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BREAD, BAKEHOUSES AND BACTERIA

WALDO AND WALSH

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BAKEHOUSE LAW (*in preparation*).

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A Bacteriological Inquiry. Price 6d.

LONDON: BAILLIÈRE, TINDALL AND COX.

BREAD, BAKEHOUSES, AND BACTERIA.

REPRINTS OF VARIOUS PAPERS

BY

F. J. WALDO, M.A., M.D., CANTAB.,

MEDICAL OFFICER OF HEALTH TO ST. GEORGE'S, SOUTHWARK, AND TO THE INNER AND THE MIDDLE TEMPLE,

AND

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To

SIR GEORGE BUCHANAN, LL.D., M.D., F.R.S.,

LATE MEDICAL OFFICER OF THE LOCAL GOVERNMENT BOARD,

THIS LITTLE WORK

IS

RESPECTFULLY DEDICATED.

CONTENTS.

PREFACE.

THE bakehouse question has been long before the British public. Thirty-one years ago its solution was attempted by a special Act, and since then various efforts have been made to deal with the matter by legislation. At the end of 1889, the *Lancet* issued a special report of four articles which described bakeries in this and in other countries. Although a great improvement has been effected since the year 1863, there is still need for immediate and radical reform, not less in the interests of the maker than of the consumer of this important food-stuff.

Within the last three years the attention of the public has been once again pointedly drawn to the bad conditions under which the main part of their bread-supply is produced. We, the present writers, were in the first place interested in that inquiry because it affected the health of a large section of the community, namely, the journeymen bakers. Before long, however, it became evident that other and far wider interests were involved, by reason of the possible spread of disease germs in bread sent out

from unclean bakeries. We then commenced a series of scientific investigations, which have shown that many micro-organisms of dough survive the ordeal of the baker's oven. From that fact we argued that what was true of harmless might also be true of harmful or disease-producing bacteria.

Accordingly, at the Bristol meeting of the British Medical Association (1894) we announced our view that the origin of not a few mysterious septic invasions of the human body might eventually be traced to the agency of bread. Some six weeks later a paper appeared in the *British Medical Journal* from Surgeon-Major Rennie, who stated that he had traced two epidemics of typhoid fever in India to underbaked bread. This paper strengthened our previous surmise that the deduction as to the possible agency of bread in conveying disease might one day open up a fresh page in the history of preventive medicine.

It is hoped that the issue of these reprints in pamphlet form will present a bird's-eye view of the present stage of the bakehouse question to all who are interested in public health matters. In our present state of knowledge, to attempt any more extended treatment of the subject would be premature.

F. J. W.
D. W.

LONDON, *November*, 1894.

BREAD, BAKEHOUSES, AND BACTERIA.

I.

LONDON CELLAR BAKERIES.*

BY DAVID WALSH.

The Bakehouse Regulation Act of 1863 constituted the first attempt at any special legislation for the baking trade. Its object was to amend the unwholesome and often revolting conditions under which the bread supply of the larger towns was produced. It has been followed by other measures, but even now, in 1894, the state of not a few of our London bakehouses is a scandal and a disgrace. Quite lately, Dr. Waldo, the Medical Officer of St. George's, Southwark, has drawn renewed attention to the evils of underground or cellar bakeries. In a paper read before the Sanitary Institute, he estimated that at least one-half of the bread supplied to Londoners came from places that violated the first principles of sanitation. His position, as may be readily imagined, has been fiercely assailed by many of the bakers and their friends. The arguments against him have been summed up in an article published in the

* Reprinted (by permission) from *St. Paul's*, London, Sept. 7, 1894.

May number of the *New Review*, under the title 'The Truth about the London Bakeries.'

The writer of the article in question is the editor of a trade journal, the *Bakers' Times*. He admits that the state of some of the bakehouses is bad, and that unwholesome places of the kind should not be tolerated; that is to say, he agrees with two of the doctor's chief premises. At the same time he argues that Dr. Waldo's objections are based upon sentiment rather than upon reason; that the evils are grossly exaggerated; that the bad bakeries are few in number; and, lastly, that the existing law is sufficient to meet the requirements of the case. These assertions may, for the most part, be at once refuted by the following short summary of facts regarding the cellar bakery.

Broadly speaking, the underground bakehouse is the direct outcome of want of building space. It is not a specially-constructed workshop, but is made by fitting up the cellar of an ordinary dwelling-house with an oven and furnace, a few gas jets and a water tap, together with some shelves and kneading troughs. Such a place has all the attributes of a cellar. It is small, low, roughly paved, damp, dark, airless, and has the house drains in close contact with its walls and floors. When used as a bakery, the stagnant air of this small space is fouled with the waste products of the gas flames, of respiration, of fermentation, of the ovens, of putrefying dough and filth, and often with sewer-gas from untrapped sinks and drains. The atmosphere is further charged with poisonous fumes from the furnace, for the baker, in order to save fuel, closes the damper when his oven is hot. This effect may be rehearsed by the reader if he first gets up a good fire in his sitting-room grate, and then suddenly blocks the chimney by pulling down the register. Modern furnaces are provided with what is known to the trade as a 'sulphur flue'; that is to

say, a special outlet for the fumes when the damper is closed. The present writer, however, has been informed on good authority that, in ninety-nine per cent. of the London bakeries, this flue either does not exist or is worthless.

