upon most almsgiving. The orchard and garden before me might, if cut up into allotments, serve for six families of young labourers. It may be all very well to say, "Take these, my good men, and be happy;" but when, in the progress of population, there arises four times six families to be fed from the same soil, where will then be the happiness of the allotments? What, I submit, are small farms but ample allotments, and what, when stripped of romance, is found by experience to be the superior condition and power of production of the small farmers? Are they not, even where they farm their own lands, almost universally failing (like the small manufacturers against the large ones) in competition before the more scientific management, economy of labour, and more powerful application of capital of the large farmer. What is all Ireland but a country of cottage allotments; and what is there in that theatre of disorder and wretchedness that should induce the benevolent (or those who may have in their eyes the immediate temptation of *Irish rents*) to make trial of any such system in England? Are the cottiers who possess the fee-simple, the small freeholders of Ireland, in a superior condition by virtue of their allotments?—Many of the promoters of allotments doubtless intend well, and act upon the evidence of immediate benefits and satisfaction derived from them; so, probably, did the original promoters of the bread-money, scales, and the allowance system, labour rates, and the train of corrupting palliatives?

Have you had an opportunity of observing experiments in what is termed spade husbandry?—I have never seen spade husbandry; but I should wish to see it universally adopted, if the adoption of it would add wealth to the farmer, for in that case it could not fail to benefit the labourer.

It is said that farmers ought to take the single agricultural labourers into their houses, and preside at the labourers' tables as formerly; what is your opinion as to the practicability of recurring to the old system?—Those who say so are very ill formed upon the subject. Farmers, who were (in manners, wealth, and education) but very little better than their own labourers, might formerly, with comfort to themselves and advantage to their men, receive their carters into their family, and dine at their table with them; but the habits of those times are gone for ever.

Do you think the enclosures of such parishes as Cookham beneficial to the poor?—Yes I do, inasmuch as they extend the demand for the poor man's only marketable commodity—his labour.

[Every position stated in this examination with relation to the practical operation of the theory of small farm allotments, and of the pig and cow theories, was corroborated by a large mass of evidence from every part of the country, where they had been, for any length of time, in operation.—E. C.]

A friend, who writes from Wiltshire, observes,—"I cannot make out who it is that does fatten pigs to a profit. I asked a brewer the other day if, with his grains, he did not make it answer; and he told me that, on the contrary, he was always out of pocket, and only kept a pig for the pleasure of eating his own pork. 'Private individuals,' he added, 'feed their pigs with what should rather be called spoilt malt than grains. I cannot afford to do that; I must get out all the goodness for my beer, and then there is not sufficient nutriment left to fatten without the addition of things which I must purchase.' It is not unlikely that many persons, who fancied they kept pigs to a profit, have fed them on this 'spoilt malt,' in ignorance that they were, in fact, giving their swine valuable beer instead of refuse grains."

A gentleman, speaking of such appendages to labourers' tenements in a manufacturing district, states,—"Formerly most of our houses had them, but they are terrible things for getting out of repair, and we are pulling them down a good deal, and clearing the ground; for I know, from intelligent, clear-headed workmen, that the manufacturing families cannot grow their pork nearly so cheap as they can buy it. The trade in bacon is quite different to what it was 20 or 30 years ago. Now it is a great business, and the quantity of the improved Irish pigs brought even into smallish cottages is very large. In such villages where yard-room is not very large, swill and manure make a terrible stink. Only such of our people keep pigs as have a fondness for it, and as a sort of hobby, but believing that it does not pay."

13.—*Arrangement of Public Walks in Towns; Plan of the Arboretum at Derby, laid out by* J. C. Loudon, *Esq.*

When it appeared that a general botanic garden would be too expensive, both to create and to keep up; that a mere composition of trees and shrubs with turf, in the manner of a common pleasure-ground, would become insipid after being seen two or three times; and, in short, that the most suitable kind of public garden, for all the circumstances included in the above data, was an arboretum, or collection of trees and shrubs, foreign and indigenous, which would endure the open air in the climate of Derby, with the names placed to each. Such a collection will have all the ordinary beauties of a pleasure-ground viewed as a whole; and yet, from no tree or shrub occurring twice in the whole collection, and from the name of every tree and shrub being placed against it, an inducement is held out for those who walk in the garden to take an interest in the name and history of each species, its

PLAN

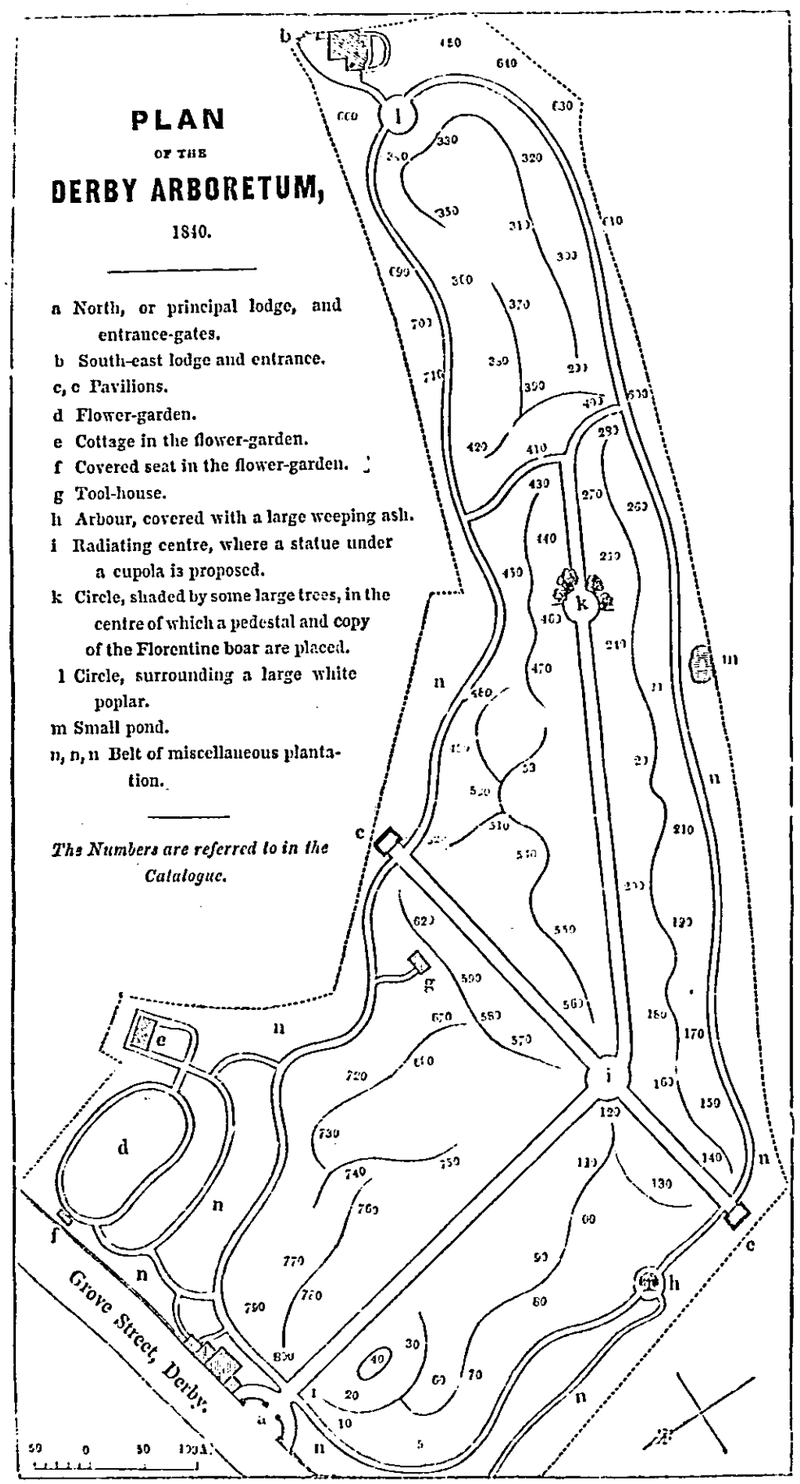
OF THE

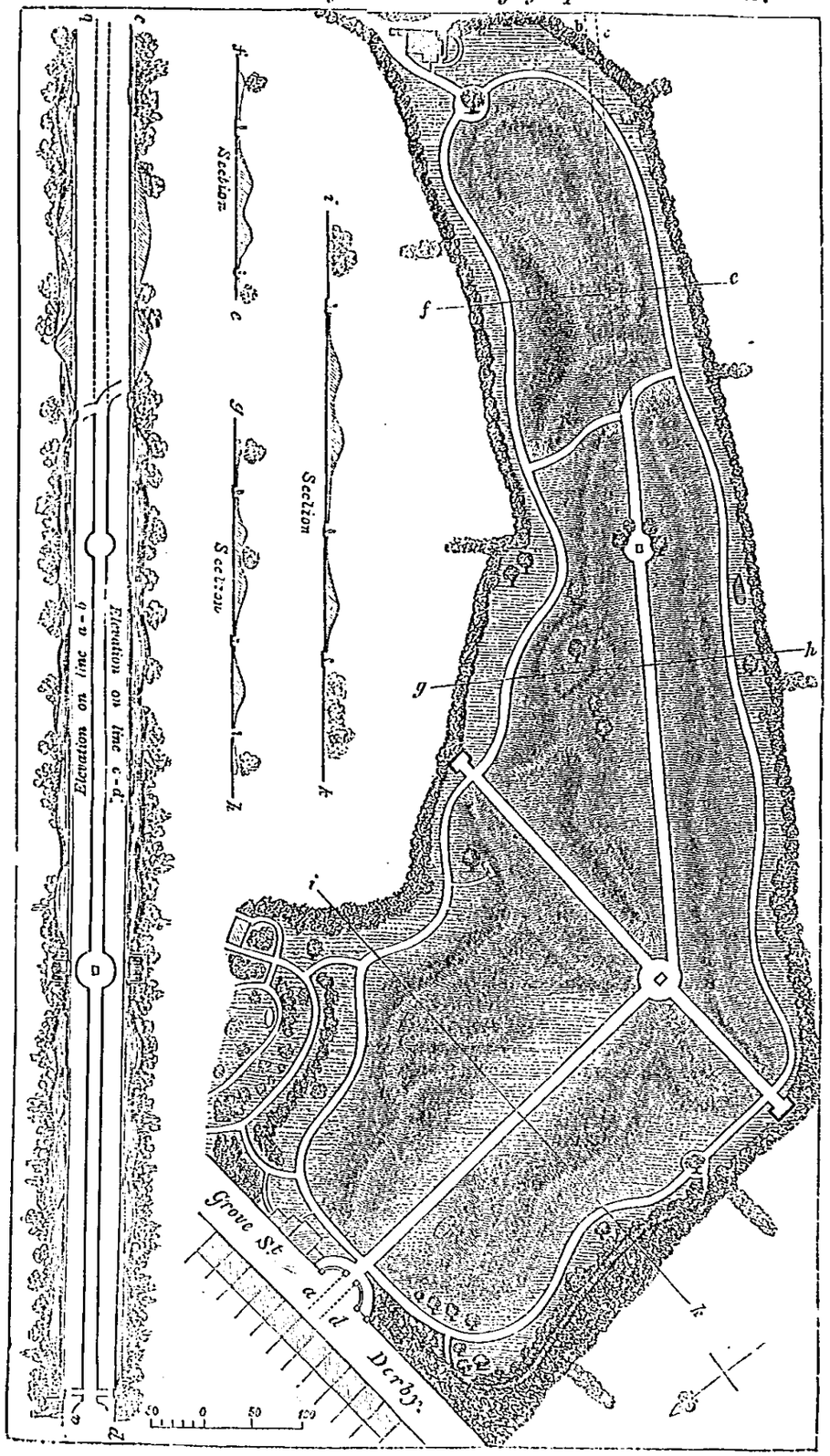
DERBY ARBORETUM,

1840.

a North, or principal lodge, and entrance-gates.
b South-east lodge and entrance.
c, c Pavilions.
d Flower-garden.
e Cottage in the flower-garden.
f Covered seat in the flower-garden.
g Tool-house.
h Arbour, covered with a large weeping ash.
i Radiating centre, where a statue under a cupola is proposed.
k Circle, shaded by some large trees, in the centre of which a pedestal and copy of the Florentine boar are placed.
l Circle, surrounding a large white poplar.
m Small pond.
n, n, n Belt of miscellaneous plantation.

The Numbers are referred to in the Catalogue.





uses in this country or in other countries, its appearance at different seasons of the year, and the various associations connected with it.

A similar interest might no doubt have been created by a collection of herbaceous plants; but this collection, to be effective in such a space of ground, must have amounted to at least 5000 species; and to form such a collection, and keep it up, would have been much more expensive than forming the most complete collection of trees and shrubs that can at present be made in Britain. It is further to be observed respecting a collection of herbaceous plants, that it would have presented no beauty or interest whatever during the winter season; whereas, among trees and shrubs, there are all the evergreen kinds, which are more beautiful in winter than in summer; while the deciduous kinds, at that season, show an endless variety in the ramification of their branches and spray, the colour of their bark, and the colour and form of their buds. Add also, that trees and shrubs, and especially evergreens, give shelter and encouragement to singing-birds, to which herbaceous plants offer little or no shelter or food.

There are yet other arguments in favour of trees and shrubs for a garden of recreation, which are worth notice. Herbaceous plants are low, small, and to have any effect must be numerous; while to acquire their names, and look into their beauties, persons walking in the garden must stand still, and stoop down, which, when repeated several times, would soon, instead of a recreation, become very fatiguing. Now trees and shrubs are large objects, and there is scarcely one of them the beauty of which may not be seen and enjoyed by the spectator while he is walking past it, and without standing still at all.

A glance at the plan, *fig.* 2, in p. 6, will show that I have provided as great an extent of gravel-walk as the space would admit of; the total length, including the walk round the flower-garden, exceeding a mile. There is a straight broad walk in the centre, as a main feature from the principal entrance; an intersecting broad and straight walk to form a centre to the garden, and to constitute a point of radiation to all the other walks; and there is a winding walk surrounding the whole. As a straight walk without a terminating object is felt to be deficient in meaning, a statute on a pedestal is proposed for the radiating centre *i.* in *fig.* 2; a pedestal with a vase, urn, or other object, for the second circle in the straight walk, *fig.* 2, *k*; while the pavilions *fig.* 3, form terminating objects to the broad cross walk.

As a terminal object gives meaning to a straight walk leading to it, so it is only by creating artificial obstructions that meaning can be given to a winding walk over a flat surface. These obstructions may either be inequalities in the ground, or the occurrence of trees or shrubs in the line which the walk would otherwise have taken, so as to force it to bend out of that line. Both these resources have been employed in laying down the direction of the surrounding walk, though its deviation from a straight line has chiefly been made in conformity with the varying position of the trees in the belt already existing. This belt, and also the trees in the flower-garden, and in other parts of the plan, which were there previously to commencing operations, and which are left conformably to Mr. Strutt's instructions, are shown in the plan, *fig.* 4, p. 75. The point of junction of one walk with another is always noticeable in an artistical point of view, and affords an excuse for putting down sculptural or other ornamental objects at these points.

14.—*Boards of Health:—Report on the labours of the "Conseil de Salubrité" of Paris, from* 1829 *to* 1839. *By* M. Trebuchet.

Before the revolution of 1789, M. Lenoir, one of the last lieutenants of police of that period, and one of those who most particularly occupied themselves with the health of the city of Paris, consulted on questions of health and salubrity two men, *Pia* and *Cadet de Vaux*, both of them apothecaries; the last had the title of inspector-general: it was to him that all matters of health were habitually referred. Later, on the institution of the prefect of police, in whose hands was vested all that related to salubrity and the public health, this magistrate consulted sometimes a physician, sometimes a chemist, sometimes a veterinary surgeon, according to the nature of the case upon which he had to determine.

This state of things presented inconveniences so much the more serious that the number of affairs increasing every day, demanded more unity in the reports, and more activity in the labours. It was then that the necessity was felt of establishing a permanent council. Such was the origin of the "Conseil de Salubrité," instituted by the prefect of police, Dubois, the 6th of July, 1802. It was composed of four members,—Deyeux, Parmentier, Huzard, senior, and Cadet-Gassicourt. In 1803, M. Thouret was called to the council; afterwards, in 1807, Leroux and Dupuytren; in 1810, M. Pariset replaced M. Thouret, and it was at the same period that the nomination of Doctor Petit took place. From that time the men of the greatest consideration sought to have a part in the labours of the "Conseil de Salubrité." Thus we see enter successively M. d'Arcet in 1813; M. Marc in 1815; M. Berard in 1817; the engineer Girard, and Huzard, junior, in 1819; Pelletier and Juge in 1821; M. Gautier de Claubry and M. Parent Duchâtelet in 1825; MM. Adelon, Andral, junior, Barruel, and Labarraque, in 1828; Doctor Esquirol in 1829. The greater part of these men no longer exist. Deyeux, Parmentier, Huzard, senior, Cadet-Gassicourt, Thouret, Leroux, Dupuytren, Marc, Girard, Parent-Duchâtelet, Barruel, Esquirol, are no longer there to direct the labours of the council, to contribute their long experience and indefatigable activity; but their labours remain to us, and we can at least draw from them useful instructions, and still enlighten ourselves by their valuable opinions.

Thus, and with the view to preserve these precious traditions, which maintain in the council an unity of design so remarkable, the administration decided from the commencement that their general reports should be printed.

This publication, which stopped in 1828, and of which the continuance was greatly desired, has just been resumed by the orders of M. Gabriel Delessert, prefect of police.

This collection, which is of such general interest, embraces therefore a period of nearly forty years.

Perhaps we are to congratulate ourselves on the delay which has taken place in the publication of these reports. In going over these ten years it becomes more easy to follow the council in the progressive march of their labours, to perceive that they were all based upon a uniform and constant jurisprudence; that they had no other end than the preservation of the public health, the well-devised interest of property and industry. On this account we have always thought that besides the annual reports, extremely useful in other respects, but confined within too narrow a circle, it would be well to publish every ten years a summary, which, retracing what had been done in that long period, should offer a wide field of study both to governors and governed.

Since 1829 the reports addressed to the administration, on the numerous questions which it submitted to the council, amount to 4431. But that of which there remains no trace are the experiments, often even the preliminary reports, the trips, and sometimes the journeys, which each of these

reports rendered necessary; labours of which the report is only a summary, and which impart such great authority to the decisions of the council.

These decisions relate to three great divisions,—*health*, *salubrity*, and *industry*. Under *health* are classed, among other things, the researches on the adulteration of food, on the vessels used in its preparation, on the precautions to be taken with respect to the vessels and utensils of copper, regard being had to the uses for which they are employed; the experiments on the adulteration of salts, on the adulteration of bread and of flour by different substances, on the poisonous substances employed to colour bonbons, liqueurs, &c.; the examination of the methods employed in preparing pork; the examination of the water used for drink; the adulteration of the flours of linseed and mustard; the use of meat of animals who had died of disease; the researches into the salubrity of dwellings. The head of *salubrity* comprises the anatomical theatres, their construction, the means of remedying the causes of the unhealthiness which these establishments present; the discharge of sulphurous waters from the public baths, the utility of street fountains, the inspection of barracks, and the sanitary measures to which they should be subject; the improvements to be made in the fires of the establishments which employ coals; the arrangements to be made for the deposit of filth in the rural districts; the purification of sewers; the supply of water for domestic and industrial purposes; the steps to be taken in exhumations; the examination of different contrivances to empty privies, the ameliorations to be introduced into this portion of service; the wholesomeness of the markets, the inspection of prisons. The reports which relate to *industry* principally treat of the construction of slaughter-houses; the condensation of the gas and vapours resulting from the refining of metals; the fabrication, preservation, and sale of fulminating and lucifer matches; the precautions to be taken in the construction of fulminating powder-mills, and in the manipulation of the substances employed there; the measures to be taken for the conveyance of the fulminate of mercury; the researches into the employment of bitumens, and the conditions to be prescribed to the makers; the making wax-candles; the conditions to be imposed on cat-gut factories; the researches on the fires of wash-houses, and on the necessity of decomposing the soapy water to prevent putrefaction; the sanitary measures applicable to white-lead manufactories, and the researches on the diseases of the workmen; the propositions of classification for different trades, such as the silk-hat factories, the forges, the places for making and keeping ether; and the beating of carpets.

Thus health, salubrity, industry, offer to the "Conseil de Salubrité" a vast field of researches and investigations, and we may affirm that there is no question relating to these three great departments of the administration which they have not profoundly meditated, and in part resolved. If now we turn to other subjects we still find important labours which touch in several points on the different matters of which we have just spoken, but which have not, like them, a special and clearly-defined character: such are the reports on epidemics and small-pox; the measures to be taken to prevent or combat them; the *epizooties* that have prevailed at different epochs among several species of animals, and particularly among milking-cows; the sale of horses with glanders, and the regulations to which they should be subject, as well as other animals seized with contagious diseases; the measures to be taken against mad dogs, and the precautions in case of bites from these animals; the modelling, examination, and embalming of corpses; the aids to be afforded to the drowned and suffocated; the measures to be taken to ascertain the number of these accidents as well as of suicides; the compilation of a new nosographic table of the diseases which cause death; the measures to be taken to prevent fires in theatres, &c. &c.

Such is a general view of the subjects upon which the council has been called to give their opinions. It now remains to describe the circumstances which demanded them, and the results they have produced.

One of the objects which more especially engaged the care of the council was that of bread. It is the thing, it is true, which most directly interests the people. The quality of bread may be deteriorated by various ingredients, but no one could have foreseen that noxious substances would be employed with the view, ostensibly at least, of improving it. Nevertheless the correctional tribunal of Brussels was called upon some years since to try some bakers brought before it under a charge of selling bread adulterated with noxious substances. On the occasion of this trial the prefect of police inquired of the council if, as these bakers alleged in their defence, a small quantity of a substance which they called *blue* alum, put into the yeast, had the property of rendering the bread whiter and less heavy.

In order to give their opinion, the council first examined what was the substance called by the name of *blue* alum. Some designate by this name the sulphate of copper, but most people mean by blue alum the rock alum, (sulphate of alumina and potass,) because this salt in the lump has a bluish tinge, and, as with all the sulphates, the sulphate of which the base is alumina is the only one which bears the name of alum, it is to be presumed that it is this salt, or rock alum, which goes under the name of *blue alum*, and not the sulphate of copper which is known in commerce by the name of *blue vitriol*.

It had been long known that alum, by the action of heat equal to that of a baker's oven, swells, increases in volume, and becomes a porous mass, light and very white, which is no longer alum, but a mixture of a great deal of insoluble sub-sulphate with a small quantity of alum, a substance astringent, and not poisonous. It is probable that this property, known to some bakers, determined them to add to bread made of certain flour a little of this alum, which, without being injurious to the health, really made the bread whiter, at the same time that the crust became brown at a less heat.

As to the employment of sulphate of copper (blue vitriol), it is only by a gross error that it could be supposed capable of making bread white. Nevertheless a baker of the town of Gand was prosecuted for putting this poisonous salt into his bread. The commission appointed to examine the bread not having been able to discover any trace of copper, mixed a kilogram of flour, to which was added twenty-four grains of sulphate of copper, and they affirmed that it was impossible to detect in the bread the least trace of the salt they had introduced.

After such an assertion it became interesting to make some researches on the subject. In consequence, the delegates of the council who were entrusted with the inquiry, had four loaves of a kilogram of flour made under their eyes: in one of these loaves was put twelve grains of sulphate of copper, in another eight grains, in a third four grains, and but two grains in the fourth. These loaves rose ill, and although the flour with which they were made produced bread very beautiful and white, the four loaves were so heavy as scarcely to present any cavities. The loaf No. 1 had a green disagreeable colour; the loaf No. 2 was in like manner green, but of a less deep colour than the preceding; No. 3 was also greenish; and No. 4, though colourless, could not support a comparison with the bread made from the same flour pure.

All these loaves were burnt separately in porcelain crucibles to complete ashes. Those of the loaf No. 1 were a beautiful azure blue; those of No. 2 a clearer sky-blue; those of No. 3 had a blue tint of a lighter hue; and those of No. 4 were so slightly coloured that it would have been impossible to infer that they contained copper. But all these ashes, when submitted to the action of sulphuric acid diluted with water, were dissolved, and when tested separately by hydrosulphuric acid, produced black

precipitates of sulphuret of copper, which precipitates, tested separately in their turn by concentrated nitric acid, furnished each a quantity of nitrate of copper, equal, within a few fractions, to the sulphate added to each of the four loaves.

It results, therefore, from the preceding experiments which have been made with the greatest care,—

1. That the sulphate of copper (blue vitriol) cannot be used in making bread for the purpose of rendering it lighter or whiter, because it prevents its rising, and gives it a disagreeable colour;

2. That by reducing it to ashes, and employing suitable means, almost all the salt of copper added to the bread may be collected again.

We should exceed the bounds of this Article if we were to re-produce the numerous reports on the bread or flour submitted to the analysis of the council, and especially on the bread and flour destined for the use of prisons, on mixed flour, and on the quality of bread prepared from flour mixed with starch. The council after examining this bread remarked, that it was not disagreeable to the taste, nor liable to injure the health. However, they were not able to pronounce on its nutritive qualities. It has therefore been recommended that if bread made of flour so mixed was offered for sale, it should have a peculiar form, in order that the public should know what is the nature of the food which is sold to them. The same conclusions have been come to with respect to the sale of bread made of flour mixed with a seventh of the flour of rice. This bread is, according to the council, savoury and it keeps well, and does not become hard so soon as the bread prepared in the ordinary way. As to its nutritive qualities, the council cannot determine on this particular, the question being one of those which, in the actual state of science, is the most difficult, and which can only be solved by a prolonged use of the bread. To complete the series of reports on all that concerns this species of food, we must speak of the leaden reservoirs made use of by bakers. It was of moment to know whether the employment by the bakers of Paris of leaden reservoirs to keep the water used in making bread could give rise to accidents; whether these reservoirs should be prohibited, or whether they might be allowed with certain modifications?

The council have studied this important question, which is become among chemists an object of controversy. Some have affirmed that the water gets charged with oxide of lead by remaining in reservoirs formed of this metal. Other chemists, of no less repute, and among others Guyton de Morveaux, have established, on the contrary, that the presence of a neutral salt, like sulphate, nitrate or muriate, in whatever quantity, as 000·2, suffices to prevent the water from dissolving the lead; and they explain in this way the use that is made, without any ill effects, of the water of the Seine, and of wells, preserved in leaden vessels, with or without exposure to the air.

This diversity of opinion rendered necessary numerous experiments, which have been made with the greatest exactness by a commission of the council. It results from these experiments:—

1. That distilled water put into a reservoir gives rise at the end of some minutes to the formation of a salt of white-lead, but that this salt does not dissolve in the water, and is precipitated, on the contrary, to the bottom of the reservoir.

2. That the waters of the Seine, and of wells, placed in leaden reservoirs, have given rise, at the point of contact of the water and air, to the formation of a white saline matter, which does not dissolve in water but is precipitated to the bottom of the vessel.

3. That the gaseous Seltz water acts the same on the leaden reservoirs as the water of the Seine, and of wells. Before affirming what precedes, the commission left some water for several weeks in four leaden reservoirs. The liquid was almost entirely evaporated, and the remainder of the water, when filtred, showed no trace of lead on the application of the most delicate tests, such as the chromate of potash, hydrosulphuric acid, and hydriodate of potash.

Water which had remained in a bucket, spread over at the moment, and throughout its whole extent, with a saline matter composed of carbonate of lead and of lime, of sulphate of lime and organic substances, did not leave the slightest trace of lead by the action on the water of the most powerful tests.

In consequence of these experiments, the council pronounced a formal opinion, that the bakers might be permitted the use of leaden reservoirs on condition that they put a cock three inches from the bottom of the reservoir, in order that if the insoluble carbonate formed it might be deposited in the water below the cock, and with the further condition that the reservoir should be cleaned once a-month. For greater security, the council thought that it should be required of bakers to cover over the lead which lines these reservoirs with a thin coat of wax, which would prevent the contact of the water with the metal, and stop the formation of the insoluble carbonate of lead. To apply this wax it is only necessary to heat slightly the lead, and rub it rapidly and several times with a piece of wool done over with wax.

Besides these questions which relate to the quality of the bread, the council examined what mischief could arise from the use of copper scales to weigh the dough of which the bread is made. It is known that the dishes of these scales are copper, and that instead of being cleaned with cloths they are cleaned with the chains by which they are suspended, and which, for this purpose, are heaped together and act like a brush. This state of things seriously engaged the attention of the council with respect to the danger it presents. The dough, composed of water and flour, and containing in addition a certain quantity of marine salt, sticks to the dishes of the scales, and exercises on the metal a chemical action, of which the result is the oxide of copper. The oxide, or salts of copper, which is formed, next penetrates into the portion of the dough which is afterwards detached by the friction of the chains.

We may suppose that in this case some of the oxide of copper would be introduced into the bread, and that it is important for the public health to take measures to prevent, from negligence or imprudence, bread which contained even very small quantities of salts of copper, from being offered for consumption. The council thought that all danger would be prevented.

1. By compelling the bakers to use no scales but those of which the dishes were of tinned iron.

2. In prescribing to them to clean the dishes of the scales by means of chains of tinned iron, which should only be used for this purpose.

3. By obliging them to wash the chains, and the pan in which they are kept, with warm water.

4. By prohibiting the bakers to employ in their bake-houses utensils of zinc, or red and yellow copper.

5. By ordering the bakers, if it is not found expedient to impose the execution of the measures indicated in the first and third articles, to tin substantially the chains and dishes of their scales, and any utensils of zinc, or red and yellow copper.

The council have been occupied at different periods with the adulterations of salt, and they have not ceased to lend active assistance to the measures of surveillance prescribed by the Government. Unhappily its efforts were long unsuccessful. Even now the analysis which has been made of more than 6000 samples of salt, proves that fraud always exists, although of a kind less detrimental to the public health. In 1829 the council proposed to forbid the sale of salt which contained from five to six per cent. of salts with a potash base, and to oppose, in addition, the sale of

salt mixed with sea-weed, even in small quantities. The council has since renewed their investigations. More than 3000 samples of salt, taken from the shops, were analysed by M. Chevalier, who discovered that 309 samples were adulterated by ground plaster, or salts of potash, or sulphate of soda, or by the iodines. These adulterations were found chiefly in the grey salts. The later experiments of the council have confirmed these results. They have, moreover, shown that the salt derived from the mines of the south is more pure than the salt of the west. It contains less water, and less of the insoluble matter foreign to sea-salt.

We wish we could follow the council in their numerous observations on the filtering of water—on the use of vessels and utensils of copper—on the dangers they present according to the circumstances in which they are employed—and on the regulations of which they ought to be the object; but there still remains much to be extracted, to show their solicitude for everything which concerns the well-being of the people, and the preservation of the public health.

The council, in an article entitled, "Necessity to submit the Construction of Houses to Sanitary Rules," inserted in its General Report for 1827 (p. 39), expressed the wish to see established in the centre of every quarter of the town a spacious square, railed in, and planted with trees, in which the children of all classes might, without apprehension, and without the special superintendence of their parents, give themselves up to the exercise suitable to their years, and in which the inhabitants of all ages might enjoy the solar influence, and breathe a purer air than in their dwellings. It is, they said, so much the more needful to come to this determination, that nearly all the gardens have given place to houses, to streets, or to passages, and that the greater part of those which have been preserved are surrounded by houses so lofty that vegetation languishes for want of air and light, which renders their existence more hurtful than beneficial to health. To these reasons, which have lost nothing of their force, we will add that which results from the advantages the quarter would receive from the presence of such squares in respect to the healthiness produced by favouring the ventilation of the streets; because a square is to all the streets which open into it a true *fourneau d'appel* with a double current, acting by night as well as by day, at the same time that it is a powerful means by which to facilitate the action of the winds in the interior of the town.

By placing the charity schools in the vicinity of these squares an advantage would be offered to the children of the poor which can rarely be procured for them, that of experiencing the salutary action of the sun, breathing a pure air, and taking their exercise safe from all danger during vacations and play-hours.

These powerful considerations naturally lead the council to speak of the construction of houses under the double relation of public and private health.

"There are," they say, "in the march of civilization, as in that of sciences, epochs of progress which should be marked by the creation of new laws. With all nations the monuments which attest their pride have preceded the monuments which testify to their true glory; the first sterile, so to speak, in their existence, fix the attention by the beauty of their form, by the elegance and grandeur of their proportions; the second, created for the wealth or happiness of nations, attract our notice to the utility or wisdom of their establishment. This epoch of true glory has arrived for France. Enough of sterile monuments cover her soil, still unfruitful in so many respects. Works of public utility, laws which conduce to the common happiness, these are the monuments that it is proposed to raise at the present day.

"It is a monument of this last kind of which the council ventures to suggest the erection, in demanding a law to regulate the construction of towns, villages, and houses, under the double relation of public and private

health; a monumental law, if ever there was one, since it will embrace France in its conceptions; all the citizens will enjoy its benefits with a perfect equality; and the poor man, even more than the rich, will find himself protected by it in his health, in his life, in his happiness; because health is life—it is more, it is happiness.

"A similar law has never existed among any ancient people, although we find among several of them no equivocal proofs of the solicitude of their legislators to introduce into the laws some precepts of health, applicable to the people they governed.

"We certainly find among the greater part of modern nations some ordinances, and regulations, relative to the salubrity of towns and houses; but their operation does not extend beyond the localities for which they were made, and little, or not at all, known out of these localities, they are still very imperfect, and altogether insufficient for the localities themselves.

"Nevertheless, can any one doubt the immense influence which the salubrity of towns, of villages, and of the dwelling, even when it is isolated in the midst of fields, exercises on the health and life of the people. All statistics, general and individual, attest this extreme influence; and there is no physician, a little observing, who has not had frequent occasions to verify it at the bed-side of his patients.

"We must be like the men, so well painted by the Psalmist, to reject such evidence—*eyes have they and see not.* How shall we explain, or rather, to what shall we attribute the difference that is remarked between the mortality of one quarter and that of another quarter of the same town; of one street and that of another street of the same quarter or of the same village; or, lastly, the difference that is observed in this respect between the houses of the same street, and those houses which are completely isolated. Misery, it is replied to us, is the cause. Yes, without doubt, misery is a powerful cause; but it is so especially when it is driven back into the most insalubrious quarters, streets, and houses; when it lives habitually in the midst of filth and dirt, that is to say, in the midst of an infected atmosphere; and when there is no misery, or when it exists in the same degree in the quarters, in the villages, in the streets, and in the houses with which the comparison is made, and, stronger still, when poverty is met with precisely there where there is the least mortality, in what is to be found the cause of this difference, if it is not in the insalubrity of the dwelling-places?

"If you had not seen yourself, Monsieur le Prefet, in one of the most beautiful streets of Paris, and in the vicinity of the most frequented promenade of the capital, the influence which the construction of the houses we inhabit has on the health, we would seek by some facts to convince you of this truth; but we are happy to need only to refer you to your own experience. This great fact, which naturally results from the comparison you have drawn, in a report addressed to the Minister of Commerce, the 31st of June, 1832, between the mortality of the quarter of the Hôtel-de-Ville, and that of the quarter of the Chaussée-d'Antin, has not escaped you. Yet, in the striking difference which is found between the mortality of these two quarters, you have not taken into account the poor who died in the hospitals, and who were, undeniably, more numerous from the quarter of the Hôtel-de-Ville than from that of the Chaussée-d'Antin. What calculation has demonstrated to you for one quarter of Paris exists in all in different degrees; and the same calculation applied to other localities, very distant from the capital, in which the condition, the habits, the mode of living, and the nature of the labour which the inhabitants perform are nearly the same, has given analogous results, presenting the same extremes, without the possibility of assigning any other cause than the insalubrity of the dwellings understood in its widest acceptation.

"The council might accumulate facts, calculations, and quotations, to

support the opinion they have formed of the necessity of a law to regulate the construction of towns, villages, and houses, under the double relation of public and private health; but they have no need to be at this pains to induce you to share their conviction, and they are fully persuaded that, in proposing to you to promote a law so important, they are only anticipating your desire to co-operate for the well-being of your fellow-citizens, and to aid the enlightened zeal of the Minister of the Interior for all that is great and useful."

Under certain points of view, salubrity confounds itself with health; on another side, it governs health; because, without it no good rules of health can be established. Thus it has engaged the special attention of the council. We see them to shrink from no difficulty, from no mission, however painful, however dangerous even, it may be. Nothing escapes their vigilant attention, and the administration is always sure to have their aid in all the amendments that it wishes to introduce into this important branch of public service. It is thus that they pass in review all which appertains to the wholesomeness of sewers, to the improvement of the paving, to the establishment of street-fountains, to the flow of water for domestic or manufacturing purposes, to the cleansing of wells, and of waste-water wells. The construction of the receptacles of privies, those incessant causes of insalubrity and inconvenience, occupies them above all. Here is what they say upon this point:—

"The emptying of the privies in the city of Paris has become a very heavy expense to the proprietors, and the expense is always on the increase, in consequence of the modifications in the construction of the receptacles, and the more abundant use of water; a use rendered necessary by the actual form of the seats, and still more by the introduction of private baths.

"It is evident that the first condition for obtaining a result at once economical and salubrious, is to separate, on the spot, the solid matter from the liquid, to preserve what has an intrinsic value, and to reject what is only cumbersome.

"For more than half a century some men, animated by love for the public good, and several speculators, have directed their researches to discover a method of making this separation. At the head of these are Girard and Gourlier, Casaneuve, Sanson, Derosne, Chaumet, the authors of the article in the *Mémorial de l'Officier du Génie*, and, lastly, the architects Payen and Dalmont.

"The system of Gourlier is seducing: if it has not yet been submitted to all the trials it requires, we are able to predict before hand that it will succeed, and that it will be productive of advantage.

"The benefits of the project of Gourlier are found in a higher degree in that which has been adopted in barracks.*

* The plan of Gourlier was simply to divide the receptacle into two parts, an upper compartment and a lower. The contents of the water-closet were discharged into the upper portion, and the water drained into the lower, through holes pierced in the partition. In the barrack plan there was no division in the receptacle, but, instead, a leaden pipe pierced with holes was carried perpendicularly through the midst of it, into which the water filtered from the receptacle, and was conducted anywhere at pleasure. Neither of these systems obviated two principal evils—the necessity to empty the receptacles, and the stagnation of the water, from the night-soil, round the foundations of the houses, from whence it worked its way up into the walls. The annoyance always felt from the removal of night-soil in Paris, and the ineffectual efforts of scientific men, for a long course of years, to discover a remedy, is a sufficient proof of the imperfection of all other methods except sewers. There has never indeed been a question that this last system was incomparably the best. But it has not occurred to men of science at Paris, that there could be any other outlet for the sewers besides the Seine, and the popular apprehension that the water would by this means be polluted, combined with the unwillingness to sacrifice the manure, have been always viewed as fatal objections.—*Translator.*

"The system of movable receptacles has the sanction of time, is applicable everywhere, facilitates the removal of the contents, and enables it to be done without smell or dirt: it preserves the workmen from the dangers of asphyxy, prevents the decay of our houses, and contributes to augment the disposable mass of manure.