The environment of bread-baking, then, clearly demands a liberal allowance of breathing-space and the freest ventilation. As a matter of fact, the average cellar bakery breaks every law of sanitation, and presents a state of affairs that would not be tolerated for a moment in any other industry. To put the matter in another way: the larger half of the national output of bread-stuffs is prepared in premises that would not be passed as fit for slaughter-houses.

Many of the Metropolitan Medical Officers are of opinion that it is impossible, at any rate without the use of ruinously expensive mechanical means, to convert a cellar into a habitable bakery. Their chief reasons are, briefly, as follows: First, the want of light and air, which in a workshop invariably means filth. Secondly, the want of room, which leads, both directly and indirectly, to a number of evils, such as insufficient breathing-space for workmen; inside furnaces and ovens; the inclusion of ash-bins and sanitary conveniences, or, worse still, their absence; and to closure of air inlets, as a small chamber cannot be ventilated without draught.

The existence of intolerable evils in cellar bakeries has been proved over and over again in the police courts. Out of a total of twenty-three underground bakehouses in the district of St. George's, Southwark, the Medical Officer has proceeded against six of the worst. In two instances the premises were closed, one case was remanded, while in the three others the magistrates inflicted the full penalty. In a single Metropolitan district, therefore, serious defects have been proved in nearly a fourth of the cellar bakehouses. Again, Dr. Bate, Medical Officer of St. Matthew's,

Bethnal Green, states in his report for 1892 that, out of a total of 102 bakehouses in his district, he found seven only in what he should call a clean and satisfactory condition. These facts are directly opposed to the contention that the bad bakeries are few and far between.

It is not easy to get an exact statement as to the proportion of underground bakeries. The following figures, however, may be taken as tolerably correct:

	Above Ground.	*Under Ground.*
Western Districts:		
Kensington	8	120
Fulham	6	65
Chelsea	10	60
Hammersmith	17	40
Westminster (St. George's)	0	23
Total	41	308
Eastern Districts:		
Bethnal Green (St. Matthew's)	60	40
Shoreditch	55	38
Whitechapel	30	36
St. George's-in-the-East	11	20
Poplar	104	20
Total	260	154

These figures are from ten districts, taken at random from the East and the West Ends of London. They prove, in a striking way, that the cellar bakeries are far more numerous in the richer quarters of the town. The above totals show a rough average of 40 per cent. underground bakeries in the East End, as against 88 per cent. in the West.

The contention that there is no risk of spreading disease by bread, because all germs are destroyed in the process of baking, requires further examination. It is by no means

certain that the heat of the oven, which would undoubtedly kill most organisms, is sufficient to destroy their much hardier spores.* The subject is under scientific investigation; but meanwhile it is open to reasonable surmise whether epidemics may not, in some cases, be due to contaminated bread. Moreover, when the loaf is brought out of the oven into a foul bakery, its surface is exposed to any typhoid or other germ that may be at hand. In any case, the burden of proof to the contrary rests with the champions of the underground bakeries. Perhaps those gentlemen will kindly ponder over the above unpleasant contingencies with regard to germs. Moreover, since the well-being of the journeyman does not figure to any great extent in their literature, it may be well to ask their careful attention to the following object-lesson.

There can be no doubt that the health of the average journeyman baker is broken, and his life shortened. He is an old man at forty—thin, bloodless, often flat-footed, and a martyr to rheumatism; he is subject to asthma, bronchitis, and consumption, owing to the foul air and the extremes of temperature in which he works; he is liable to eczema and other skin diseases; and, in three cases out of four, is the victim of grave internal injuries from hauling about sacks of eighteen or twenty stone weight. In Dr. Ogle's mortality tables of a hundred different occupations, he comes third in suicide, seventh in alcoholism, eleventh in diseases of the liver, and twelfth in nervous affections. Some of his troubles, no doubt, arise from the nature of his employment, but it may be confidently asserted that the main part of them is preventible.