"To prevent the gravest consequences, it is essential not to conduct the liquid from the privies into waste-water wells, and put them in communication with the upper layer of the soil in which our wells are sunk. Prudence requires that the liquid should not be directed into the second layer, which in many parts of Paris furnishes very good water. If it is possible, without great inconvenience, to conduct it into channels altogether lower, it is still the opinion of many experienced persons that it ought not to be done under Paris for any very considerable quantities of water, and that it is necessary to reserve this resource for localities badly situated, and which are rarely met with.

"All the proofs show that the liquid of the privies may be discharged into the Seine without inconvenience. An investigation conducted formerly by Hallé and Fourcroy, on the sweepings of Paris, adds great weight to this opinion. The ancient and recent gaugings, as well as the daily observation of facts, demonstrate that the quantity of dirty water sent into the Seine would be so small compared to the water of the river, that it would always remain unperceived, and could in no way be injurious to health.

"To convey these waters to the Seine, the first idea which presents itself is to cast them into one of the three great sewers which surround Paris on the north.

"A mass of facts and observations prove that the discharge into the sewers of the liquid from the privies will not infect the sewers, nor cause danger to those who work in them; that this infection will be so much the less to be apprehended with the apparatus of Gourlier, with that which has been adopted in barracks, and with the movable receptacles, that, by these different methods, the separation taking place slowly and successively, the liquid carries along with it but very little of solid matter.

"Everything seems to show that by mixing the liquid from the privies with a sufficient quantity of water it might, without inconvenience, be thrown upon the public way, and got rid of in this manner; but prudence requires that before any innovations of this kind the project should be submitted to minute and multiplied experiments. These experiments are the more important, that the result would be to increase the revenues of the city by the sale of a considerable quantity of water which it has for disposal.

"If the drying of the solid contents of the privies has hitherto been considered as one of the most infectious and inconvenient trades, it may be affirmed that it can now be made one of the less disagreeable, a circumstance which we owe to the means of disinfection recently discovered, or which, formerly known, have not been put in practice till lately on a large scale.*

"To favour the employment of these means, and to arrive thereby at results of high importance, it is not sufficient for the administration to be animated by praiseworthy intentions. It must obtain, by its interposition with the supreme authority, a modification in the classification of the establishments in which the fecal substances are prepared, and, above all, must use the means at its disposal to disabuse the public of the prejudices it entertains against these sort of places. The administration will meet at

* The disinfection is produced by mixing the night-soil with calcined mud, or burned turf, or saw-dust, or refuse tan, and various other substances. A commission of the Conseil de Salubrité found that a large barrel of fecal matter was deprived of all smell in five minutes by this process; and even putrefied entrails, the severest test by which it could be tried, yielded equally to its influence. The commission, however, doubted the success of the application where the water was in large proportions.—*Translator.*

first with very great obstacles, but, with time and perseverance, may rest confident of success.

"The changes proposed are of such importance, they will be attended by consequences so useful, and extensive, that they will be sufficient to render illustrious to future generations, and to recommend to their gratitude, the name of the ministers who shall effect them."

Since their institution, the "Conseil de Salubrité" have been charged to visit all the parts of France in which epidemic sicknesses have appeared. Thus we find them in 1807 investigating the autumnal disorders which broke out at Créteil, at Maisons, at Charenton, &c., and proposing the creation of a travelling hospital to render aid to the country districts during the prevalence of epidemics. Some years later, in 1810, they went to Montreuil, to Montmartre, and other communes in which the small-pox had assumed an epidemic character; to Pantin where there reigned an epidemic fever; to Fontenay-sur-Bois, Rosny, &c., where some ravages had been made by the dysentery. In 1812 they set forth the causes of the epidemic maladies which had declared themselves in the communes of Charonne, and Clicky, and by this means prevented their recurrence. In 1818 they stopped the progress of an endemic fever in the commune of Chevilly, and of the croup in the commune of Montreuil. In 1825 the small-pox committed great ravages among the inhabitants of Paris, and of the rural communes of the department of the Seine. Brought by a mass of workmen who flocked from the country to partake of the high wages produced by a glut of employment, it was rapidly propagated among a population who, through carelessness, or prejudice, had rejected the blessing of vaccination. The small-pox, favoured in its development by the high temperature of the atmosphere, gave rise for a moment to a doubt of the preservative property of the vaccine. An eruptive malady, the *varioloïde*, confounded with the small-pox by people in general, and by inattentive and inexperienced medical men, originated this idea, which some cases—rare certainly, but distinctly marked—of small-pox in persons who had had the true cow-pox, appeared to confirm. It was then feared that the vaccine had lost with time the advantages which rendered it so precious; that, weakened in its nature, by passing from one individual to another through a long course of years, it was no more susceptible of modifying the organization in a manner to render it inaccessible to the small-pox. It became therefore important to examine with care this interesting point of practice. The difficult task was performed by the council, and the administration, enlightened by their reports, was able both to re-assure the people justly alarmed, and to take the proper measures to arrest an evil of which no one could foresee the consequences.

It is by such labours that the council prepared themselves for the noble and grand mission which was reserved for them by the appearance in the capital of the cholera morbus,—a mission which they fulfilled with so much courage and devotion. In the midst of this public calamity, the "Conseil de Salubrité," we do not hesitate to say, surpassed all expectation. This same zeal was manifested in 1837, when the epidemic catarrh made some ravages in the capital. Since then, with the exception of local maladies of little importance, the "Conseil de Salubrité" have not been called upon to occupy themselves with epidemics.

The *épizooties* are in many respects less serious than the epidemics. Nevertheless, as they often affect the animals which serve for the nutriment of man, and that, apart from this consideration, they may have grave consequences for the public health, they have constantly engaged the care of the council. In 1834 an *épizootie* was reported to the administration, which prevailed among the cows of the communes round Paris, and which caused a great mortality. The researches of the council established that this *épizootie* was only a chronic disease, a true pulmonary phthisis to which has been given the name of *pommeliere*, and by which the greater

part of the cows had been attacked which fill the stables of the milkmen of Paris and its environs. According to the council, the principal cause of the evil was to be attributed to the vicious regimen to which this species of animal is subjected. "It is known that they pass a part of the year in stables perfectly closed, in which the space is not proportioned to the number of inmates, in which the vitiated air renews itself with extreme difficulty, and in which the heat is sometimes suffocating. It is known also that they pass suddenly from the food of the stable to pasture, and that in this change they go from the hot and humid atmosphere of the stable, to a sudden exposure to the continual variations of the external air. This alternation of food, and of heat and cold, operates as a powerful cause of disease. But as the evil does not announce itself in a violent manner, as its progress is not very rapid, as there is even a period in the disease in which the animal is disposed to get flesh, the cow-feeder, who knows to what point to keep her, sells her when she is ready to calve. It is in a radius of thirty leagues from the capital that cows of this kind are purchased by the jobbers who supply the milkmen of Paris. With these last they still hold out a certain number of years, if they are properly cared for; but in general they are kept in stables which are neither sufficiently large, nor sufficiently airy, where they are exposed to the same causes which gave birth to the malady. The phthisis arrives insensibly at its last stage, and carries off every year from Paris, and its neighbourhood, a great number of these cows.

"As to the question, whether the sale of the flesh of oxen that have died from the diseases just described should be allowed, the council have already shown that, from time immemorial, the meat of cows attacked by pulmonary phthisis in a slight degree, has been consumed at Paris as good cow-beef. Often even cows which have reached the last stage of this disease are consigned to the butcher, who offers their flesh for sale as meat of the second quality, after taking the precaution to cut away the lungs, the pericardium, the mediastin, and those parts of the sides and diaphragm, which present a state of disorganization more or less advanced. This commerce has always taken place in the environs of Paris, and in Paris itself before the establishment of the *abattoirs;* and if we are not able to affirm that food of this nature is not bad, there is at least no example of its use having given rise to accidents. It is to be presumed that in this case, as in many others, the cooking destroys the vicious properties of the flesh, and deprives it of all the qualities injurious to the health of the consumer.

"The council have, however, been far from drawing from all these facts the conclusion that it is unnecessary to watch over the sale of butchers' meat. They think, on the contrary, that this superintendence cannot be too active, in order that the low price of such meat may not lead poor families to make it habitually their principal sustenance. It is known that a bad diet which is not injurious when used casually, may become, by its continual employment, a source of disease. Numerous observations have equally taught us, that the flesh of animals in which putrefaction had commenced, has produced in persons who touched it the most serious consequences. The council, building upon such data, believe that it is indispensable to watch with the greatest care the sale of meat, to have destroyed all the bad meat which is exposed in the shops, and to forbid the butchers to sell the flesh of any animal that has died from disease, or been killed in consequence of disease, unless a veterinary surgeon and physician, appointed by authority, have decided that the meat could be eaten without inconvenience."

Some considerations of a kind still more general are developed in the important report made by the commission, charged in 1839 with the investigation of the disease called *cocotte*, which attacked the milking-cows, and deeply occupied the public attention.

We stated at the commencement of this article, that the number of reports made by the "Conseil de Salubrité," during the years comprised in this account, amounts to 4131. This number greatly surpasses in its proportions that of the preceding years, that is to say, of the twenty years which form the first period of their labours, dating from their institution, and which only presents a total of 5008 reports. This arises from the fact that Paris for a long time has been only a city of produce, and that the labours of the council have necessarily increased with the progress of trade, and the character, altogether manufacturing, assumed by the department of the Seine since 1815. It is necessary, moreover, to remark that the provisions of the decree of 1810 on insalubrious establishments, by submitting certain classes of manufactories to special authorizations, rendered more frequent the intervention of the council, who were the first to demonstrate the necessity of these new measures. "It is a great satisfaction to the council," say the reporters of their labours for the year 1810, "that every year the observations and reports lead to general measures which simplify your administration, by giving certain rules of which the application becomes every day more easy. The public health was long since compromised by the existence of certain manufactures, and in the general accounts we have rendered we have never ceased to demand the removal of insalubrious establishments. The National Institute, consulted on this important point, shared our opinion, and a regulatory law has just designated the manufactures which may be established in the interior of towns, and those which are not to be tolerated there."

In the year 1811 we find 118 reports on classed establishments. This number increased in 1812, and so from year to year, till in 1813, 313 reports were made on establishments of this kind. The use of steam-engines increased the labours of the council. In 1813, for instance, there was but one report on these engines; in 1822, the number had risen already to fifteen. The examination of these machines led the council to examine their different systems, the dangers and inconveniences they presented to the public health or safety, and we foresee, in reading their important observations on this subject, all the improvements which experience introduced in the sequel into this new branch of industry. If we pass from the year 1822 to the year 1839, we find there has been read ninety-six reports on engines of this description: but they are no longer simple considerations on machines of which the use is not well understood; they are views of an elevated order, both on the application of these engines, and on their dangers and inconveniences. We see that the council have profoundly studied these important questions.

"We have united under one head," says M. Busy, the reporter, "all the establishments on which reports have been made relative to steam-engines. Each of these establishments doubtless offers by itself some inconveniences inherent in the kind of trade carried on; but in general these inconveniences are trifling. The greater part of the manufactories about which there is a question are for the construction of engines, and other analogous things, which can only affect the neighbourhood by the noise and activity which reign there. Out of sixty-three reports made to the council on steam-engines, eleven were on sawing-machines, nine on shops for the construction of engines, six on fulminating powder-mills, four on factories for printing and preparing stuffs, three on mechanical printing presses. The other reports are divided in the following manner:

"On machines for flattening metal, for bruising colours, for pulverizing, for mixing mortar, for extracting stone, seven; for sugar refining, for the making of sugar of starch, three; for spinning, two; for turning, two; for optical glasses, two; for polishing steel, one; for cleaning grain, for the preservation of provisions, three; for perfumery, two; for soap-making, two; for bleaching, for making candles, hats, and delf-ware, for iron-founding, for scouring ashes, six; total 63.

"There has been made besides on simple steam-boilers 33 reports, divided among different trades in the following manner, viz:—

For printing and preparing of stuffs and woollens	12
Hat manufactories	7
Wax and tallow candle manufactories	3
The shops of mechanicians	2
Refining	2
Soap-making	2
Extraction of the colouring matter from dye-woods	2
Baths	2
Dyeing	1

"If we add these 33 reports to the 63 preceding, we have a total of 96 reports on steam-engines, or simple boilers. We join them together in consequence of the identity of the inconveniences to which these machines give rise. These inconveniences can only proceed from the chance of explosion of compressed steam, or from the chance of fire, and from the presence of smoke, which accompany the establishment of every furnace, whatever may be its use. It is true, however, that among the complaints or objections which have reached the council, several have turned upon the noise and shaking occasioned by the steam-engines, a shaking which is particularly felt in houses a little shut in, and connected with the neighbouring houses. This occurred with the printing presses, and some other mechanical applications of steam.

"But these results are altogether independent of the steam itself, are inherent in the imperfection of the mechanism employed, and would be produced with much greater intensity by substituting for steam a horse, a fall of water, the action of the wind, or any other mechanical motor.

"If we consider the steam-engines and boilers with respect to the explosions to which they may give birth, we see that no accident has happened during the current year from a total or partial explosion of an engine, and yet there is no complaint or opposition which is not swelled by the fear of these dangers. If the accidents of this nature may with justice, by their seriousness and sphere of action, provoke the fears of the neighbours, the wise measures prescribed by the rules are of a nature to render them impossible, when they are faithfully executed. Thus, Monsieur le Prefect, the council have always vigorously insisted on the maintenance of the precautions with which the law surrounds the steam-engines, not only to shield the responsibility of your administration, but also because they are persuaded that it is impossible in the actual state of things to neglect these prescriptions without exposing those who make use of steam-engines to eminent dangers.

"The true and the most serious inconvenience of steam-engines is the smoke. It is against this that most of the well-founded complaints are raised.

"This inconvenience is not only felt at the present moment, but it excites, above all, apprehensions for the future.

"When we consider that in the single year 1839, there have been granted 82 authorizations for steam-engines, and that we are yet but at the beginning of the applications of this mechanical agent,—when we follow the increasing progression of petitions addressed to the administration, we are not able to suppress a certain fear against the ulterior invasions of the smoke from these establishments.

"The council have applied themselves for a long time to the solution of this difficulty, which is met at every turn in the petitions addressed to you, not only for steam-engines, but for all the trades in which furnaces are employed.

"Various systems have been proposed: that which first presents itself is the use of smoke-consuming furnaces, which appears in fact the most

rational and appropriate. Nevertheless, although it is very easy to assign the theoretical conditions for complete combustion of coal, the difficulties of application have not permitted this kind of furnace to become general. Hitherto the smoke-consuming furnaces require great precision in the execution, great regularity in the distribution of the fuel,—things difficult to realize in ordinary labour. On the other hand, the great excess of air necessary to obtain complete combustion often diminishes the efficacy of the coal, and renders these furnaces more expensive, in certain cases, than the ordinary furnaces, in spite of the loss of fuel which the latter involve.

"The mechanical distributors to regulate the supply of fuel, and the activity of the combustion, have been also proposed and employed with success; but they are a considerable expense at the outset, and can be but little adopted except in great concerns, and where there is a very constant application of steam.

"It remains to modify the nature of the fuel; and it is this which the council have generally done. They commonly prescribe the use of coke, or some variety of prepared coal, which gives no smoke—leaving it however to the proprietors to make use of whichever method suits them best, whether smoke-consuming furnaces, mechanical distributors, or fuel which yields no smoke.

"These regulations, Monsieur le Prefect, have been adopted in principle by the "Conseil de Salubrité," and are, in the majority of cases, the condition to which they think it their duty to submit the authorizations they have the honour to propose to you.

"Doubtless their rigorous application may cramp certain establishments. The council are not ignorant that for some particular purposes the use of coke presents great obstacles, considering the construction of the furnaces; but the absence of smoke in the combustion of coal is not so very difficult to obtain, as to shake the intimate conviction of the council that this constriction will be but momentary, and that it will end by turning to the profit of the manufacturer.

"The problem of which the council seek the solution, is able to be resolved; it is so already in great part, but there yet remains one step to arrive at the goal, and they will reach it by persevering in the course they have adopted. In their efforts they have been sustained, we repeat, by the conviction that they labour not only for the advantage of the health and cleanliness of the capital, by seeking to guarantee its inhabitants from the nuisance of smoke, but also for the advantage of the manufacturer himself, by forcing him to a better employment of his fuel, and by putting him into such a condition that he may be able to select the localities which suit him, without being exposed to those continual complaints, to those recriminations, often well-founded, which have not always been foreseen, and which sometimes become the cause of the greatest embarrassments to the manufacturing establishments.

"An important progress in the path we indicate was made in 1839, by the contrivance of M. Beslay, a mechanician, for steam-boilers—a contrivance which has been pointed out in several reports on this subject, and which proposes to prevent explosions and avoid smoke by means of a general use of coke. It is only to be regretted that it has not yet been able to be applied to all the purposes for which steam-boilers are employed."

The improvements introduced by the council into the different branches of industry with which they have had to deal, and on which their reports enter into details at once useful and interesting, are numerous. Thus the refining of gold and silver, the factories for fulminating powder, for gilding, for chemical products, for bitumen, for melting tallow, and a mass of other trades, owe to them notable improvements, both in the methods of fabrication, and in the conditions for public health and safety under which they are to be carried on. The white-lead manufactories have excited their earnest solicitude. It is known that the workmen who labour in these places are subject to serious and frequent maladies. In consulting the earlier labours of the council, we see them unceasingly occupied with this question; but the frequency of the accidents, and their seriousness, have more particularly attracted their attention in these latter times, and have engaged them to compile a set of instructions which set forth the best rules of health to be observed in these manufactories. (The rules have already been quoted.

Later, the council have anew examined deeply this branch of trade. They have visited the manufactories of white-lead existing in the department of the Seine; they have obtained the experience of other departments, and they have shown the necessity of commissioning one of their members to follow the results of the rules quoted above. They have required, moreover, that the administration should furnish some statistics on the state of workers in white-lead admitted into the hospital. The administration has hastened to defer to this wish, and there is no doubt that there will result a sensible improvement in the health of the workmen.

(After giving several other minor instances of the labours of the Conseil, the report thus concludes:—)

And now that we have detailed the principal labours of the council, it would be a necessary supplement to this article to show the results that have followed from them,—the reforms they have introduced into the public service. But here we are no more dealing with the labours of the council, but with the labours of the administration. Thus independently of the decisions on classed establishments, and which amount to about 300 a-year, it would be necessary to describe the measures for the public health executed by the administration. But to confine ourselves only to acts which interest the generality of the citizens, we may cite the ordinances of police which relate to coloured sugar-plums; to horses attacked with the glanders, or contagious maladies; to vessels and utensils of copper; to the adulteration of salt; to the aid to be given to the drowned and asphyxied; to the depôts for refuse in the rural communes; to the dissection, modelling, and embalming of corpses; to the cleaning of wells and waste-water wells; to the adulteration and sale of fulminating powder; to the classification of new trades, the amphitheatres of anatomy, the establishments of pork-butchers, &c. &c.

Certainly there are few institutions that can show such results; there are few that receive an impulse so enlightened and constant. Bound in an intimate manner with the administration of which they form part, the "Conseil de Salubrité" has at all times found in it a just appreciator of their labours. They know the credit accorded to their reports, and the duties imposed on them by a confidence so honourable for the administration that gives it, and so justly merited by the body that receives it.

16.—*Qualifications of Officers of Public Health: Statement by* M. Duchatelet.

It is generally thought in the world that the medical knowledge acquired in the schools is all that is necessary to become a useful member of the council. The greater part of medical men themselves share this opinion; and on the strength of some precepts which they have collected from books on health and professions, they think themselves sufficiently instructed to decide on the instant the gravest questions, which can only be resolved by special studies.

A man may have exhausted medical literature; he may be an excellent practician at the sick-bed, a learned physician, a clever and eloquent professor; but all these acquirements, taken in themselves, are nearly useless in a Conseil de Salubrité like that of Paris; and if an occasion presents

itself to make use of them, a very small number of persons suffice to apply them. To be really useful in the council, it is necessary to have an extended knowledge of natural philosophy, of the constitution of the soil on which Paris stands, and of the geology of neighbouring countries; it is necessary, above all, to know with exactness the action which trades may have on the health of those who exercise them, and the much more important action of manufactories of every species on plants, on men congregated in towns, and on animals. This knowledge, so important, of the action of manufactories and trades, is not to be acquired by ordinary study, or in the silence of the cabinet. It is not to be obtained without positive notions on the arts, and on the greater part of the processes peculiar to each trade. It requires habit and the frequenting of the places of work. In this particular, more even than with medicine, books are not a substitute for practice; and if there exist works on the subject, they are more likely to mislead than enlighten.

From what has been said, the necessity will be evident to introduce into the council those physicians who have made health, and particularly the public health, a special study; and to join with them chemists, and, above all, manufacturing chemists, because what would many of those persons, whose life has been passed in hospitals and the exclusive study of medicine, be before a steam engine? It is clear that they would often be deceived by those adroit and skilful manufacturers who would have an interest in concealing the truth.

17.—*Instance by* MM. Duchatelet *and* D'Arcet *of the erroneous Medical Inferences as to the insalubrity of particular Trades.*

Ramazzin is, as far as we know, the first who has treated professedly of the maladies produced by the fumes of tobacco. In his great work, *De Morbis Artificum*, he states that the workmen employed in the manufacture of tobacco are seized with great pains in the head, with vertigo, nausea, and perpetual sneezing; and that so great is the subtilty of this substance, that all the neighbourhood, particularly in summer, experience nausea. He adds, that those who work on tobacco lose their appetite, and that their breath is insupportable.

Fourcroy, after repeating in his translation of Ramazzini all the passages from this author, adds, in a note, several observations to prove the dangers of tobacco; such as, that a lady died from a cancer in the nose in consequence of taking too much snuff; another from a polypus in the œsophagus, which prevented her swallowing; another from frightful convulsions produced by sleeping in a room in which tobacco had been rasped. Fourcroy states, however, that there are some privileged persons who become accustomed to the action of tobacco, and experience no inconvenience from it.

Cadet-Gassicourt, in a memoir addressed to the prefect of police on the maladies incident to the trades carried on in Paris, says that the workmen occupied in the preparation of tobacco are subject to vomitings, colics, and acute and chronic affections of the chest; that they have often vertigo, bloody fluxes, and are addicted to drink.

Tourtelle, in his *Elémens d'Hygiène*, affirms that it is very dangerous to sleep in warehouses of tobacco; and he quotes a case, mentioned by Buchoz, of a young girl of five, who died in a short time from dreadful vomitings, occasioned by this sole cause.

Percy, in the article *Chapeau*, in the *Dictionnaire des Sciences Médicales*, mentions, that some soldiers, exercising in the *Champ-de-Mars* in very warm weather, were overcome by syncope, which he attributes to some tobacco that these men had put in their caps.

In a new edition of Ramazzini and Foureroy, by Patissier, we find the opinions of these authors without observation or comment. The editor is

content to add, that those who have to do with tobacco are, in general, wasted, discoloured, yellow, and asthmatical.

Finally, Merat, in the article *Tubac*, in the *Dictionnaire des Sciences Médicales*, says, that men engaged in the preparation of this substance are wasted, discoloured, yellow, asthmatic, subject to colic, diarrhœa, the bloody flux, but, above all, to vertigo, cephalalgia, muscular tremor, to true narcotism, and to diseases, more or less acute, of the chest. "All these assertions," he continues, "are the fruit of my observations in the hospitals of Paris. Tobacco causes not only evils without number, but even death to those who prepare it. It deranges the memory of all who inhale it, and renders it less clear and entire; it weakens the tissues, especially the nervous tissues; it causes trembling of the limbs; diminishes strength; it produces emaciation, and even consumption, particularly among females; and sometimes begets entire imbecility."

We might multiply these quotations. The just celebrity of the authors who have furnished them gives to their opinion a force which imposes belief, and makes us reject every species of doubt. Let us recall, however, the maxim of Descartes; let us cease to believe the words of a master; let us dare to doubt for an instant, and, observing for ourselves, let us learn to form an opinion, based on what our own senses and judgment have taught us."

Acting in this spirit, Parent Duchâtelet and D'Arcet carried on a minute investigation, in a vast manufactory of tobacco at Paris, containing 1,054 workmen. Not content with the results afforded by a single establishment, they directed questions to the nine other great manufactories of tobacco which France contains, and the answers were prepared by the physicians, surgeons, and officers of each establishment in conjunction. "The observations," say MM. Duchâtelet and D'Arcet, "which compose this memoir, have been collected from a sum total of 4518 workmen. They appear to us so much the more valuable and conclusive, that they have been made simultaneously in the most opposite parts of France, by men who had not, and could not have, any connexion. There is thus no possibility to suspect the influence of a preconceived opinion; and if those to whom our inquiries were addressed are unanimous in their replies, and if these replies agree with our own observations, we shall be sure that we have arrived at the truth."

The conclusions which followed from these widely extended researches were—

1. That in the greater part of the factories there was never known an example of an individual who could not accustom himself to the emanations of tobacco, and that in the rare cases where it proved injurious, it was always in a particular part of the process, which merely obliged the workman to be transferred to another department of the factory.

2. That all which has been said on the frequency of nausea, of vomitings, of diarrhœa, of colic, and of hæmorrhages, is pure supposition. That it is so no less with respect to the headaches, sneezings, loss of appetite, foulness of breath, acute and chronic affections of the chest, cancers, and other similar diseases. What the same authors say on the discolouration of the skin of the workmen engaged in the preparation of tobacco, on the yellow hue of their complexion, their leanness, and emaciation, proves that they have not observed for themselves, or have only seen the exceptions to the rule, or have not compared this class of people with other workmen of the same town, who were engaged in occupations of a totally different kind.

3. That tobacco, far from producing, in those who prepare it, death and narcotism, does not even influence their nervous system; and that vertigo, syncope, muscular tremor, convulsions, and other like evils, which have been charged against it, have never existed in the manufactories, though the men sleep in the midst of the most subtil preparations, or, at least, are not to be attributed to that cause.

4. Not only is the tobacco without any effect on the health during the first years devoted to its preparation, it has not the least ill consequences in more advanced life. Feebleness and great age, or causes altogether accidental, have been the sole ground for dismissing the workmen.

5. There are some professions which, without destroying health in an evident manner, abridge life; but a great number of those who work on tobacco reach, and even surpass, the ordinary limit of human existence.

6. It is proved by innumerable facts, that the manufactories of tobacco are not in anywise injurious to the men, animals, or plants, which may exist in their vicinity.

It thus turns out, upon examination, that this much maligned substance is perfectly innocuous. "Yet what practitioner," say MM. Parent Duchâtelet and D'Arcet, "who had not had occasion to visit the workshops and study their influence, would not be forced into belief by the imposing authorities we have quoted above; who of them would hesitate to regard as demonstrated opinions on which Ramazzini, Fourcroy, Cadet Gassicourt, Tourtelle, Percy, Patissier, Merat and others are unanimous, without a single person having uttered a contrary assertion? There are found among these authorities two members of the Royal Academy of Medicine, three members of the Academy of Sciences, two professors of the Faculty of Medicine of Paris, one professor of the Faculty of Medicine of Strasbourg, two chemists, and two celebrated physicians—one French, the other Italian; in a word, six physicians and an apothecary, who held, and still hold, the most eminent places in the learned world. It is therefore evident that it is of the highest importance that trades and professions should be investigated differently from what they have hitherto been; and this importance daily increases, because of the progress and extension of arts and manufactures."

18.—*On the Habitations of the Lower Orders of Paris.*

No. 1.

The labouring classes are obliged to live in houses almost always dilapidated, insufficient, or unhealthy. Such is the lot of the poor man in all countries: the force of circumstances, the hard law of necessity, compel it. Yet, if it is impossible to remedy completely this state of things, may we not approximate to it, by building houses for every grade of the lower orders—not only of the honest poor, but of the debased and depraved? It appears to me that these houses would have a double advantage;—they would diminish the causes of public insalubrity, and offer to the honest and economical workman the means to procure a residence equal to his necessities, and capable of producing in him the taste for retirement and domestic peace so favourable to morals. It is especially in this last point of view that the amelioration of the dwellings of the poor and laborious class is to be ranked among the preservatives against vicious habits.

Rent being one of the most important and indispensable domestic expenses, the father of a family, pressed by other wants of the first necessity, naturally seeks the least costly habitation. Now, these habitations exist only in certain quarters, and in certain streets of those quarters: they are old, ruined, and filthy. The proprietors, in order to tenant them, let the lodgings very low, and thus attract the poorer families. If these lodgings were healthy, if they were sufficient for all the members of the family, there would be no room for censure; but they are foul, badly lighted, and neither air-tight nor water-tight. They are small, and as parents and children live and sleep in the same room, the overcrowding is both a cause of unhealthiness, and an offence against good morals. Moreover, the bad state and filth of the passages, privies, and sinks, give rise to infectious exhalations, which vitiate the air of these humble abodes, and affect the health of their

inhabitants in a manner so much more mischievous that the greater part of them work all the day in crowded and ill-ventilated shops.

It would be worthy of a wise administration to remedy this dangerous complication. The task is doubtless difficult; but why not grapple with it boldly, instead of allowing to subsist in Paris, without any effort to destroy them, so many centres of infection which reduce to the level of the lowest animals the unfortunate beings who seek in them a retreat for the night.

Although the lodgings are not all repulsive, they are all alike open to criticism. Some offend by overcrowding, others by the mode of sleeping; others, lastly, by the absence of all ventilation, and even by a total want of air. Overcrowding is an evil which prevails in all the lodgings of the lowest class, and which aggravates the mischief resulting from the other inconveniences to which they are subject. The twenty-five or thirty thousand workmen employed in house-building, who flock to Paris every year from certain departments, congregate in chambers, and sleep there during the season. Many of these places are kept by countrymen of their own, who attract them by their known probity, and the kindness they entertain for them. These chambers abound principally in the quarter of the Hôtel-de-Ville for the masons, and in the Faubourg Saint-Martin for the carpenters. These excellent workmen, by an exception more peculiar to them than to any others, look only to economy. They bargain with the lodging-house keeper, so as to obtain for six francs a month, besides the room, the washing of a shirt a-week, and a mess of soup every day, for which they themselves provide the bread. All that is not devoted to their slender wants is laid by for the support of their family, or the increase of their little patrimony. The police unanimously testify to the order and concord which reign in their chambers, as well as to their good conduct abroad. Is it not mournful that these fine fellows should sleep thus piled up in little garrets? Accustomed to work in the open air, the smallness of their rooms is more trying to them than to any others. Thus typhus fever is common among them, and sometimes attacks a whole chamber.

The overcrowding and deficient ventilation are still more injurious to workmen employed in manufactures. They pass every day from an infected lodging into a shop which is usually as unwholesome, and they are thus predisposed to contract readily contagious maladies.

Of all the lower orders, the chiffonniers inhabit the most infected and disgusting lodgings. It is vain to expect to descend into the lowest ranks of society,—inequality always appears somewhere. Even the chiffonniers have their notables. There are some a little more economical, a little more raised than the mass, and who enjoy a certain comfort. Those the most elevated occupy one or two small rooms, which they hire for themselves and their families; others possess a pallet, which serves them to sleep on, in the chamber of which they are one occupant among many. But this possession is more often collective than personal; and although shared, it does not fail to excite the envy of the poor wretches who lie in a species of trough, on rags, or on handsful of straw, with which the room is strewed. The police charged with the surveillance of the lodgings inhabited by the chiffonniers give an incredible picture of them. Each occupant keeps by him his basket, sometimes full of filth—and what filth! These savages do not hesitate to comprise dead animals in their gleanings, and pass the night by the side of this stinking prey. When the police go to these places, they experience a suffocating feeling, bordering on asphyxy. They order the windows to be opened when they can be opened, and the severe representations they address to the lodging-house keepers on this horrible mixture of human beings with decayed animal matter does not move them. They answer, that their lodgers are accustomed to it as well as themselves. A trait of manners peculiar to the chiffonniers, and which might be called their pastime, consists in rat-catching in the courts of the houses which they frequent. They entice the rats by the aid of certain

substances attached to the rags they gather in the streets. With this view they put heaps of rags near the holes in the walls, and when they think that the rats are buried in the rags, they let loose into the court dogs trained for the purpose, and, in the twinkling of an eye, they make themselves masters of the rats, of which they eat the flesh and sell the skin.

The lodgings which receive at night the scum of society are thorough pest-houses. Those even which are not frequented by chiffonniers become, by the crowding of the inhabitants and their filthy habits, dangerous centres of infection. There are some chambers which contain as many as nine beds, separated by small passages hardly wide enough to get through, and these beds are often occupied by two persons who do not know each other, and have never seen one another. Difference of sex is no obstacle to these nocturnal and fortuitous cohabitations, although the police neglect nothing to prevent disorders. Among the female apartments there is one which is famous for the picture of decrepitude and abjectness which it presents. The women who occupy it are old drunkards, of whom several are suspected of theft. The spectacle of these animated mummies has something sepulchral.

One must bring to social anatomy a serious spirit of investigation, to form a just idea of the population which lives in the concealed recesses of society. The imagination, however fertile and daring, could never reach, in this matter, to the height of the reality: there is a character, a physiognomy, a strangeness, which it is necessary to have seen in order to assume the responsibility of an historian. Let no one tax with romance the traits of manners nor the description of places contained in this chapter. However softened by the reserve I have imposed on myself, they are not less true at bottom. I have sacrificed the coarseness of the outline and colouring out of respect to decency. It is the only infidelity of which I accuse myself. It is impossible not to feel the necessity to provide an efficacious remedy for a state of things so contrary to the rights of humanity and civilization.*

19.—*On the Habitations and Lodgings of the Lower Orders of Paris.*

No. 2.

There exist in Paris some thousands of individuals who have no domicile —who sleep to-day in one place, the next day in another—and who have recourse every evening to those houses where, for a payment usually very moderate, they can at least obtain a place to lie in, and a covering for their heads. It is not only strangers living temporarily in Paris who lodge in this manner; a mass of workmen, mostly single men, who have not stirred from the capital for ten, fifteen, and twenty years, prefer this kind of life to the occupation of a separate chamber. It may be affirmed, without fear of contradiction, that this population comprises all that is most drunken and debased in society. It is composed of people without foresight, and without a home, living from day to day, and trusting to the hospitals in the case of sickness or infirmity. It is in the lowest places in these disgusting haunts in which a person is lodged for six, four, and even for two sous, that the greater part of the prostitutes reside, who can scarcely, after purchasing food, lay aside from their daily gains the trifling sum necessary to avert sleeping in the open air. I have visited some of these lodgings, and it was not without a feeling of pain that I have seen human creatures reduced to live in such places, and that in the capital of France. To give a just idea of these abodes, I will extract some passages from the remarkable report which the inspector-general of furnished lodgings addressed to the prefect of police at the time of the cholera. It tells of nothing but houses in ruin,

* Classes Dangereuses, tom. ii., p. 126.

of straw for beds in a state of putrefaction, of darkness, of infectious smells, of filth without example. These are some of the passages:—

"Rue ——, No. —. This house is remarkable for its excessive dirt. It is a genuine centre of infection. It is inhabited solely by thieves, smugglers, beggars, and prostitutes. It is impossible to enter without being suffocated.

"Rue ——, No. —. This house fixes the attention by its construction and filth. There are no beds, except some loathsome pallets; animal remains, intestines, and the refuse of meals, are rotting in the court; all the chambers look on a corridor completely deprived of air and light; the sinks and the privies of every story are loathsome from ordure and fecal matter. It is the hideous abode of vice and misery.

"Rue ——, No. —. The court of this house is four feet square, and is full of dung; the chambers, crowded with occupants, open on it; the privies, dilapidated to the fifth floor, let the fecal matter fall upon the staircase, which is covered with it to the bottom. Many of the rooms have no other aperture than the door which opens upon this staircase. The house is the resort of sharpers, of thieves, of the most filthy prostitutes, and of everything that is most abject both of men and women.

"Rue du Faubourg ——, No. —. A house occupied from top to bottom by chiffonniers, mendicants, street-organists, street-walkers, and Italian boys, who go about with animals. All these sleep upon rags picked from the street, and of which there is a depôt on the ground-floor. More complete abjectness it is impossible to witness.

"Rue ——, No. —. This house is the resort of all that is most abased. It is exclusively inhabited by thieves, prostitutes, discharged criminals, beggars, vagabonds, gamesters, and every species of rogues. The greatest filth reigns everywhere; the windows are made of oiled paper instead of glass; the rooms are infected; at each story the ordure of the privies flows upon the staircase." *

Another French writer, M. Frégier, has given the following description of the external appearance of these abodes:—"The streets, not, at farthest, more than eight feet wide, are dirty, and flanked by lofty houses, four stories high, which are blackened by time. The height of the houses renders the streets gloomy and damp, and the houses themselves are dark, particularly on the ground-floor. Spirit shops, beer shops, and low eating houses abound. The gloom of these shops, joined to the repulsive physiognomy of the streets, infuse a secret horror into the visitor who is led there by the spirit of observation, and who knows that the greater part of the shops are the habitual resort of the lowest prostitutes, and of rogues that live in the neighbourhood. The lodgings and places of dissipation frequented by this part of the population are worthy, from their filth, of the streets and quarters in which they are situated." †

20.—*Extract from the Report of the Commission appointed by the Central Board of Public Health to ascertain the Condition of the Dwellings of the Working Classes in Brussels, and to suggest Means for their Improvement.*

Our inquiries have led us more particularly into the most populous and miserable districts into which the working classes are continually crowding, in proportion as new and elegant buildings have encroached upon the districts within the heart of the capital, formerly almost exclusively occupied by those classes. We have visited successively, in the district of *Minimes*, the *rue des Pignons*, and *de la Samaritane*, the *cul-de-sac des Minimes*, the alley *des Prêtres, les rues de l'Epris, du Bourreau, de la Oventail*, &c.; in

* Parent Duchâtelet, de la Prostitution, tom. i. p. 504.