The question of the adequacy or otherwise of the existing

* Since this article was written it has been shown that micro-organisms in dough are not necessarily killed by baking. See paper, p. 28, 'Does Baking sterilize Bread?'

law to purge the bakeries may be dismissed in a few words. Speaking generally, it may be said that with a few additions and alterations the present machinery would be ample, but that the difficulty is to set it in motion. Medical officers have no fixed standards of wholesomeness, and their inspectors are overworked men, burdened with a host of harassing routine duties. Above all, sanitary bodies are slow to act; they are loath to prosecute rate-paying tradesmen, and there is hardly a vestry in London that does not include one or more influential master bakers among its members. It is obvious that the Medical Officer cannot act in opposition to the wishes of the vestry by which he is employed.

In this brief paper it has been pointed out that underground bakeries exist in large numbers in London, and that a considerable proportion of them are unwholesome; that in the opinion of competent authorities cellars cannot be converted into healthy bakehouses; that these underground workshops constitute a possible danger to the bread-consumer, and a very real one to the bread-producer.

Thirty-one years of tentative legislation has not sufficed to bring the baking trade within the grip of public health reformers. The time is now surely ripe for a searching Parliamentary inquiry, in order to stay the wanton waste of human life that is going on day by day in the cellar bakeries of this vast city.

II.

WHERE BREAD IS MADE.*

BY F. J. WALDO, M.A., M.D. (CANTAB.), D.P.H.

(*Read at the Sessional Meeting, February* 14, 1894.)

THE subject upon which I have been invited to address you covers so much ground that it would be hopeless to attempt to deal with it exhaustively within the limits of time allotted to this paper. I propose, therefore, to confine my remarks to the consideration of the hygienic aspects of bakehouses. At the same time, it may be broadly stated that many of the objectionable features met with in ill-regulated bakehouses are reproduced in bad kitchens.

After a prolonged consideration of this question, I have been forced to the conclusion that there is urgent need throughout the United Kingdom for inquiry and reform. Under the present system, the health of the workman often suffers, and in some instances the public health is also endangered. To remedy these evils, I would suggest (1) that inspection under existing statutes should be more systematic and complete; (2) that legislation is needed to extend the powers of local authorities to deal with all aspects of the bakehouse question. Further, I am of

* 'The Sanitation of Places where Food is Stored and Prepared.' Reprinted from the *Journal of the Sanitary Institute*, April, 1894.

opinion that a proper scheme of legislative action could be best initiated by a Select Committee of the House of Commons.

Too little attention has, I think, been devoted in the past to the wholesomeness of places where food is stored and prepared. Most practical sanitarians will agree with me that this neglect is likely to entail consequences more or less serious to the food-consumer, and in a still greater degree to the food-producer.

Turning to that portion of the subject with which I propose to deal more particularly, namely, the question of bakehouses, this attitude of general apathy is remarkable. In bread we have to deal with an article of prime necessity; it is the staple and essential factor in all dietaries, and every citizen is directly concerned in matters affecting its cost, its purity, and its methods of production. Under such circumstances, it seems hardly credible that, on a moderate estimate, one-half of the bread supplied to Londoners is sent out from cellar bakeries, or, in other words, is manufactured in underground places which violate the first principles of sanitation. This estimate, it may be at once acknowledged, is only approximate, as it is impossible to obtain anything like a comprehensive statement of facts and figures. In my own district of St. George the Martyr, Southwark, I find that out of sixty-seven bakeries, twenty-three are situated altogether, and nine partially in basements—a proportion which is exceeded in other Metropolitan districts. In considering the source of the total output of bread, moreover, the fact must be taken into consideration that some of the above-ground bakeries carry on business on a very extensive scale. On the whole, however, I think we may take it as a fairly correct assumption that about one-half of the Londoners' daily bread is perived from underground bakeries.

According to the census of 1891, there are no fewer than 18,029 bakers in London, and 84,158 in England and Wales.* These figures do not include the pastrycooks and confectioners, many of whom work underground, but whom I exclude, as they are not directly concerned in the production of bread. The bakers, however, constitute a large and important class, and when we take into consideration the wives and children dependent on their exertions, it will be evident that our present discussion directly affects the interests of a large section of the industrial community.

The lot of the journeyman baker is neither a healthy nor an enviable one. From the nature of his occupation, he is placed in an environment that saps his strength and too often makes him prematurely aged. His face is thin and pale, his shoulders are rounded, and his whole look is suggestive of chronic ill-health. Nor is this to be wondered at when we consider the fatiguing nature of his work, which is carried on through the night and far into the next day. He is exposed to damp and to great and sudden changes of temperature, and he habitually breathes an atmosphere which is charged with dust, with the fumes of coal, with the products of respiration, and not infrequently with actual sewage contamination. In consequence of the unhealthiness of the employment, the young journeyman changes his occupation whenever he is able, and thus swells the mortality figure of some other trade. His place, however, is quickly filled up by a recruit from the country, or by an apprentice from Scotland or the West of England.

Dr. Ogle's tables of comparative mortality of males between twenty-five and sixty-five years of age, founded upon the death registers of 1880-1-2, offer some suggestive figures. From them we learn that in one hundred different

* Since the census of 1881 the bakers have added 13,126 to their number.

occupations bakers occupy the following relative positions: In suicide they come third, in alcoholism seventh, in liver disease eleventh, in diseases of the circulatory system eleventh, and in diseases of the nervous system twelfth. Many of these diseases may be traced to the abuse of alcohol, an evil habit which is doubtless fostered by the fatigue consequent upon the overwork, the long hours, the want of sleep, and the poisonous atmosphere to which the journeyman baker is exposed. It may be remarked that Dr. Ogle's tables do not confirm the high rate of mortality from consumption and diseases of the respiratory organs testified to by other authorities. This apparent anomaly may perhaps be explained by the fact that a small proportion only of the total number of bakers included in his tables are exposed to the bad environment met with in London. In short, his figures deal with the state of the trade generally, as apart from the Metropolis, and in this way they are diluted, so to speak, with the more favourable results furnished by provincial bakeries.

Among the diseases to which bakers are specially liable may be mentioned rheumatism, colds, erysipelas, and a form of eczema, due to the irritation of the flour, known as 'bakers' itch.' They are peculiarly liable to rupture; Malgaigne, indeed, states that their tendency to that affection is three times that of other trades. This observation is readily accounted for by the fact that the baker has to lift heavy sacks weighing 280 pounds. Another common affection of bakers is flat-foot, a deformity that produces a peculiar gait, and is also due to long standing, to rheumatism, and to the habitual lifting of heavy weights.

As to the hours of work, from personal inquiries among the journeymen I find that seventy-two hours' work weekly is a fair average in the better-class trade, with Saturday evening and Sunday free. Nor is it easy to see how, with

the present system of making bread by hand, this time could be materially shortened. In the poorer neighbourhoods, where what is known as a 'cutting' business is conducted, the baker works from eighty-four to a hundred hours weekly, and, in addition, frequently bakes dinners up to half-past one o'clock on Sunday.

Perhaps the best way to form an idea of the realities of a cellar bakehouse will be to draw a picture of such a place, sketching in the details from facts which have come under my own observation.

First of all we enter a baker's shop from the street, and passing through a trap-door, climb down a steep ladder into the bakehouse. We then find ourselves in a cellar some twenty or thirty feet in length, and ten or twelve feet in breadth. It is, in fact, an ordinary basement cellar, six or seven feet high, and is lighted by gas-jets. Its roof is unceiled, and between the boards covering the warped rafters are many cracks, which open directly into the shop above. A portion of its floor-space is occupied by a slightly-raised wooden platform, on which are ranged a number of sacks of flour. Along one of its sides are placed the kneading troughs, large wooden boxes, which are fixed immovably against the damp and whitewashed wall. The oven stands at one end of the bakehouse, away from the sacks of flour, and consists of a long, deep chamber built of unglazed bricks. Its furnace is fed with coal, a supply of which lies in a loose heap close by. In the darkest corner of this underground bakery stands a kind of open cupboard, in which a water-closet is placed.

In the cellar thus fitted up are carried on all the operations of mixing, kneading, and baking the dough, in addition to which it often serves for storing the loaves of bread.

On entering this cellar, the visitor finds himself plunged

into a hot and stifling atmosphere. Pursuing his investigations, he will find that the air is vitiated from many sources; for instance, there is the active contamination of the flaring gas-jets, while the furnace fills the place with sulphurous fumes, more especially when the journeyman economizes fuel by closing the damper. The air is further charged with moisture and with other products derived directly from the baking of the bread. Sewer gas may enter through the drain openings in the floor, the more so as the grating traps are often worthless. It may enter, moreover, through a defective closet soil-pipe. Further pollution is caused by the ground air and damp which are sucked up into the heated cellar through the faulty flooring. But this is not all, for in low-lying districts there is the danger that in times of heavy rainfall the sewage may force its way through the drain-pipes into the bakehouse. It is easy to see that the introduction of a flood of sewage in this way may bring the germs of typhoid and other filth diseases into direct contact with the loaves of baked bread.

Ventilation, in any real sense of the term, is absent, and, indeed under the circumstances we have pictured, is impossible. An inlet grating usually exists at the level of the street, but as a rule it is kept carefully closed by the journeyman, who is morbidly susceptible to draughts. In most cases, again, there is another small inlet at the back of the cellar, but the second ventilator is almost invariably covered up by means of a sack. It will be seen therefore that not only is the air systematically poisoned from within, but also that no provision is made for that constant renewal from without which is essential to health. We may safely assert that no man could habitually work in an atmosphere even approaching that which has been portrayed without sooner or later sustaining serious injury to his health.