† Classes Dangereuses, tom. i., p. 135.

the district *de la Chapelle, les rues des Ménages, du Radro, de la Rasière, des Rats, du Renard,* &c.; in the district *de la rue d'Anderlecht, la rue des Navets,* and the alley *au Lait.* We entered into a great number of the dwellings. We not only inquired, but also inspected, in order that we might ascertain the truth of the statements which were made to us. In now presenting the results of this inquiry, we do not hesitate to call your attention to the very important facts which have been gathered, at the same time that we ask your indulgence for the imperfect manner in which we have been able to perform the duties committed to our zeal and exertions.

The misery of the localities we have visited struck us immediately, from their appearance of uniform poverty. The streets and alleys, at all times dirty and ill-paved, in times of rain or thaw had the appearance of a pestilential mire; the water had no means of running off, and the smallness of the passages, the absence of courts or gardens, the crowding of families, and the detestable modes of building, rendered all circulation of air or ventilation quite impossible. The most indispensable conveniences were entirely wanting in most of the houses. They had no pumps, nor privies, nor sewers, except one in common. Indeed, we saw seventy houses that were provided with only one pump or one privy for the whole of that number.

If you enter the houses, the spectacle which is there presented to your view is, if anything, still more wretched. If the arrangement and order to be seen in some of the rooms recall the proverbial neatness of the Flemish, on the other hand, the houses occupied by large families, the alleys, the passages, and the stairs, are generally disgustingly filthy; the brush of the whitewasher never passes along them, or if they are ever cleaned, it is only to attract new tenants, who soon restore them to their primitive dirtiness. The steepness of the stairs, which, indeed, are often more like ladders, must be a perpetual cause of accidents, especially to the young children. The space occupied by a family is generally much too confined for each of the members to receive the quantity of fresh air necessary for the preservation of health. Hence their appearance is generally that of suffering and of bad condition. The children are pale and emaciated, and bear all the visible signs of premature suffering. The number of those who are ricketty and scrofulous is considerable, and the mortality amongst the children and the aged exceeds all the most unfavourable averages. As we pass along these receptacles of misery, we feel astonished to see so few old people; an early death has carried them beyond their wretchedness: and if inquiries are made of parents, there are few who have not lost one or more children. It would be important to compare the proportion of deaths in the families of the rich and of the indigent. There is little doubt that this comparison would prove that misery, the want of proper air and space, the occupations of these people, and privations of every sort, sensibly diminish the period of life of the working classes.

In these wretched habitations everything is sacrificed generally to the rapacity of the proprietor. Every repair which affects the health or the comfort of the tenant merely, and that is not necessary to prevent the total ruin of the dwelling, is entirely neglected. What is the use of cleaning the walls for people whose habits are filthy? Why make windows for the entrance of air and light, or repair a sewer, or cleanse an alley covered with stagnant water, for people who are accustomed to pestilential smells? It is what a proprietor can never understand. Do not believe, however, that these dreadful abodes are rented at their proper value. On the contrary, the unfortunate people obliged to live in these houses, because all better ones are closed against them, in reality pay a higher rent than for a wholesome room in a good house.

21.—*Principles of Sanitary Police in Germany. Extracts from Professor* Mohl.

It is one important duty of a State to provide abundant supplies of water for its people; and this duty is based on the impossibility, in many cases, for individuals by their own exertions to procure even the barest necessary quantity of water, and also that it requires much skill to distinguish that which is of a good quality from that which is injurious. The State ought, therefore, to provide water of the best quality in sufficient abundance, and to arrange also for its most extensive distribution: this is often attended with great difficulties and with much expense, if the district is naturally ill-supplied with springs of water; or where a town, being large, requires more water than its own surface springs, or those of the immediate neighbourhood, can supply. Without maintaining that the example given us by ancient nations, of munificent expenditure in the laying out of aqueducts, &c., is one which we, therefore, are obliged to follow, yet it may be demanded of the State, that it should provide water, at least so far as the absolute wants of life require, by aqueducts or pipes, or at least by cisterns, laid down at the public expense. For the sake of the poorer classes, it does not seem advisable that this duty should be handed over to a private company.*

An injudicious economy on this point affects most injuriously the habits of cleanliness, and consequently the health of the lower classes. Water is properly distributed when every district is provided with an abundance of springs or wells. Loss of time, danger of fire, difficulties in the time of contagious diseases, are the consequences of the wells being few in number, even though each one should furnish a large stream of water.

It is a well-known fact, that locality has a great effect on the life and health of the inhabitants, and especially according as it offers the means of proper circulation of air or not. Thus, elevated situations are generally more healthy than places shut in by hills. In towns, those parts which are traversed by broad streets, are always more healthy than those which are so closely covered with houses as never to be properly ventilated, or where the sun can never penetrate to dry up the moisture; but an ill-drained situation is the most injurious to health.

The healthiness of a whole town is often essentially improved by the formation of a single sewer or drain: in other places, it requires very extended operations to produce the same effect. We may include amongst the various influences, the ditches surrounding the cities filled with stagnant water; by draining these, not only a purer air is gained, but also a fertile piece of land. It ought to be remarked here, however, that this work of draining water, and the removal of the mud, ought to be done in the cold season; if not, dangerous fevers will in all probability be the consequence.

The foul air arising from marshy land, when that is necessary, as in the cultivation of rice, is an evil for which there is no remedy.†

Another means of improving the healthiness of a town, is by proper attention to the breadth, and to the direction of the streets in all the new quarters of the town. The streets ought to intersect each other at right angles, and not at too great distances: the direction of the streets, also, should not run due north and south, as in that case the streets lying parallel in one

* Even in case of the existence of water companies for the supply of towns, there should still be public springs or wells, which would furnish at least the absolutely necessary quantity of water, free of *all* expense. In this case, any one who wished to have greater abundance, or wished the water to be introduced into his house, might have it by paying for it.

† The instances of towns having gained very essentially by drainage are Stuttgard, which has, in consequence, entirely lost a peculiar endemic fever; and Pavia which, by the filling up of the city ditches, has had its average duration of life much raised.

direction, would be scorched by the sun, and without any shade during mid-day; whilst the streets running at right angles to these, would never be warmed by a ray of sunshine.

The health of towns would also be much improved by the prohibition of all cellars as dwelling-houses, by legislative enactments as to the elevation of the ground-floor of dwelling-houses above the level of the streets; also as to the construction of proper conveniences attached to dwelling-houses; and by regulations with regard to the proper size of windows: also by regulations regarding the strictest cleanliness of the streets, as this is more important in its effects on the health generally, than even the situation of a town, or attention to its mode of building. By attention to it, Holland is inhabitable; by the neglect of it, Cairo and Constantinople are the very hot-beds of the plague.

The first means to attain this cleanliness is by a proper paving of all the streets, in order to lay the district dry. Without this, the streets are either a stream of mud, or a sea of dust; in both cases equally injurious to the health. It is often expensive to get a hard material for the purpose of pavement; but when obtained, the expense of keeping it in repair is much less. When it is possible, the streets should be kept clean, by turning on them a stream of water,—the drains being always kept well open to receive it afterwards. Every inhabitant should be obliged to keep the portion of the street clean before his own door. The refuse of the town ought to be conveyed away, at the expense of the town, to some part of the country, removed from all dwelling-houses.

22.—*A Report on the Statements of Dr. Mauthner regarding the Cotton Manufactures, given at the Monthly Meeting on the 2nd of November*, 1841. *By* Herr L. M. Von Pacher.

At the meeting of the 7th of June, Dr. Mauthner sent in a report on the condition of the children employed in the cotton-works, in which he gave an exposition of the evidence, partly of his own experience and partly on the reports of others, of the moral and physical evils which the various branches of manufacture bring with them, and proposals were put into the hands of the owners of the mills for preventing the evils so strongly denounced.

The learned meeting determined to appoint a special commission to inquire into so grave and important a matter. This body held its first meeting on the 29th of July, at which our much-esteemed chairman presided, and I had the honour to be commissioned to inquire into that part of the report of Dr. Mauthner which treats more particularly of the effects of the cotton manufactures.

Before I enter upon the discussion on the special points of inquiry, permit me to lay before you a few general remarks on the nature of our inquiry, and of the condition of the people employed in the cotton-works, more particularly of Lower Austria. It must first be conceded that the condition of the children working in the factories is closely connected with the condition of the rest of the working population, and cannot be considered separately. Our president felt the necessity of considering them in connexion throughout the various parts of the inquiry which he had proposed to himself; and, before the commencement of our inquiry, it was generally agreed that our attention should extend also to the condition of the adult workpeople.

We could not conceal from ourselves that we were undertaking a subject at once the most important and the most delicate,—an inquiry which might disclose to the general public that the unhappy signs of the times were to be seen in our affairs, and which also, without cause, might alarm a very excitable class as to their own condition. English and French

journals are full of the most striking descriptions of the physical and moral evils of the manufacturing population; and not without ground, as we learn from the various commissions of inquiry appointed by the respective governments. With your permission I will quote a passage from a report which the Commission de l'Intendance Sanataire du Nord drew up in the year 1832, and which unfortunately has not been found exaggerated even in later periods. It is word for word as follows:—

"No one without personal inspection can form any conception of the dwellings of our workpeople: the neglect in which they live brings evils with it which makes their misery unbearable, indeed almost fatal. Their poverty, by the negligence and demoralization which produces it, becomes almost destructive. In their dark cellars, in their cellar-like rooms, the air is never changed; it is perfectly poisonous. The walls are covered with filth. If a bed is ever found, it is always filthy, and made up of foul and rotten straw. It is covered with a coarse and dirty rag, the colour or material of which can hardly be distinguished; it is a miserable thread-bare coverlet. The dirty and worm-eaten pieces of furniture and utensils are thrown about without any order; the closed windows scarcely allow any light to pass through their smoky panes, many of which are stuffed with paper, and (it will hardly be credited) they not unfrequently nail the window fast in order that it may run no risk of being broken in the opening and shutting of it. The floors of their houses are dirtier than the rest of the house, covered with ordure, ashes, rotten straw, and all that has been brought in from the filthy streets outside; it is a receptacle for every kind of vermin. The air is no longer fit to breathe; one feels in these abodes stunned with an overpowering and horrible stench, a smell of excrement, filth of every kind, and of human beings. And the inhabitant of these abodes, in what state is he? His clothes are in rags, and tossed on. His hair has never known a comb, and is covered with the material with which he is working; and his skin, though filthy, is yet distinguishable on his face, but on the other part of his body, concealed by his rags, there are accumulations of every kind. Nothing is so fearfully dirty as the old and wrinkled of these demoralised creatures. Their abdomens distended, their limbs distorted, their backs bent forward, their legs twisted, their necks scarred and full of swellings, their fingers festered, their joints swollen and weak, and, lastly, these unfortunate creatures are tormented, we may say eaten up, with vermin of all kinds."

These descriptions were given by M. de Chambert, Boglli, Brigaudet, Kulman, and Themistocles Lestibuwers. I shall be excused for having given this long and disgusting extract, as it shows clearly what was the state and the evils which could call forth those general and loud complaints, and which made it a duty for government to take the matter into consideration. The whole picture is too wretched to be brought into the most distant comparison with the condition of the poorest of our workpeople, who are in general well fed and decently clothed, and show in the furniture of their cleanly-kept houses the fruits of their small earnings. They, together with their children, enjoy excellent health, and in general deserve the character of being a sober, industrious, orderly, tractable, and attached class. But a large population of workpeople, living entirely on the daily labour of their hands, wanting many things in external circumstances which, to the eye accustomed to luxury and abundance, are considered indispensable, under the continual pressure of strict regulations and continuous labour, is not a very enviable picture to the superficial observer, and often gives occasion to many unfounded lamentations and ill-timed apprehensions, if not to one-sided measures, which are, however, powerless against the stern necessity of supporting thousands of human beings, which are disturbing when they shake the established order of things, and are destructive when they make a happy and quiet class of workpeople discontented with their lot.

The cotton-works in Lower Austria, which are almost all situated within

a circle of a few miles around Vienna, employ about 10,000 hands, for whose accommodation solid and roomy dwellings have been erected for the most part at the same time as the works were established.

Most of the mills have not only a considerable number of dwellings for the married workers, but large, separate sleeping-rooms for the unmarried of both sexes, which are provided with beds, and lighted and warmed at the expense of the mill. When the larger and older mills were built, there was erected for the boys and girls a so-called children's house, in which, at that time, the children were provided at the expense of the mill with food, clothes, and instruction, and who were bound by certain regulations issued by the government, and were placed under the inspection of the respective clergyman and physician of the district. After the works were extended, they found they were obliged to give up these institutions; and they now drew the requisite number of hands, partly from the descendants of their own people, and partly from the children of the country people, who, in the course of time, becoming informed as to the condition of the children in the factories, send their own children after they are too big for home employment and to go to school, to work in the mills for a certain number of years; after which, however, they generally return to their agricultural labour. On the confines of Hungary, on a Sunday evening, hundreds of young, robust, and healthy workpeople, carrying with them the provisions for the week, may be seen coming to the mill, whence, on the Saturday evening, they may be seen going in merry groups carrying their wages back to their own homes. For these, and all who do not live with their parents, decent and proper rooms are provided, sometimes in that which used to be the children's house, or in other places equally under inspection.

The employment in cotton mills, and more especially of the children, requires attention, and a certain quickness or sleight of hand more than any bodily exertion. The whole of the hands are employed in roomy and light apartments, which in summer are well ventilated, and in winter warmed with great regularity, and there is nothing in the material, nor in the processes of the manufacture, which can be injurious to the health. The hours of work, which are generally from four to five in the morning to seven or eight in the evening, are interrupted by three meal-times; and on Saturday the mill is closed from three to four hours earlier. The weekly wages of boys and girls are from 3 to 5 florins, and those of the adults from 6 to 18, besides a house free; and it is not only sufficient for their wants, but gives them also the means of laying by a little saving, examples of which are not unfrequent.

Under these circumstances the health is not, and cannot be, anything else than extremely good; the large number of old who are still robust and in employment, the experience and evidence of all the physicians who practise amongst the mill population, the result of the reports of the district physician, but above all, the healthy state they were in during several epidemics, and also the small proportion of deaths as seen in the parish register, all afford the most striking evidence of the fact of their healthiness. Every noxious circumstance must undoubtedly bear with it the traces of its evil; street riots, mobs of workpeople, and excesses of all kinds, breaches of the law and criminal acts, numerous and open concubinage, large numbers of illegitimate children (in many manufacturing towns amounting to one-fourth of the whole births), and, lastly, the large numbers of entirely destitute and disabled workpeople who seek for assistance from the parish and from all charities; these are the melancholy signs which mark in England and France the state of the manufacturing population.

In the course of 40 years, during which the Austrian manufactures have arisen so near to the capital, and have been well watched by the police, such moral and physical deterioration of so large a population could not have escaped notice; but I ask where are those incontrovertible signs which an hospital or a workhouse more frequently attended or applied to by the mill

population than by any other poor class of the community would be? where are those prevailing diseases? where is the increased mortality? and, lastly, where are the traces of moral and mental degradation? Certainly it would be unjust to throw the stone at those who have linked with the unavoidable demands of business circumstances which might be measured by the scale of a more fortunate and independent existence.

Dr. Mauthner states, "that the weakness of the body and constitution of the children employed in the great cotton-works in the neighbourhood is very striking.

"1st. That the race of men employed in those establishments is much less robust than that of the peasantry of the neighbouring villages.

"2nd. That bauchscropheln and scrophuleuse consumption are not uncommon; that inflammatory diseases are very rare.

"3rd. That premature old age and early death is the common fate."

Even supposing that since the establishment of the spinning-works there could have been created a peculiar race of people, still the supposition could not prove more than that the constitution of the workers had been modified by their employment and their mode of living, since experience shows that the duration of life is not shorter than that of the other working classes.

2dly. That the above-mentioned diseases principally affect children of the earliest age, the former about the fifth year, the last about the seventh year; and that it is to be premised that the children who never work in the mill before their ninth year, come sometimes with the disease already developed upon them. The children of the mill hands are, indeed, less attacked by this disease than the children of the poor agricultural labourer, because they are generally better housed and clothed than these. That inflammatory diseases seldom appear is no sign of a weak constitution, since, on the one hand, these seldom appear amongst children; and, on the other hand, they do show themselves amongst the adults, whenever there are external influences and inducing circumstances to produce them; and all the physicians practising in the cotton-works agree in stating that, with the exception of rheumatic affections, there are no peculiar forms of disease amongst the cotton-spinning population.

3rdly. As to the statement of premature old age and early deaths, it is one which is contradicted by all the experience of half a century. The registers of deaths made by the clergymen of the parishes give the most exact information as to the proportion of deaths. The results of these are,

1st. That the number of deaths, especially amongst the manufacturing people, is proportionally less than amongst the agricultural labourers;

2nd. That, as amongst other classes, the deaths are the most numerous of children under two years;

3rd. That between the age of 12 and 16 there are the fewest deaths;

4th. That there are a great many between 60 and 70.

The means proposed by Dr. Mauthner for obtaining a better physical and moral state are,

1st. Shortening the hours of labour;

2ndly. Interrupting the hours of labour by school instruction: on both which points there could be no discussion, since these are already provided for by the law.

With regard to the long working hours, which certainly appear very oppressive to the unemployed spectator, long habit has accustomed the workers to them, and they do not produce any perceptible injury, more especially as the people are paid in proportion to the time they are employed. It is to be remembered that there remain eight hours for rest, none of which are spent in going and coming to their homes, as is the case in other countries, as, for instance, in Mulhausen, where one-third of the workers live from one to two miles from the mill.

It is not during the hours of well-regulated and orderly employment that there is any danger of demoralization, but during the leisure hours.

Villermé, in his valuable work on the *Etat Physique et Morale des Ouvriers*, states that the moral and physical deterioration of the manufacturing class in Rheims, where they only work from 10 to 12 hours, is most striking. The hours of work being ended, the people fill the taverns and the streets with prostitutes, whilst the workers from the numerous manufactories of Sedan, who work 15 hours, are sober, moral, and orderly. He mentions also that few manufactories employ so many robust hands as the spinning works at Sedan.

3dly. To employ more than one spinner to attend to a new spinning machine which turns a greater number of spindles.

It would in general be well to trust to the manufacturer the number of workers he should employ, as his interest compels him to use a requisite number of hands. In this particular case it ought to be stated that, owing to the progress of machinery, the spinner having 800 or 1000 spindles has less labour than formerly, when he had only 300 spindles to attend to.

4thly. That the children, and mill hands generally, should be kept in good order, by sick funds and savings' banks.

In most works there is established a kind of sick fund, to which each hand contributes weekly from 1 to 2 *kr.* for every guilder they earn; or there are voluntary contributions to those who are invalided; or, lastly, when they receive medical advice gratis, they have this fund to expend in medicines. If this fund is sufficient to assist the sick, it is not enough to support those in old age, and they must of necessity depend on that help which they are entitled to as being the fathers of families; and indeed every country mill can count many families amongst the workers in which an aged father or mother is supported by their children.

The formation of regulations, binding on all and applicable to all cases, as to the employment of children in mills, together with all other regulations which affect the internal arrangements of a manufactory, is incontestibly attended with many difficulties, and indeed one might say with insuperable obstacles. French legislation has employed itself three years with this object. The law has appeared, and we have read it in our public journals. In the leading principles it does not seem to contain anything but what has been in practice in Austria for many years, though of our proceedings in regard to minute details may be said what the minister of finance prognosticated in the Chamber of Peers on the 31st May, 1837, when he said, "At different times government has felt the necessity of a similar law. It has occupied itself with it, and made every inquiry on the subject, but the law itself presents extreme difficulties: many countries have attempted one; England has even passed a law on this subject, but it is not observed."

The interests of the children, it is repeated, have been protected by the regulations issued by the government of Lower Austria, the last of which were issued on July 16, 1839. For the moral and mental development of the labourer in general there is only one great panacea: this lies in the extension of trade, in the security and steadiness of employment, and in the power of the labourer to maintain himself and his children comfortably and respectably with the work of his own hands.

It is to be hoped that our manufacturers will progress in the gradual and prudent course which is equally removed from stupid and blind adherence to old things, as from the spirit of hasty imitation and the headlong pursuit of novelties. We shall then not have to fear the creation of a dissolute and depraved class of workpeople, as we see in other countries. For the rest, trust to the wise care of our government—trust to the sound sense and excellent disposition of our labourers—and, above all, trust something to the humanity and to the opinions of the manufacturers of Austria themselves.

Remarks on the Cotton Manufactory in Schwadorf.

There is here, under the superintendence of the master of the works, a sick-fund for the workpeople, to which every man, woman, and child together must contribute 1½ *xr.* kreutzer for every guilder they receive in wages; for this they obtain not only for themselves, but also for the members of their families who do not come to the mill (such as the little children and the mothers), gratuitous medical advice and medicines; and, further, the *men*, when they are prevented from coming to the mill by sickness, receive a 12-kreutzer per day.

The number of hands is on an average 170 men, 220 women and adult girls, and 160 children; total, 550 individuals.

The amount of contribution to the relief-fund was, in

1839	f.380·4	per day	62 *xr.*
1840	f.410·56	„	67 *xr.*

Though on an average from five to six men of the 170 employed are prevented from coming to their work, yet of these there are *four* who have received support from the fund, on account of the infirmities of age and incurable diseases, for many years; so that, on an average, there is only from one to two who are prevented from coming to their work by sickness.* A part of the above-mentioned 550 mill hands live in the adjacent district; these, when they cannot come to the medical man belonging to the factory, are attended by the surgeon of the district; but then, on the other hand, there must be set against these the members of the families who do not work at the mill, as above-mentioned, and which are about equal in number. Indeed, the number of those coming for medical advice of the factory physician, and to which the following tables relate, may be from 600 to 700. The total population of Schwadorf is about 1700, of which, on an average of the last 10 years, according to the parish register, 62 died annually. Of these, according to the register kept by the factory physician, only 13, on an average, were from the mill population; at least, as it appears in the last seven years, during which the present physician has attended.

	Attended.	Died.
1834	1211	23 (N.B. Cholera.)
1835	852	10
1836	653	15
1837	540	14
1838	394	12
1839	298	6
1840	345	10
	4293	90
Average . . .	617	13

* Supposing the number to be 1½ daily out of 170, that would give little more than half a week's sickness yearly to each individual employed. This is a very low average. The sickness found to prevail in ordinary times amongst the labouring population of two parishes in Westminster was at the rate of between 5 and 6 days to each individual. The sickness of the Metropolitan Police is 10½ per annum to each individual. The proportionate mortality of 13 annually out of 550 is 1 to 42, which it will also be perceived, on reference to the standards previously given, is a low proportion of mortality for a manufacturing population.

A Special View of the state of Sickness in the years 1839, 1840.

Diseases.	Treated.								Deaths.							
	1839.				1840.				1839.				1840.			
	Men.	Women.	Children.	Total.	Men.	Women.	Children.	Total.	Men.	Women.	Children.	Total.	Men.	Women.	Children.	Total.
Inflammation and consumption. .	10	17	10	37	35	19	10	64								
Nervous fever . .	19	4	..	23	8	9	..	17	..	..	..	..	1	..	..	1
Diseases of the first class	23	25	7	55	34	18	19	71								
Chronic disease of the skin . . .	15	11	5	31	12	9	14	35								
Bleeding and other cleansings : .	5	16	3	24	3	13	..	16								
Swelling of the scutiformed glandule	..	10	..	10	..	6	..	6								
Consumption : .	..	2	..	2	..	2	..	2	..	2	1	3	..	2	1	3
Spasms or convulsions	..	15	6	21	1	10	10	21	1	..	1	2	..	..	2	2
Green sickness. .	..	20	..	20	..	30	..	30								
Rheumatism . .	5	7	..	12	4	6	..	10								
Worms	3	2	22	27	..	3	20	23								
Water in the head.	..	..	4	4	..	..	14	14	..	..	..	..	..	..	3	3
Scrofula : . . .	..	..	2	2	..	..	3	3	..	..	1	1	..	..	1	1
Sundries. . . .	5	11	2	18	..	20	..	20								
Total . .	83	143	70	298	100	145	100	345	1	2	3	6	1	2	7	10

Although the number of deaths only includes those who lived in the village of Schwadorf itself, yet under the "treated" are included also all those from the neighbourhood whose illness was not too great to prevent them coming to Schwadorf for medical advice. It further ought to be remarked upon the apparently large number of cases of sickness, that as the people have medical advice and medicine gratis, that they come for it on the slightest illness, and the more so as not only the master of the works but also the physician encourages them as much as possible to do so, convinced that in most cases, by timely aid, more serious illnesses are prevented. Lastly, it is to be understood that these memoranda or notices have not been made for any special object, but only for our own information.

Remarks on the Factories in Neunkirchen.

1. *Screw Works.* There exists in connexion with this mill a sick-fund, in which, however, the hands dwelling out of Neunkirchen do not participate. Those who live in Neunkirchen pay to this fund weekly 1 *xr.* for every guilder they earn as wages. They receive for this medical advice and medicine gratis; and if they cannot come to work, the following relief, namely, (those under Wr. Wf. fl. 4½ weekly wages have nothing)

From fl. 4½ to 6 . . . daily 20 *xr.* W. W.
6 to 9 . . . „ 24 „
Over 9 . . . . . „ 30 „

Those Croatians who live in their houses do not receive any quota from the sick-fund, but are, of course, attended. As to those who are out of the district, they also receive medical advice gratis, if they can come to the factory physician, even though they do not contribute to the sick-fund. Only few have families, but these also, in case of sickness, receive medical assistance.

The number of hands varies considerably from 200 to 300; on an average about 250; of these may be,

Men and adults 180
Women 20
Children from 13 to 17 years 50

The total contribution to the relief-fund was, in the

Year 1839, W. W. fl. 190·48, or 31 *x.* per day.
1840, „ 250·50, or 41 *x.* per day.

Also on an average one or two individuals could not work on account of illness.

To both the spinning works of Herrn von Eltz and Herrn Roulet there is attached a sick-fund, the exact rules of which I am not acquainted with. In the print-works of Dubois, Dupasquier, and Co., the printers have a sick-fund amongst themselves, out of which the hands in work assist those who are unable to work, according to the circumstances. Since the hands in the screw-works are not, like the spinners, a steady, fixed class of workers, but a more fluctuating class, since it often happens that members of the same family are employed in different factories, and it is difficult to separate into heads the number of individuals who have received medical aid; the annexed table for 1840 will give a tolerably correct view of the state of sickness in the various works, only with regard however to the numbers working, leaving the other members of the family out of consideration. It is to be observed here, that the physician by whom these statements have been drawn up is appointed exclusively to the screw-works and the two spinning manufactories. The hands from the print-works go also to other physicians, of whom there are several in Neunkirchen; hence is explained the apparently small number of persons from the print-works who have received medical aid from him.

	Screw works of Brevillier and Co.	Spinning works of Frid. Eltz and Carl Roulet together.	Print works of Von Dubois, Dupasquier, and Co.
	About 180 men	160 men	180 men
	20 women	200 women	90 women
	50 children	150 children	90 children
	250 persons.	510 persons.	360 persons.
In 1840, having received medical treatment:			
Catarrh . .	14	30	8
Rheumatism .	88	40	20
Gastric . .	12	25	4
Intermittent fever	5	16	3
Nervous fever.	3	10	3
Inflammations	16	36	10
Various diseases	17	36	8
Scrofula . .	0	8	0
Accidents . .	7	12	4
	92	213	60

Deaths in the screw works . . 1 man, tubercles in the lungs.
Ditto ditto . . 1 man, inflammation of the lungs.
Ditto spinning works . 1 man, tubercles in the lungs.
Ditto print works . . 1 man, apoplexy.
Ditto ditto . . 1 man, fatal accident.

5 men.

A Tabular View of the Deaths in the various Spinning Manufactories, as a means of comparing them with the Deaths occurring in the rest of the Population, taken from the Registers of Deaths in the under-mentioned Parishes.

Year.	Parish.	Total Population.	Deaths.	Proportion of Deaths per Cent.	Spinning Works.	Mill Population.	Deaths.	Proportion of Deaths per Cent.	Age of Death of the Mill Population. Under 3 years.	Between 3 and 6 years.	Between 6 and 9 years.	Between 10 and 14 years.	Between 15 and 18 years	Between 19 and 25 years.	Between 26 and 30 years.	Between 32 and 36 years.	Between 38 and 40 years.	Between 41 and 44 years.	Between 45 and 47 years.	Between 50 and 54 years.	Between 55 and 58 years.	Between 60 and 64 years.	Between 65 and 69 years.	Between 70 and 75 years.
1840	Günselsdorf .	1,500	48	3.2	Teesdorf . .	700	21	3.0	9	..	..	1	1	..	..	2	1	1	..	1	1	2	1	1
1840	Pottendorf . .	4,000	157	4.0	Pottendorf . .	1,200	42	3.5	13	4	3	3	5	6	4	1	1	..	..	1	..	..	..	1
1840	Pottenstein .	3,000	111	3.7	Fatnafeld . .	500	19	3.8	11	1	..	..	3	..	..	1	..	..	..	..	..	..	1	2
During 10 years	Schönau . .	860	354	4.1	Schönau . .	300	132	3.4	46	6	5	23	7	12	2	4	2	5	4	3	2	4	4	3
During 10 years	Sollenau . .	750	288	3.8	Sollenau . .	360	115	3.2	59	1	8	5	5	6	3	5	2	2	6	..	3	6	2	2
The average of 7 years . .	Schwadorf .	1,700	62	3.7	Schwadorf . .	550	13	2.3																
During 2 years	Steinabürkl .	640	33	2.5	Steinabürkl .	394	16	2.0	13	..	1	..	..	..	1	..	..	..	..	..	..	1		
During 2 years	Teresimfeld .	1,200	78	3.3	Felydorf . .	700	28	2.0	19	..	..	2	..	1	2	2	..	..	..	1	..	1		
	Total . .	13,650	1,131	3.8	. .	4,704	386	3.3	170	12	17	34	21	25	12	15	6	8	10	6	6	14	8	9

23.—*Typhus Fever, the vast amount of, produced among the Poor of Liverpool from want of Ventilation and Cleanliness.*

The typhus, or low contagious fever, prevails in all large cities and towns to a degree that those are not aware of who have not turned their attention to the subject, or whose occupations do not lead them to mix with the labouring poor. In Liverpool it has been supposed that this disease is seldom to be met with; and it is certainly true, that the upper classes of the inhabitants are not often subjected to its ravages. When the extent to which it is constantly present among the poor shall be proved by authentic documents, this circumstance will serve to demonstrate the narrow sphere of the contagion, and to show how much it is within the limits of human power to lessen the frequency of the disease.

Of the inhabitants of Liverpool, it is ascertained that about 9500 live in cellars underground, and upwards of 9000 in back houses, which in general have an imperfect ventilation, especially in the new streets on the south side of the town, where a pernicious practice has been introduced of building houses to be let to labourers, in small confined courts, which have a communication with the street by a narrow aperture, but no passage for the air through them. Among the inhabitants of the cellars and these back houses the typhus is constantly present; and the number of persons under this disease that apply for medical assistance to the charitable institutions, the public will be astonished to hear, exceeds, on an average, 3000 annually. For the ten years preceding 1797, there were, on an average, 119 patients ill of fever constantly on the books of the dispensary. Of convalescents, unfit for labour, the average number will be nearly as great. Thus, in Liverpool, 240 of the poor may be considered as constantly rendered incapable of earning their subsistence by this single disease; and as the poor seldom lay up any part of their earnings for a season of sickness, the expense of their maintenance must, in one form or other, fall on the public. If we take this as low as 10*l.* for each, it will amount to 2400*l.* annually.

Though the cure of this disease is a principal object of our charitable institutions in Liverpool, it is to be lamented that hitherto little or nothing has been done for its prevention. The infection arises from a want of cleanliness and ventilation, and its influence is promoted by damp, fatigue, sorrow, and hunger. A vigilant exercise of all the means of prevention might, in a short period, supersede the use of hospitals, by extinguishing the disease; a prospect in which the philanthropist might more safely indulge, if he could calculate with the same confidence on the wisdom as on the power of his species.*

24.—*Extract from Dr. Ferriar's Advice to the Labouring Classes in Manchester; given in* 1800.

Avoid living in damp cellars; they destroy your constitutions and shorten your lives. No temptation of low rents can counterbalance their ill effects. You are apt to crowd into the cellars of new buildings, supposing them to be clean; this is a fatal mistake; a new house is always damp for two years, and the cellars which you inhabit under them are generally as moist as the bottom of a well. In such places you are liable to bad fevers, which often throw the patient into a decline, and you are apt to get rheumatic complaints, that continue for a long time and disable you from working.

If you cannot help taking a cellar, be attentive to have all the windows put in good repair before you venture into it, and, if possible, get it whitewashed. If you attempt to live in a cellar with broken windows, colds and fevers will be the certain consequences.

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* Dr. Currie's Medical Reports, chap. xxii. Liverpool, 1797.

In many parts of the town you sleep in back rooms, behind the front cellar, which are dark and have no proper circulation of air. It would be much more healthy to sleep to the front; at least when you have large families, which is often the case, you ought to divide them, and not to crowd the whole together in the back cellar.

Keep your persons and houses as clean as your employments will permit, and do not regret the loss of an hour's wages when your time is occupied in attending to cleanliness. It is better to give up a little time occasionally to keep your houses neat, than to see your whole family lying sick in consequence of working constantly without cleaning. It would be of great service if you could contrive to air your bed and bed-clothes out of doors once or twice a-week.

Always wash your children from head to foot with cold water before you send them to work in the morning. Take care to keep them dry in their feet, and never allow them to go to work without giving them their breakfast, though you should have nothing to offer them but a crust of bread and a little water. Children who get wet feet, when they go out early fasting, seldom escape fever or severe colds.

* * * *

You health will always be materially injured by the following circumstances:—living in small back buildings, adjoining to the open vaults of privies; living in cellars where the streets are not properly soughed or drained; living in narrow bye-streets where sheep are slaughtered, and where the blood and garbage are allowed to stagnate and corrupt, and perhaps more than all, by living crowded together in dirty lodging-houses, where you cannot have the common comforts of light and air.

It should be unnecessary to remind you that much sickness is occasioned among you by passing your evenings at ale-houses, or in strolling about the streets or in the fields adjoining to the town. Perhaps those who are most apt to expose themselves in this manner would pay little attention to dissuasive arguments of any kind; however, those who feel an interest in your welfare cannot omit making the remark.

25.—*Principles of Jurisprudence and Responsibility for Accidents.*

(Extract from the First Report of the Commissioners of Inquiry into the Labour Children in Factories.)

From the evidence collected, it appears that in many of the mills, numerous accidents of a grievous nature do occur to the workpeople. It appears also that these accidents may be prevented, since in some mills where more care of the workpeople is in general displayed they are prevented. It appears further, that whilst some manufacturers liberally contribute to the relief of the sufferers, many other manufacturers leave them to obtain relief from public bounty, or as they may.

The refusal to contribute to the expense of the cure of those who have been maimed is usually founded on the assertion that the accident was occasioned by culpable heedlessness or temerity. In the cases of the children of tender years, we do not consider this a valid defence against the claim for contribution from the employer. We cannot suppose an obligation to perpetual caution and discretion imposed on children at an age when those qualities do not usually exist. The indiscretion of children must, we consider, be presumed and guarded against as a thing that must necessarily, and to a greater or less extent, be manifested by all of them.

But the accidents which occur to the adults, are of themselves evidence (unless they were wilfully incurred in a state of delirium) that the individual used all the caution of which he is capable; as it may be presumed that the loss of life or limb, or the infliction of severe pain, would rarely be wantonly incurred.

Some of the manufacturers have proposed that the inspectors, who they think ought to be appointed to insure compliance with any legislative regulation, should have power to inspect the factories, and direct what parts of the machinery should be fenced off, and that after such directions have been complied with, the manufacturer should be relieved from further responsibility.

We concur in the proposition for giving such power to inspectors, but we do not concur in the proposal to relieve the manufacturer from responsibility.

We apprehend that no inspector would probably be so fully conversant with all the uses of every variety of machinery as to be acquainted with all the dangers which may be provided against; and also, that whilst there is much machinery which does not, from its nature, admit of its being boxed off, there is much that could not be made entirely safe without the reconstruction of whole manufactories.

Excluding from consideration the cases of culpable temerity on the part of the adults, and assuming that the aid to be given when accidents do occur shall afford no bounty on carelessness, the cases which remain for provision are those of adults which may be considered purely accidental. Taking a case of this class, where mischief has occurred in the performance of the joint business of the labourer and his employer; the question is, by which of these parties the pecuniary consequences of such mischief shall be sustained.

We conceive that it may be stated, as a principle of jurisprudence applicable to the cases of evils arising from causes which ordinary prudence cannot avert, that responsibility should be concentrated, or, as closely as possible, apportioned on those who have the best means of preventing the mischief. Unless we are to impose on the workman the obligation of perpetual care and apprehension of danger, the nature of the injuries inflicted are of themselves evidence that all the care which can be taken by individuals attending to their work is taken by them; it is only the proprietor of the machinery who has the most effectual means of guarding against the dangers attendant upon its use.

If such an extent of pecuniary responsibility for the accidents which are incidental to the use of the machines is imposed upon him, those consequences will be more likely to be taken into account, and to be guarded against at the time of the erection of the machinery. The workmen are not prone to regard immediate dangers, still less dangers which are remote and contingent, and many of the accidents are of a nature apparently too uncertain to form data for insurance. It could hardly be expected that a workman in entering a manufactory should object that any portion of the machinery is dangerous, and that it ought to be boxed off. But the proprietor of the machine is necessarily the person who can best foresee all the consequences incidental to its use, and can best guard against them. By throwing upon him a portion of the pecuniary responsibility for those mischiefs, we combine interest with duty, and add to the efficiency of both.

If the pecuniary consequences from unavoidable accidents were considerable, the imposition of the proposed responsibility may be met by the master, or by a deduction from the wages. Considering the defective nature of most existing modes of provision against sickness and casualties by benefit or friendly societies, and also, unhappily, the large proportion of those who, from improvidence, do not take advantage of these or other means, (of which some portion of the working-class avail themselves in so exemplary and admirable a manner), if we were to devise a form of insurance against the casualties in question, available to all classes, we should recommend that measures should be taken to secure from the master the regular deductions of the amount of the contribution of the persons employed.

We propose that in the case of all accidents whatsoever from machinery occurring to children under fourteen years of age, the proprietor of the

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machinery shall pay for the medical attendance on the child, and all the expenses of the cure, until medical attendance is no longer required; and also during the same period, shall continue to pay wages at the rate of half the wages enjoyed by the individual in question at the time of the occurrence of the accident.