Our description, however, has by no means exhausted

the evils incident to a bad underground bakehouse. In many of these places the unhappy journeyman is actually shut up for twelve hours or more at a stretch, and during that period adds his quota to the general impurity. At times he smokes, or uses tobacco in the still more objectionable form of chewing. Now and then dogs and cats are found in the cellars. Other forms of animal life include rats, mice, black-beetles, cockroaches, ants and spiders, the smaller insects often being present in almost incredible numbers. Then the moist and heated atmosphere is favourable to the rapid decay of vegetable matter, and this takes place in the scraps of dough and refuse flour which collect in the hollow sides of and beneath the kneading troughs. The same conditions act on the coal, and cause it to give off various injurious gases.

Bread, as everyone knows, is peculiarly liable to absorb moisture and gaseous substances. When stored in a badly arranged bakehouse, therefore, it can hardly escape deterioration. Moreover, when prepared under these conditions, it is liable to be injured at every step of its manufacture. The flour becomes damp, musty and sour, the 'sponge' and dough contaminated by the sweating arms of the journeyman, while on all sides it is exposed to the risk of sewage and of other noxious emanations. Lastly, the water with which the flour is mixed is often obtained from the same cistern which supplies the water-closet, a system which is nothing less than an open invitation for the entrance of sewage matter into an important and universally used article of food.

In London there are between thirty and forty 'model bakeries'; that is to say, places where baking is carried on in a cleanly and scientific way, amid wholesome surroundings. This number does not include the wholesale factories, of which there are several of large size. It will be sufficient

here if I briefly lay down the principles which should guide the construction and management of a sanitary bakery.

First, the building itself should be specially built for the purpose, with strong walls and a plentiful supply of windows. Separate and lofty rooms should be provided for storing flour, for mixing and kneading the dough, for baking, and for storing the bread. The flour-loft should be placed at the top of the building, and all the sacks should be conveyed thither by means of a lift, so as to spare the workmen as much as possible from the laborious and dangerous work of hauling about heavy weights. The mixing and kneading room should be provided with movable iron troughs, the kneading as well as the mixing to be conducted by means of machinery wherever possible, in order to avoid the handling of dough or flour by the workmen. Then a special provision should be made for thoroughly cleansing the empty sacks before they are returned to the miller.

These various rooms should be light, airy, and lofty, and be kept with the most scrupulous regard to cleanliness. Much will depend on the construction of the rooms. The walls, ceiling and floor of each room should be of smooth and non-absorbent material, such as glazed tiles for the walls and roof, and hard wood or tessellated pavement for the floor. The windows should reach to the ceiling, and be kept permanently open at the top. Additional ventilation could be provided by means of Tobin's tubes and other appliances, but in all cases it is imperative that all such apparatus should act automatically and be beyond the control of the workmen. As much daylight as possible should be admitted to every part of the building, and no part of the bakehouse must be below the ground level. Where artificial light is wanted, it would be best obtained from electric lamps. The water used for mixing the dough must be provided from a special and separate cistern, or

better still, direct from the main. All sanitary conveniences, including wash-basins and baths, should be placed in a basement, or in some place quite apart from the main building.

The ovens themselves may be heated in various ways. Some of the most cleanly and convenient means are by gas or by wrought-iron tubes containing super-heated steam If coal or coke be used, it is important to insist that the furnace-room be freely ventilated, and that on no account is the flue to be closed by a damper.

Let us glance briefly at the state of legislation with regard to bakehouses.

Before 1863 no special legislation existed. In that year, however, the Bakehouse Regulation Act was passed. The measure in question was introduced at a time when public attention had been pointedly drawn to the unhealthy conditions under which baking was carried on. The duty of enforcing this first Act of 1863 was imposed on the local authorities. As a result of the report of a Royal Commission on Factories and Workshops in 1876, the Factory and Workshop Act of 1878 became law, and at the same time the Bakehouse Act was repealed. For some unaccountable reason, and against the advice of the Commission, the regulation of bakehouses was transferred from the local authorities to the already overburdened factory inspectors, who numbered six only for the whole of London. In 1883, on the passing of the Factory and Workshop Amendment Act, the duties were re-transferred from the factory inspectors to the local authorities.

The present law regarding retail bakehouses, as far as London is concerned, is incorporated in Sections 26 and 27 of the Public Health (London) Act, 1891. The provisions of the Act of 1878 are contained in Sections 34, 35 and 81. These sections, repeated in Section 26 of the Public Health

(London) Act, apply to such bakehouses only as are situated in any place that contains, according to the last published census, a population of more than 5,000 persons. Section 34 runs as follows: 'Where a bakehouse is situate in any city, town, or place containing, according to the last published census for the time being, a population of more than 5,000 persons, all the inside walls of the rooms of such bakehouse, and all the ceilings or tops of such rooms (whether such walls. ceilings, or tops be plastered or not), and all the passages and staircases of such bakehouse, shall either be painted with oil or varnished, or be limewashed, or be partly painted, or varnished and partly limewashed; where painted with oil or varnish there shall be three coats of oil or varnish, and the paint or varnish shall be renewed once at least in every seven years and shall be washed with hot water and soap once at least in every six months; where limewashed, the limewashing shall be renewed once at least in every six months. A bakehouse in which there is any contravention of this section shall be deemed not to be kept in conformity with this Act.'

Section 35 of the 1878 Act states that a place on the same level with the bakehouse, and forming part of the same building, shall not be used as a sleeping place, unless it is constructed as follows, that is to say: 'It must be effectually separated from the bakehouse by a partition extending from the floor to the ceiling, and unless there be an external glazed window of at least nine superficial feet in area, of which at least four and a half superficial feet are made to open for ventilation.' There is no apparent reason why the operation of this section should have been confined to urban districts. Surely, in the interests of the sleeper or of the bread-consumer — whether rustic or cockney—it is desirable that the section should be of

general application. Section 81 of the 1878 Act provides that if Section 34 be contravened the occupier of the bakehouse shall be liable to a fine not exceeding £10.

The sections of the Act of 1883 applicable to bakehouses, and repeated in Section 26 of the Public Health (London) Acts, are Sections 15 and 16. Section 15 relates exclusively to places which were not let or occupied as bakehouses before June 1, 1883. This section provides that it shall not be lawful to let or to suffer to be occupied as a bakehouse, or to occupy as a bakehouse, any such place, unless the following regulations are complied with: (1) No water-closet, earth-closet, privy, or ashpit, shall be within, or communicate directly with, the bakehouse; (2) any cistern for supplying water to the bakehouse shall be separate and distinct from any cistern for supplying water to a water-closet; (3) no drain or pipe for carrying off fæcal or sewage matter shall have an opening within the bakehouse.

It is to be regretted that this section is not applicable to bakehouses let or occupied as such before, as well as after, June 1, 1883.

Section 16 relates to all bakehouses, whatever may be the date of their construction or first occupation. It provides that where a court of summary jurisdiction is satisfied on the prosecution of a local authority that any place used as a retail bakehouse is in such a state as to be, on sanitary grounds, unfit for use or occupation as a bakehouse, the occupier of the bakehouse shall be liable, on summary conviction, to a fine not exceeding forty shillings, and on a second or any subsequent conviction not exceeding £5. The court, in addition to or instead of inflicting such fine, have it in their power to order means to be adopted by the occupier within a time named in the order for the purpose of removing the ground of complaint, and

may on application enlarge the time so named; but if after the time so originally named, or enlarged by subsequent order, the order is not complied with, the occupier will be liable to a fine not exceeding £1 for every day that such non-compliance continues.

The Vestry of St. George the Martyr, Southwark, is the first Sanitary Authority that has gained a conviction, and this quite recently, under Section 16 of the 1883 Act, without asking the court to order means to be adopted by the occupier for the purpose of removing the ground of complaint. In the case cited, the prosecution did not apply for this order, since the Medical Officer of Health was of opinion that the premises were incapable of being made fit for use as a bakehouse.

The magistrate inflicted the full penalty with costs, and made no order for removing the ground of complaint for the reason stated above.

Sub-sections 1 and 2 of Section 17 of the 1883 Act have been repealed—so far as London is concerned—by Section 142 (*vide* Schedule IV.) of the Public Health (London) Act, 1891.

Sub-section 3 of the same Section 17 has been repealed by Section 39 (*vide* Schedule II.) of the Factory and Workshop Act, 1891.

The present law for the regulation of the Metropolitan bakehouses, summarized and reproduced in the following two sections of the Public Health (London) Act, 1891, reads as follows:

'Section 26.—(1) Sections thirty-four, thirty-five, and eighty-one of the Factory and Workshop Act, 1878, and Sections fifteen and sixteen of the Factory and Workshop Act Amendment Act, 1883 (which relate to cleanliness, ventilation, and other sanitary conditions), shall, as respects every bakehouse which is a workshop, be enforced by the

Sanitary Authority of the district in which the bakehouse is situate, and they shall be the local authority within the meaning of those sections.

'(2) For the purpose of this section, the provisions of this Act with respect to the admission of the Sanitary Authority and their officers into any premises for any purpose in relation to nuisances shall apply in like manner as if they were herein re-enacted and in terms made applicable to this section; and every person refusing or failing to allow the Sanitary Authority or their officer to enter any premises in pursuance of those provisions for the purposes of this section shall be subject to a fine.

'Section 27.—If any child, young person or woman is employed in a workshop, and the Medical Officer of the Sanitary Authority becomes aware thereof, he shall forthwith give written notice thereof to the Factory Inspector for the district.'

By Section 96 of the Factory and Workshop Act, 1878, 'child' means a person under the age of fourteen years; 'young person' signifies a person of the age of fourteen years and under the age of eighteen years; and 'woman' is defined as a female of eighteen years of age and upwards.