We are of opinion that persons above that age, in all cases where the injury was received from accidents in the ordinary course of business, where there was no culpable temerity, should receive similar treatment at the expense of the employer, and should also be allowed half wages until the period of cure, as we believe that an allowance of full wages would occasion considerable fraud in the protraction of that period, especially in the cases of accidents of a less serious nature.

We think that the remedy should be given on complaint before a magistrate or the inspector.

With regard to fatal injuries occasioned by wilful negligence, we have at present no new remedies to suggest as substitutes to those afforded by the common law."

[In a recent case, I believe in Scotland, 300*l.* damages were recovered against the owner of an old mine for the loss of a child, which had fallen into it accidentally from the opening not being properly protected.

It is sometimes stated that the owners of mines already come within the principle, that they are interested in prevention, inasmuch as they incur loss from the stoppage of work and otherwise by accidents. The fact, however, of no exertions being made for prevention might be adduced as proof that the share of the loss was not sufficiently great, and the interest therefore inadequate; but it will generally be found that no share of the loss falls directly on the manager of the works, and that the pecuniary consequences are so far diffused over numerous partners as not to be felt, and that this is so particularly in works or machinery belonging to joint-stock companies.

In Prussia, as well as Austria, deductions are required by the law to be made from the wages of the men engaged in mining operations, which deductions constitute a sick-fund for the support of the men during ordinary sickness. The following is a translation of the articles of the Prussian code in respect to the responsibility now imposed on the owners for accidents to the workpeople in Prussia as in Austria:—

Art. 214. "The proprietors of the mines are bound to take care of the miners who are wounded or fall into bad health in their service.

Art. 215. "When the provincial laws do not contain any express provisions thereon, the person who works the mine shall pay to the sick or wounded workman four weeks' wages if the produce of the mine does not cover the expense of working, or if it be only just equal to it, or if it be required to defray the antecedent expenses of the mine; and when the mine produces a sufficient dividend, the workman shall be paid eight weeks' wages in case the illness lasts that length of time.

Art. 216. "If the illness lasts a greater length of time, the miner shall be supported out of the sick-fund.

Art. 217. "The expenses of medical treatment, and of burial of a miner wounded or killed by accident, shall be defrayed from the some fund.

Art. 218. "The widow of a miner has also the right to claim the gratuitous wages fixed by Article 215.

Art. 219. "The gratuitous wages granted to the miner in case of wounds or death are not allowed if the miner has killed or wounded himself with premeditation, or by any gross neglect, working otherwise than in the mine.

Art. 220. "If the wound or death has been occasioned by malice or the gross neglect of a third person, the latter shall indemnify the sick-fund and the proprietors of the mine."—E. C.]

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26. *Extract from the Report of John L. Kennedy, Esq., Barrister at Law, to the Commissioners for Inquiring into the Labour of Young Persons in Mines and Manufactories.*

In all the instances which I have met with of accidents occurring in coal-mines, as I have repeatedly stated, negligence forms an almost invariable element—negligence which is fairly assignable to one or other of the parties concerned in this branch of industry: either negligence on the part of the colliers, whether adults or children, in omitting those means of safety which are within their own control, or negligence on the part of the superintendent, or ultimately of the owners of the mines, in not providing the *means*, or duly regulating those means of safety, which are not within the discretion of any child or the control of the individual workman.

The children who are below the age of discretion are of course not to be deemed responsible for that which they have not to exercise; and unfortunately in the present state of education of the adult colliers, a large proportion of them are in the same category as children in respect to the want of discretion; and hence arises the first difficulty of any direct legislative interference for their protection.

Whatever detailed provisions might be laid down in any statute, or directed by any public officer acting under the authority of any statute, I can see no reason to believe that they would be adopted below ground by such a population.

For example; the safety-lamp is provided by most, and directed by all proprietors and underlookers to be used by the colliers; but, as we have seen, they habitually set aside the protection thus provided for them, though they do so under a penalty of maiming or death—and what more severe penalty could any statute impose or enforce with greater certainty? Education appears to me to be the slow and remote but complete preventive of those calamities arising from indiscretion. The efficiency of this remedy, the fact that ignorance and brutality are not essential to mining occupations, will, I apprehend, be shown by the comparative superiority of a better educated class of miners, namely, the Cornish miners and the lead miners of Lead Hills, Lanarkshire, who often, with less wages than the colliers of this district, attain a superior condition and are comparatively free from the like instances of indiscretion.

It will, however, be seen that there is a large class of accidents which comes within the control of responsible agents, and which would scarcely be within the control of the colliers, even if they had the discretion. For example, the sufficiency of the winding-ropes, guiders and side-rods, chairs, sliders, casing of the pit sides with brick and mortar, covers over the tubs to prevent coal falling on those ascending and descending in them, and the various other means of security in superior pit gearing, which, having been adopted in some mines with success, are demonstrably practicable, and no doubt ought to be used in all other similar cases.

But these practical measures appear to me from their number to be incapable of specification in any statute that could be discussed or tolerated in Parliament, if it should take upon itself the direction of mining operations, and they are apparently too numerous and important to be intrusted to the discretion of any public officer. Positive regulations by statute or under legislative sanction would, I apprehend, impede changes in machinery and in operations which are commonly beneficial to the whole class of the workpeople. In whatsoever mode such preventive regulations were prescribed, the enforcement of them would, I apprehend, imply an inspection by a public officer; from the nature of the places I should doubt the efficiency of such inspection. I doubt whether inspectors could be found who would faithfully descend shafts two or three times the depth of the height of St. Paul's, and amidst wet and damp and noxious gases crawl or

allow themselves to be waggoned through miles of dark drains and subterranean caverns, with the chance of the roof falling on them or being burnt by explosion, *to see that all was right*, and not act on the easy assumption that it was so.

I believe, in the course of my own performance of the disagreeable duty assigned to me, I became tolerably familiar with such places; but I could not but perceive that I might easily have been deceived, and was always at the mercy of the colliers themselves for the completeness of my information.

No familiarity diminishes the disagreeable duty of proceeding through low, hot, and damp galleries, bent with the chest on the knees, under the oppression of clothes damp with moisture or perspiration, which the inspector must endure.

Proprietors themselves, whose direct interest it is to be aware of what is going forward under ground, are obliged to depend for inspection on their underlookers or foremen, who have been colliers.

In a large proportion of accidents, especially those where the witnesses are themselves destroyed, it would, I conceive, be extremely difficult, if not impossible, to prove against underlookers or proprietors the neglect of proper precaution. For example, in explosions of fire-damp the air-doors are frequently blown to pieces, the waggons dashed to atoms, the roof brought in by collapse from the exhaustion of the air in the mine, and, in short, the position of everything so completely deranged that it would be impossible to arrive at any correct conclusion as to the state of things previous to the accident.

A boy is thrown out of a tub in ascending the pit-shaft by the chairs coming in contact half way, the chairs may or may not be broken, the body is found dashed to pieces at the bottom; if it so happen that there are no marks either on the chairs or basket to show that they have been in contact, no one would be so bold as to swear that it was so. Numerous cases of this nature might be cited.

It may be a question whether extensive remedies are not practicable by the application of the principle of concentrating responsibility on those who have the best means of prevention, by such self-acting arrangements as shall give them a direct interest in prevention. Coal-owners and the underlookers of collieries assume that all the accidents which are not caused by the negligence of the workmen themselves are absolutely unavoidable, and in the present state of their interest and knowledge I believe them to be sincere in their assumption. As evidence of its truth, and in justification, they may adduce the frequent return of verdicts of simply "accidental death" upon inquests before the coroners. Conceding most fully that a large extent of accident is an unavoidable and essential concomitant of this branch of industry, the question then arises, Why should not this branch of industry bear the whole of its necessary and unavoidable consequences?

The more this question is examined, the more I apprehend will it be found desirable that the full expenses of such accidents should be borne by that branch of industry in which they are created; in which case they will be borne either by those who, as producers, have the chief profits, or they will fall, as I apprehend they ought to fall, on the consumers.

The satisfaction of the pecuniary losses attendant on *personal injuries* from accidents, heavy and long continued as those losses are, will be found to be a consideration of minor importance to the *prevention* of the accidents; and, above all, the prevention of the degraded mental condition of the reckless population amidst which such accidents occur. By imposing the pecuniary consequences, not as penalties for omissions, which at present are really not wilful, but as a trade charge or *insurance* payable by the branch of industry liable to the accidents, an interest will be created in their prevention on the part of those who alone have the means of efficiently preventing them. Instead of a penalty in the expense to which they might

be put, they would thus have a perpetually acting bounty in the saving of every new improvement, and would be made the most efficient inspectors—having in every foreman and collier a superintendent in himself, gratis to the public.

It is a maxim of this district that manufacturers "only improve or adopt improvements upon threadbare profits." Under the bounty created by the just and necessary charge upon the mines of the insurance against accidents and calamities, it can scarcely be doubted that the coal-owners would find out and adopt improvements in working of which they are themselves at present unaware. They would, moreover, have an interest in the removal by education of that dense ignorance, constituting that state of mind out of which the acts of "indiscretion" or heedlessness, and the other daily acts which disturb the community, emanate. Even with the present adult colliers, they would have an interest in exercising such a preventive control as would be exemplified by a case in another branch of industry which I have cited in the section on Accidents in my Report on the Calico Print-Grounds—I allude to the case of the men who were employed in kyanizing logs of wood on the Bolton and Preston Railway. It would, of course, follow from the adoption of the principle of charging the costs of accidents as an insurance or trade charge on the employment, or on those who had the best means of preventing them—viz. the coal-proprietors—that they should be enabled to distribute the principle of self-insurance and responsibility on their underlookers and workmen.

I avail myself of an illustration of the operation of the principle of preventive legislation which appears to me to be applicable to cases of the nature of those which are the subjects of this Report.

Formerly convicts were transported in private vessels engaged for the purpose at a charge of a certain amount per head on the number *embarked*. The ships belonged to respectable merchants and owners; and on that responsibility which is supposed to attach to fair character and respectability the convicts were committed to their charge.

The interest which engrossed the mind of the shipowner, it may be presumed, was that of making the most of his vessels, and sending out a full cargo. No wilful oversight, still less any oppression, was perhaps imputable to the owners, the captains, or any one else: but still the fair profits of a good cargo could scarcely be expected to be sacrificed for the avoidance of any temporary inconvenience of convicts during a voyage; but somehow or other it happened that fever broke out, and that the mortality during the first voyages was dreadful—sometimes half the passengers were lost. I presume that the convicts were accompanied by officers of the Government; but the importance of ventilation was little known at that time, and even the King's ships were ravaged by scurvy, dysentery, and fever. The appointment of special inspectors for this purpose solely would possibly have mitigated the evil to some extent, perhaps to an extent to warrant the expense; but I believe it would have protracted amendment, and left untouched a large mass of evil.

At length, however, the form of contract was altered: instead of the shipowners being paid per head on the number *embarked*, they were only paid per head *on the number landed alive;* so that the shipowners lost by every person who died on the passage. This form of contract changed the whole face of things.

Attention, or the efficient stimulus of interest, was directed to the cause of the mortality: ventilation and other appliances were sedulously attended to; the merchant, at his own proper cost, provided a medical officer to take charge of the convicts, and the remuneration of that officer was proportioned to the number landed *alive*. The result was that the frightful mortality disappeared, and the voyages have generally been effected with a higher degree of health amongst the passengers, or with less mortality, than would perhaps have occurred amongst the same number of the same class

of persons living at large on shore.* The East India Company have also, I am informed, adopted the same principle in the payment of the medical officers who have charge of the transport of their troops. The same principle has been directed to be applied by the Poor Law Commissioners in the contracts for the shipment of pauper-emigrants for Canada; and I am informed that complaints and the cause of them have proportionably disappeared.

I am informed by a friend who has taken a great interest in the subject of the transport of emigrants, that a year or two ago the principle was overlooked in the transport of emigrants by the Government agent. Some vessels were chartered and officered by Government officers of the highest character; but fever broke out in those ships, and there was severe suffering; whilst the voyages of ordinary emigrant-ships, commanded by common skippers—people of no rank or consideration, but placed under a contract which made their interest coincident with humanity—made their voyages as any person of practical experience and observance of the operation of different interests might have expected.

I believe that the practical application of the same principle of legislation, viz. the concentration of responsibilty on those who may best find out and apply the means of prevention, would, in this important branch of industry, in which such numbers of young persons, and persons young in understanding and discretion, are employed, would be the most efficient preventive, and would, at the same time, give the owners and managers of collieries, at the outset, the least trouble, and ultimately a high degree of comfort.

I may here repeat, that it is observable in the district assigned to me, that the accidents from the breakage of rope are of rare occurrence in the deepest mines. The cost of a rope for the deeper mines is proportionably greater than for those of less depth. Not only, therefore, is the breakage of a rope a serious loss in itself, but the cause of still more serious loss from the interruption of the very extensive operations of the large mines to which they belong. It is a matter of fact, that greater care is bestowed on these expensive ropes and gearing, because it is the interest of those who are not always thinking about preventing *remote* accidents, but who are naturally and properly always thinking about *immediate* profits, to take care of them.

The responsibility implied by the proposed application of the principle for prevention, is a responsibility for exercise of care in their own business operations, which care can be exercised by them and no others, without interrupting and interfering with them in their business operations.

* Formerly the mortality on board convict ships amounted to 50 and even 60 per cent. during the voyage; under the more recent arrangements they have amounted only to about 1½ per cent.—E. C.

27.—*Tables of Sickness in Prisons.*

TABLE showing the Sickness experienced by 2,876 Prisoners committed to the Prison of Glasgow, from 1st January to 31st October, 1841, including 432 in Prison on 1st January, as compared with that of the East India Company's Labourers, and the Highland Society's Tables.

Age.	Females.					Prison of Glasgow.	Males.					Prison of Glasgow.	East India Company's Labourers.	Highland Society.		Prison of Glasgow.			
	Total No. of Prisoners	Daily Average No. of Prisoners.	Total No. of Days in Prison.	Average No. of Days in Prison.	Actual sickness Prison of Glasgow.	Average duration of Sickness per annum for every Female.	Total No. of Prisoners	Daily average No. of Prisoners.	Total No. of Days in Prison.	Average No. of Days in Prison.	Actual sickness, Prison of Glasgow.	Average duration of Sickness per annum for every Male.	Average duration of Sickness per annum for every Man.	Age.	Average duration of Sickness per annum for every Man, as shown by Tables of	No. liberated on account of Sickness.		Deaths.	
Years.				Days & Decimals.	Days.					Days and Decimals.	Days.	Days and Decimals.	Days and Decimals.	Years.	Days and Decimals.	M.	F.	M.	F.
Under 16	68	This cannot be given without immense labour, no register having been kept which readily shows the daily average of the various ages and sexes.	4,520	66·47	11	·87	267	This cannot be given without immense labour, no register having been kept which readily shows the daily average of the various ages and sexes.	20,428	76·50	66	1·17	..	21	4·0	..	..	..	..
16 to 21	317		23,575	74·36	61	·95	596		43,484	72·95	417	3·5	4·02	46	7·0	1	..	3	2
21 ,, 26	209		17,140	82·00	125	2·74	376		23,128	61·51	116	1·83	5·40	57	14·0	..	1	..	1
26 ,, 31	172		8,932	51·93	57	2·34	204		11,886	58·26	86	2·65	4·49	63	21·0	..	..	..	..
31 ,, 36	95		6,306	66·37	30	1·89	111		8,409	75·75	64	2·83	4·55	65	30·8	..	1	..	..
36 ,, 41	89		5,785	65·	21	1·5	93		4,813	51·75	12	9·	5·57	66	37·8	..	..	3	1
41 ,, 46	46		3,198	69·52	57	6·5	62		4,174	67·32	6	·49	5·18	67	46·2	..	..	..	..
46 ,, 51	45		1,813	40·28	7	1·38	37		1,195	32·29	7	2·16	5·43	68	56·0	..	..	..	..
51 ,, 56	24		1,530	63·75	9	2·19	26		1,156	44·46	25	7·9	6·80	69	63·0	..	1	..	..
56 ,, 61	7		1,731	247·28	40	8·	12		612	51·	4	2·3	7·21	70	70·0	..	..	..	..
61 ,, 66	5		45	9·	..	..	7		238	34·	4	6·	10·24	..	..	..	..	1	..
66 ,, 71	2		362	181·	60	·60	4		948	237·	..	..	9·93	..	..	..	..	1	..
71 ,, 76	..		..	..	..	..	1		14	14·	..	..	10·60	..	..	..	..	..	..
76 ,, 81	..		..	..	..	..	..		..	..	..	..	12·67	..	..	..	..	..	..
Total .	1,079	..	74,837	69·36	478	2·33	1,796	..	123,885	68·98	807	2·38	..	..	..	..	..	8*	4*

* Ten has been the average deaths, taking the last three years.

Dictary. { Weight.—First-rate, 24 ounces; second-rate, 30 ounces; third-rate, 36 ounces. Equivalent Total in ounces of wheaten bread. } { Cost on an average $3\frac{1}{16}d.$ per day, but taking the average of the last seven years, it cost exactly $2\frac{3}{4}d.$ per day. This is exclusive of fuel and cooking. }

TABLE showing the Sickness experienced by 2,889 Prisoners committed to the Prison of Edinburgh from 1st January to 31st October, 1841, as compared with that of the East India Company's Labourers, and the Highland Society's Tables.

Age.	Females.					Prison of Edinburgh.	Males.					Prison of Edinburgh.	East India Company's Labourers	Highland Society.		Prison of Edinburgh.			
	Total No. of Prisoners.	Daily Average No. of Prisoners.	Total No. of Days in Prison.	Average No. of Days in Prison.	Actual Sickness, Prison of Edinburgh.	Average duration of Sickness per annum for every Female.	Total No. of Prisoners.	Daily average No. of Prisoners.	Total No. of Days in Prison.	Average No. of Days in Prison.	Actual Sickness, Prison of Edinburgh.	Average duration of Sickness per annum for every Male.	Average duration of Sickness per annum for every Man.	Age.	Average duration of Sickness per annum for every Man, as shown by Tables of	No. liberated on account of Sickness.		Deaths.	
Years.				Days and Decimals.	Days.	Days and Decimals.					Days.	Days and Decimals.	Days and Decimals.	Years.	Days and Decimals.	M.	F.	M.	F.
Under 16	106	11·9	3,631	34·25	9	·90	216	41·9	12,752	59·03	43	1·23	..	21	4·0	..	..	..	..
16 to 21	420	49·2	15,060	35·85	25	·60	314	55·3	16,826	53·58	143	3·10	4·02	46	7·0	..	..	1	..
21 ,, 26	437	42·6	12,952	29·61	102	2·87	223	28·9	8,199	36·72	37	1·64	5·40	57	14·0	..	..	..	..
26 ,, 31	252	22·8	6,958	27·61	57	2·90	136	15·8	4,818	35·42	36	2·72	4·49	63	21·0	..	..	..	..
31 ,, 36	135	17·7	5,463	40·66	32	2·01	95	11·2	3,426	36·06	25	2·63	4·55	65	30·8	..	..	..	..
36 ,, 41	105	11·1	3,399	32·37	11	1·17	81	9·8	3,007	37·12	7	·85	5·57	66	37·8	..	..	..	..
41 ,, 46	47	4·3	1,327	28·23	30*	8·25	56	4·4	1,338	23·88	2	·51	5·18	67	46·2	..	..	..	..
46 ,, 51	60	7·5	2,294	38·23	6	·95	55	8·2	1,892	34·40	12	2·31	5·43	68	56·0	..	..	1	..
51 ,, 56	14	1·6	494	35·28	3	2·21	23	1·7	544	23·85	13	8·71	6·80	69	63·0	..	..	1	..
56 ,, 61	29	1·7	524	18·06	..	..	24	3·3	1,004	41·83	36*	13·09	7·21	70	70·0	..	..	..	..
61 ,, 66	9	1·2	386	42·88	..	..	19	2·2	683	35·94	8	4·27	10·24	..	..	..	..	..	..
66 ,, 71	11	1·1	339	30·81	..	..	8	·62	190	23·75	..	..	9·93	..	..	..	..	..	..
71 ,, 76	3	·23	70	23·33	..	..	3	·16	51	17·	..	..	10·60	..	..	..	..	..	..
76 ,, 81	5	·43	130	26·	..	..	3	·19	60	20·	3*	18·25	12·67	..	..	..	..	1	..
Total .	1,663	173·36	53,057	32·49	275	1·9	1,256	179·67	54,790	43·62	365	2·4	..	..	..	..	..	4	..