The only remaining special legislation affecting retail bakehouses is to be found under Section 26, sub-sections 1 and 2, of the Factory and Workshop Act, 1891. This section obliges every person within one month after opening a bakehouse to serve a written notice upon the District Factory Inspector, acquainting him of the fact. The section further imposes upon the Inspector the duty of forwarding the notice forthwith to the Sanitary Authority of the district in which the bakehouse is situate.

The chief conclusions at which I have arrived may be stated somewhat as follows:

(1) That it is advisable by means of a Select Committee of the House of Commons to inquire into the bakehouse question.

(2) That in case the Committee advise fresh legislation they shall prepare a Bill incorporating their recommendations with the Public Health (London) Act, 1891.

(3) That it should be rendered an offence to occupy as a bakehouse any cellar or place almost or altogether below the level of the street, unless it had been so occupied before and up to a certain fixed date.

(4) That all bakehouses be compulsorily licensed, and that such license be renewable annually.

(5) That the granting of licenses be vested in the London County Council.

(6) That uniform Metropolitan bye-laws regulating the conduct of the retail bakeries be made by the County Council and be confirmed by the Local Government Board, and that the duty of enforcing these bye-laws devolve upon the various Sanitary Authorities.

(7) That such bye-laws shall cover: (*a*) The regulation of the conduct of the business; (*b*) the regulation of the structure of the premises; (*c*) the regulation of the mode in which application is to be made for sanction to establish anew the business of a baker in the County of London.

(8) That the bye-laws relating to structure and comprised under heading (*b*) do not apply to existing bakeries until after the lapse of a certain number of years.

(9) That the question of compensation for disturbance of existing right in bakeries be taken into consideration by the Parliamentary Committee.

(10) That no dealing with the question of the regulation of bakehouses will be complete unless it investigates the relations between the millers and the retail bakers. At present the small tradesmen are often completely under the thumb of the capitalist millers.

(11) That inspection of bakehouses should be more systematic and thorough. To fulfil this condition, an increase of the staff of Sanitary Inspectors is imperative.

(12) That a more intelligent knowledge of the whole question of their bread-supply is desirable on the part of the public.

(13) That the weight of the sacks of flour should be reduced from 280 to 140 lb.

To my mind, the ill-health of the baker is, in the main, the result of the bad surroundings in which he works. If baking be carried on in well-ventilated places, with a perfect sanitary environment, there is no reason why it should be a particularly dangerous or unhealthy trade. It is open to question how far the State should be called upon to fix the hours of labour of the journeyman baker. Without entering, however, into the discussion of that difficult and complex economical problem, it may, I think, on the other hand be emphatically asserted that there is much in the present condition of the retail bakehouses which calls for stringent legislative interference.

III.

DOES BAKING STERILIZE BREAD?*

BY F. J. WALDO, M.A., M.D. (CANTAB.), D.P.H., AND DAVID WALSH, M.B., C.M. EDIN.

THE following paper is founded on a large series of experiments. Its main conclusion is that baking does not necessarily destroy the vitality of micro-organisms (or their spores) that may be contained in dough. Briefly stated, we have succeeded in obtaining cultures of thirteen different kinds of microbes from bread taken out of the centre of recently-baked loaves. Our contention, then, is that baking does not necessarily sterilize a loaf. In order to grasp the full significance of that proposition, it will be well to review the circumstances that have led us to undertake the present inquiry.

One of the joint authors of this paper, Dr. Waldo, Medical Officer of Health to St. George's, Southwark, has for some time past been endeavouring to reform the insanitary conditions of the cellar bakeries in his district. There has been little serious attempt at denial of the charges of unwholesomeness brought against these underground workplaces; indeed, the case against the London

* A paper read in the Public Health Section at the meeting of the British Medical Association at Bristol on Aug. 1, 1894. Reprinted from the *Lancet*, London, Oct. 20, 1894.

bakers could hardly be better summed up than has been done by one of their most ardent champions in the following passage:* 'The indictment is that half the bakeries in the Metropolis are underground; that there is little or no ventilation . . . ; the air is vitiated from many sources; sewer-gas may enter through the drain openings in the floor . . . ; and that sewage may, through a defective drain-pipe, force its way into the bakehouse. Add to these a closet opening into the room; the men smoking or chewing tobacco; rats, cockroaches, spiders, and other insects in incredible numbers, and general filthiness, and we have something like a fair picture of Dr. Waldo's typical underground bakehouse. This is revolting enough, but add a few realistic touches, showing the operatives kneading the dough while suffering from a form of eczema known as "bakers' itch," the sweat from their arms mixing with the dough, and we have enough of the nauseous to satisfy a glutton.' The question of the insanitary bakehouse, it should be clearly borne in mind, is raised on two distinct and separate grounds, namely, (1) the health of the bread-producer, and (2) the health of the bread-consumer.