* I am of opinion that this Table does not afford sufficient data to warrant general conclusions being deduced from it after the age of 36, as the number of prisoners above that age is too small. In proof of this it may be stated that one person experienced 18 days' sickness out of the 30 days in the class from 41 to 46, and that another had 18 days' sickness out of the 36 in the class from 56 to 61, while in the class 76 to 81, one person experienced 3 days, being the whole sickness.

J. SMITH.

TABLE showing the Sickness experienced by 5,408 Prisoners committed to the Prisons of Salford from October 17, 1840, to October 16, 1841, as compared with that of the East India Company's Labourers, and the Highland Society's Tables.

Age.	Females.					Prison of Salford.	Males.					Prison of Salford.	East India Company's Labourers.	Highland Society.		Prison of Salford.			
	Total No. of Prisoners.	Daily Average No. of Prisoners.	Total No. of Days in Prison.	Average No. of Days in Prison.	Actual Sickness Prison of Salford.	Average Duration of Sickness per Annum for every Female.	Total No. of Prisoners.	Daily Average No. of Prisoners.	Total No. of Days in Prison.	Average No. of Days in Prison.	Actual Sickness Prison of Salford.	Average duration of Sickness per Annum for every Male.	Average duration of Sickness per Annum for every Man.	Age.	Average Duration of Sickness per Annum for every Man as shown by Tables of	No. liberated on account of Sickness.		Deaths.	
Years.				Days and Decimals.	Days.	Days and Decimals.					Days.	Days and Decimals.	Days and Decimals.	Years.	Days and Decimals.	M.	F.	M.	F.
Under 16	58	12·93	3,353	57·81	4	·44	542	89·52	32,690	60·31	69	·77	..	21	4·0				
16 to 21	279	37·52	13,701	49·1	372	9·91	1,072	155·2	56,671	52·86	623	4·01	4·02	46	7·0				
21 ,, 26	264	31·96	11,681	44·24	239	7·46	935	118·2	43,166	46·16	293	2·4	5·40	57	14·0	..	..	1	
26 ,, 31	185	26·69	9,748	52·7	409	15·31	590	78·07	28,507	47·67	182	2·33	4·49	83	21·0	..	..	..	1
31 ,, 36	120	17·33	6,329	52·74	316	18·22	371	43·39	15,847	42·71	135	3·1	4·55	85	30·8	..	..	2	1
36 ,, 41	90	8·49	3,238	36.	56	6·31	316	41·14	15,023	47·54	210	5·1	5·57	66	37·8	..	..	1	
41 ,, 46	58	9·98	3,647	62·89	213	21·31	170	19·98	7,298	42·93	55	2·75	5·18	67	46·2	..	..	1	
46 ,, 51	46	6·36	2,325	50·54	55	8·63	117	13·11	4,818	41·18	77	5·83	5·43	68	56·0	..	..	1	
51 ,, 56	17	2·83	1,034	60·82	..	..	75	9·42	3,443	45·69	51	5·43	6·80	69	63·0				
56 ,, 61	9	1·07	393	43·60	80	74·3	47	4·24	1,547	32·93	7	1·65	7·21	70	70·0				
61 ,, 66	4	·05	192	38·	29	55·13	20	3·08	1,127	56·35	83	2·67	10·24	..	..	..	..	1	
66 ,, 71	1	..	14	14·	..	..	9	·07	267	29·66	2	2·69	9·93	..	..	..	..	1	
71 ,, 76	..	..	30	30·	..	..	4	·27	101	25·25	..	..	10·60						
76 ,, 81	..	..	..	..	..	..	..	..	..	..	..	..	12·67						
Total .	1,132	155·21	55,635	49·37	1,773	11·6	4,276	574·53	210,505	49·23	1,787	3·098				...	..	8	2

28.—*Experience of Sickness in the Wynds of Edinburgh.*

TABLE showing the Sickness experienced by 334 Persons, from 10th November, 1840, to 10th November, 1841, in some of the Wynds and Closes of Edinburgh, compared with the Sickness experienced in the Edinburgh Prison, by the East India Company's Labourers, and by the Members of Benefit Societies, as shown in the Highland Society's Tables.

Age.	Females.				Males.				Highland Society.	Deaths.		Deaths.	
	No. of Persons.	Actual Sickness, Closes and Wynds of Edinburgh.	Closes and Wynds.	Prison of Edinburgh.	No. of Persons.	Actual Sickness, Closes and Wynds of Edinburgh.	Closes and Wynds.	Prison of Edinburgh.	Age.	Closes and Wynds.		Prison of Edinburgh.	
Years.		Days.	Average duration of Sickness per Annum for every Female.	Average duration of Sickness per Annum for every Female.		Days.	Average duration of Sickness per Annum for every Male.	Average duration of Sickness per Annum for every Male.	Years.	M.	F.	M.	F.
Under 12	12	98	8·1	..	6	21	3·5	..	..	1	..	..	..
12 to 16	19	244	12·8	·90	21	49	2·3	1·23	21	..	..	..	..
16 ,, 21	19	112	5·9	·60	19	98	5·1	3·10	46	..	..	1	..
21 ,, 26	18	273	15·1	2·87	7	77	11·0	1·64	57	..	2	..	..
26 ,, 31	23	215	9·3	2·90	16	133	8·3	2·72	63	..	..	..	..
31 ,, 36	12	133	11·0	2·01	17	70	4·1	2·63	65	..	..	..	..
36 ,, 41	30	199	6·6	1·17	19	287	15·1	·85	66	..	..	..	..
41 ,, 46	9	84	9·3	8·25	13	393	30·0	·51	67	..	1	..	..
46 ,, 51	11	477	43·3	·95	15	243	16·2	2·31	68	..	..	1	..
51 ,, 56	5	81	16·2	2·21	5	152	30·4	8·71	69	..	..	1	..
56 ,, 61	10	71	7·1	·00	9	385	42·7	13·09	70	1	..	..	..
61 ,, 66	5	56	11·2	·00	5	321	64·2	4·27	..	..	..	..	..
66 ,, 71	1	0	·0	·00	2	82	41·0	·00	..	..	..	..	..
71 ,, 76	2	365	182·5	·00	3	251	83·6	·00	..	..	..	..	..
76 ,, 81	1	35	35·	·00	..	..	..	18·25	..	..	..	1	..
Total .	177	2,443	13·8	1·9	157	2,562	16·3	2·4	..	2	3	4	..

29.—*Suggested Form of Notification to Owners or Occupiers for the distribution of the Expense of permanent Alterations, and the avoidance of Overcharges on persons enjoying only portions of the benefit.*

The Commissioners of Sewers appointed to superintend the execution of the Act of Victoria, passed for the protection of the public health, which requires that every inhabited tenement shall be provided with proper means of drainage, and cleansing, and the removal of refuse, have caused a survey to be made of the houses and tenements in—[court or street, as the case may be]. On this survey it appears that your house, with others in the same place, are without the requisites required by law; that they are without proper sewers, without drainage from the house, and without water or proper means for the constant removal of nightsoil, or conveniences for cleansing.

By the section of the Act the several requisites hereunder described are directed to be provided and completed within months after this date.

The Commissioners have directed tenders for contracts upon specifications to be taken for the execution of the required works, under a civil engineer, in the most beneficial manner and at the lowest cost.

They are also prepared to take loans on the security of the rates for defraying the expenses of the execution of the works contracted for.

It will be at your option either to repay at once the cost of the requisite works by which the property will be benefited, or to repay it by annual instalments in 30 year, paying 5 per cent. interest on the principal sum expended, or on that part of it that may, from time to time, remain unpaid.

To save the trouble and expense of a double collection, annual instalments and the interest on the principal sums expended will be collected from the tenant with rates. Where the landlord is under any agreement or obligation to cleanse the cesspools, the tenant will be entitled to deduct from the rent the charge for the drainage and apparatus for cleansing. Where the tenant pays rent weekly, or at shorter periods than quarterly, and does not pay rates, the charge for the works in question is required by the statute to be paid by the owner of the tenement, who will levy the amount with the rent, or make his own terms with the tenant for the improvement in question.

The cost of the required improvements or principal sum, which will be charged at the contract prices, together with the annual instalments and interest thereon, and the weekly charge or improved rent that may be due or charged on the weekly tenant, will be as follows:—

First Outlay per Tenement.	Annual Instalment for Repayment in 30 years.	Annual Interest, commuted at 5 per cent. on Outlay, charged as Rent on Tenant, and Annual Rent of Water.	Weekly Charge to the Tenant, or Increased Rent.
£. s. d.	s. d.	s. d.	s. d.
Water-closet, Water-tank, Drain . . 10 8 6	6 11	6 8	0 3
Main Sewer 5 12 0	3 9	3 6	0 1½
Water	..	5 0	0 1
Total . .	10 8	15 2	0 5½

If the landlord undertake to cleanse the cesspools, then the additional weekly charge on the occupier for the supplies of water and drainage will

be 2½*d.* weekly, involving, as the occupier should be informed, the conveniences, cleanliness, and security to health, and saving of medical expenses.

Persons having only interests in property for years or for determinate periods may, by means of the above table, distribute amongst the persons successively interested in the property the portions of the charge to which they are liable.

The surveyor and officers of sewers are charged with the duty of from time to time inspecting and seeing to the sufficiency of the means of drainage and cleansing. By the terms of the contract the contractor is bound to make good the drains for years, but the tenant will be liable to make good any wanton damage.

The Act gives to the owner of the beneficial interest in the premises the option of executing the prescribed works himself, on giving notice on or before the of such his intention, and entering into his surety to execute them within the time prescribed and according to the contract specifications, to the satisfaction of the officer charged with the superintendence of the work.

30.—*Extracts from Evidence on the Moral and Physical Evils which may be created by the mode of Hiring and Paying Workmen.*

(Extract from Evidence given before a Committee of the House of Commons.)

Charles Saunders.

What is your occupation?—Coal-whipper.

Have the goodness to state to the Committee the manner in which coal whippers are engaged and paid?—I have been in the habit of obtaining a living by coal whipping for the last 10 years, and when I want employment, (me and the likes of me of course,) I have to go to the publican to get a job, to ask him for a job; and he tells me to go and sit down, and he will give me an answer by and by. I go and sit down, and if I have 2*d.* in my pocket, of course I am obliged to spend it, with a view of getting a job; and, probably, when two or three hours have elapsed, by that time there is about 50 or 60 people come on the same errand to the same person for a job. He keeps us three or four hours there; and then he comes out, and he looks round among us, and he knows those well that can drink the most, and those are the people that obtain employment first. Those that cannot drink a great deal, and think more of their family than others do, cannot obtain any employment; those that drink the most get the most employment. When the men are made up for the ship, we go to work the next day morning, but we have to take what the publican calls the allowance, such as a quartern of rum, or three half-querterns, or a pot of beer, or what not; then they have to take a pot of beer off in a bottle on board,—what he calls beer, but not fit for a man to drink, generally speaking, what I call poison: I have actually teemed it overboard myself, before I could drink it; I could not drink it, although I have been sweating and as thirsty as a man could be, and have put it overboard, and gone and dipped my bottle in a bucket of water.

In the after part of the day, when your work was over, where did you go then?—Then, when we have done our day's work, we came on shore, and we had to go into the house again; and perhaps we might want a shilling or two to get our families a little support; the landlord would tell us to go and sit down in the tap-room, and he would give us some by and by, and he would keep us there until nine or ten at night; first, we would go for a pint or a pot, or what not, to see whether he was getting ready, for we dare not go empty-handed, without a pot or pint, or to call for something by way of excuse; after keeping us there until nine or ten at night, then he would give us 2*s.* 6*d.* or 3*s.*

Were you obliged to spend money in drink?—Yes.

Could you not avoid it by any means?—No.

What would have happened if you had refused to spend money in drink?—Then we could have no employment; and moreover than that, if you had had what you thought was requisite, if he did not think it was sufficient, he would add more than what you had actually contracted for; and if you refused to pay this, and you said, "I have not had but so much, I won't pay it." "Oh, won't you; if you do not, here is your money, what you say it is; go out, and never come in here again."

Have you known anybody refused employment because they would not contribute to the publican's demand for drink?—Yes, I could find 50.

Who have lost their employment because they would not drink so much as the publican wished?—Yes, I could.

Could you not engage yourself to the captain of the ship without going to the publican?—No, for the publicans are some of them ship-owners, and they are all intermixed through the trade by one thing and another, so that the captain or owner of the ship gives the favour to the publican to employ the whippers.

Mr. Claydon, *Master of the Limehouse Workhouse, belonging to the Stepney Union.*

With respect to the labouring classes, have you observed whether, with respect to any of them, these ill-regulated inclinations are subjected to unnecessary temptations?—The practice of paying men at public houses, and making the obtaining employment dependent in a certain measure upon drinking, which is the case with the coal-whippers.

Have you ever had occasion as respects the coal-whippers to investigate those cases?—We did at one period, having an opportunity, investigate upwards of 40 cases of coal-whippers.

Those were 40 applicants for relief?—The greater part of them were; 22 of them were in the immediate receipt of relief at the time the others were applicants.

What was the result in those cases?—We took their earnings over a considerable period, and we found that they had earned, taking the average, 18*s.* 10*d.* per week. The utmost we could make out that their families had received of that, in any shape, was 12*s.* 10*d.* per week. Whatever might have been their family, one-third of it had gone in drink and those charges which were brought against them.

Had any of those men earned more than that?—There were instances in which they had earned 20*s.* a-day.

And all came upon the pauper list just the same?—Yes, just as destitute as the rest, saving never seems to enter into their calculation at all.

Then with respect to this particular class, notwithstanding their earning wages twice as much as agricultural labourers earn probably, and which agricultural labourers save money, and are depositors in savings-banks, these men made no deposits, and no reserve, but the whole of them fall upon the rates. In one shape or other they receive the public charity, is that so?—Yes, in fact they have not the means possessed by other labourers, of pawning anything. I question whether you could find as much furniture in any one of their houses, as you could pawn for 2*s.* 6*d.*

Not even in those cases where they are earning a guinea a-day?—No, they are all alike destitute, and their families look as dirty and as filthy, and are as ill-governed, and their houses are as destitute of furniture as those who earn the smaller sums, there is no difference; and in case of sickness they come at once upon the parish, unless they sometimes assist each other a little; but, however, they have no certain means at all but the parish.

Their sicknesses are generally short. In most cases they are so ill prepared to bear sickness, that they are cut off very rapidly, and die comparatively young. I do not speak this from actual experience however.

Have you seen the cases of the widows, and the children coming in upon the parish?—Yes, we have 28 cases now. Our present numbers are 425 children, that is from the whole of the Union; there is only a small portion of the Union in the coal-whippers' district, but we have 28 children directly belonging to them, some of them legitimate, and others illegitimate; all of that origin that we know decidedly that they are the produce of those coal-whippers.

Are the same observations as to the causes of the pauperism of the adults to be taken as to the causes of the pauperism of the children?—Yes. The observation is universal. The children cannot have produced it themselves, but they have the same habits and the same proneness to indulge the appetites, in fact I think there is a remarkable deficiency in the consideration of most parents, in that matter, even of respectable parents; they let their children go to the confectioners and buy drams, for they are drams in another form, peppermint and cloves, and so on, made up into articles of confectionary, and nothing is so likely to produce a depraved appetite, the transition is so natural from that to ardent spirit.

With respect to the residences of those classes, the coal-whippers especially, have you observed whether you have had any cases of sickness arising from their state of filthiness, or traceable to it?—I do not know whether we can attribute it to that, but nothing can be more likely, although it is impossible to say, for the coal-whipper is very little at home, still nothing can be conceived more destitute, or more disgusting than their abodes.

What are the sorts of children you receive in the house from them with respect to training or education, that is, of those classes of coal-whippers?—They are completely uneducated; the generality of them are very untractable.

Allowed to run about wild?—Completely.

No care taken of them?—Not the ordinary care of cleanliness. I had three in last night, and notwithstanding all our anxiety after economy we were obliged to burn every rag of their clothes. To cleanse them was out of the question entirely; that is the case with half that come in to the workhouse.

Mr. Sargeant, the relieving officer of the same district.

Is it not your duty to visit the houses, and to inquire into the cases of applicants for relief? Yes, it is.

In doing so, you must trace the causes of the application for relief?—Yes.

What is the chief cause you find precede the application for relief?—Excessive drink.

In respect to those trammels which it is described that the coal-whippers are in, what is the consequence as to their households? how do you find, when you visit those cases, that their houses are provided?—I would rather sleep in my coal-hole than in any of their hovels. I went into six houses yesterday, each house contains four rooms, and in some of those houses there were 30 souls. In the least house there were 17.

How many sleep in the same room?—In one room there were four widows and two children, in the most wretched place imaginable.

Are quarrels between man and wife frequent?—Yes; through drink.

Are separations frequent? Yes; separations through drink on the part of the wife.

How many cases have you of wives separated from their husbands in the same way? I have had 15.

The wives, then, have imbibed the habits of the husbands? Yes.

Is there no cleanliness on a Sunday? Oh dear, no!

No attendance to church? No.

As to the children, what is their condition? The children of most abject wretchedness. Those poor children are sent out to scour the streets, to pick up and do anything else they can; and not particular to thieving.

What the condition of the girls?—The girls, when infants of seven years of age, are turned out into the streets with fruit and all sorts of things; when they arrive at the age of 14, go to stay stitching; then they sit in doors at home with their mother, and so on, until the age of 15 or 16, when they generally become prostitutes. I see it, because I am always amongst them. I have tried to get them to send those girls out to service, when they say, "Mr. Sargeant, what am I to do? my husband earns but little, I am obliged to depend upon what my daughter can do and myself."

Mr. Rooke, the relieving officer of St. George's in the East.

I know the poor population of our parish well. I know that a large proportion of the juvenile delinquents in our streets are coal-whippers' children; I have known some of them to be transported. I know also that the girls, who are coal-whippers' children, turn out prostitutes; it is seldom that any of them turn out to be good servants. Delirium tremens is a frequent complaint amongst the coal-whippers, and it sometimes extends to madness. There is one girl, for example, Margaret Harley, aged 25, the daughter of a coal-whipper, who, for the last 10 years, has always been either in a prison, in our workhouse, or the lunatic asylum; I do not believe that during that time she has been 10 months out of either of those places. I know a large proportion of the prostitutes in our district who, as the children of these improvident classes, have either been inmates of the house or otherwise chargeable to the public.

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