1. *The Health of the Bread-producer.*—Into this part of the question we do not propose to enter; the point has been fully dealt with elsewhere. Suffice it to say that journeymen bakers, as a class, are unhealthy and short-lived.

2. *The Health of the Bread-consumer.*—Hitherto it has been assumed that, however filthy the surroundings of the bakery, however contaminated the flour or other ingredients of the dough, yet all was set right by the mere process of baking in the oven, which destroyed those living organisms now shown to lie at the root of most diseased conditions.

* 'The Truth about the London Bakeries,' *New Review*, May, 1894, p. 607.

In short, it has been a generally accepted belief that the loaf left the oven in a sterilized condition, incapable of conveying disease to the consumer. This view has been forcibly expressed in a leading article in one of the bakers' journals.* 'An unhealthy bakehouse,' it says, 'is bad because it is bad for the baker, and not because of any injury likely to result to the consumer of his produce. Dr. Waldo has painted a picture of a wretched cellar bakehouse, but he does nothing to show that bread, produced even under these extreme conditions, is capable of causing zymotic disease. The dough in an underground cellar may be as unhygienic as possible; it may be a very hotbed of bacilli; it may swarm with all the germs known (more or less imperfectly) to medical science, and yet the bread made therefrom would be no whit the less wholesome. The loaf has been purified by fire. Germs cannot resist the temperature of the baker's oven, and it is not too much to say that there is more danger of infection in one single quart of diseased milk, or in one glass of unfiltered water, than there is in all the bread made by all the bakers of the Metropolis from one year's end to another.' The foregoing contention that baking sterilizes the loaf is one of the chief arguments advanced by those who defend the present system of cellar bakeries. It is founded entirely on assumption. Our present investigation was started primarily to test the truth of that assumption.

There is little need to point out that specific pathogenic organisms may gain an entrance into insanitary bakeries. Sewage contamination has been repeatedly shown to exist in those places. Several gross cases of the kind, for instance, have been proved before the London magistrates during the present year. Then, again, a certain number of bakers are phthisical. These men are closely confined

* The *Baker and Confectioner*, March 9, 1894, p. 144.

to the bakehouses for ten, twelve, or even twenty hours at a stretch. It has been again and again demonstrated that the dust of rooms occupied by phthisical patients contains tubercle bacilli. Lastly, it is obvious that germs in a bakehouse could easily be conveyed to the dough either by the air, by utensils, by the hands of workmen, or in other ways. From these data we think it may be fairly argued that some bakeries from which bread is issued to the public are likely to be infected with the specific pathogenic organisms, at any rate, of typhoid fever and of phthisis.

There are two ways in which it is conceivable that a loaf might convey specific organisms capable of causing injury to consumers—viz., (1) organisms that have lodged on the crust of the loaf from surface contamination in an infected bakery; and (2) organisms that have possibly escaped destruction in the interior of the loaf during the process of baking.

1. *Organisms that have lodged on the Surface of the Loaf after Baking.*—When taken from the oven, a batch of loaves is often allowed to lie about in the bakehouse for a considerable time. It is obvious that there is every chance of contamination of the crust by the lodgment of bacteria either from the air, from the trays or shelves on which the bread is laid, or from the hands of the workmen. The fact that the baked loaf is open to infection in a dirty bakehouse seems to be overlooked by those who insist so loudly that baking sterilizes the loaf. Their assumption appears to be that the loaf, once sterilized, will remain so for an indefinite time. The fallacy of this assumption, on the other hand, is recognised by some few people, who re-sterilize the crust by putting their loaves into a hot oven for a short while before use. We propose to deal with the whole question of the surface contamination of the baked loaf in another paper.

2. *Organisms that have possibly escaped Destruction in the Interior of the Loaf.*—This consideration brings us to the starting-point of our investigation. It will be impossible to do more in this place than give a short summary of the numerous experiments carried out under our directions by Mr. Walter Severn at his laboratory in Bentinck Street, London.

Temperature.

In considering the likelihood of the survival of micro-organisms or their spores in the baked loaf, the question of temperature is of first importance. From a number of experiments made on loaves baked in a small laboratory oven, it appears that: 1. The average maximum temperature in the middle of an ordinary quartern loaf during baking varies from 73° to 86° C. (163·2° to 186·8° F.), and in small loaves from 86° to 95° C. (186·8° to 203° F.). 2. There is a steady increase of temperature in the centre of any loaf during baking; thus, in a quartern loaf during one hour it rises from 25° to 75° C., and in a half-quartern loaf from 25° to 88° C. during the same time. The increase of fifty odd degrees (Centigrade) in the centre of an ordinary loaf is attained somewhat after the following scale:

In the first 8 or 9 minutes about 6 degrees are gained.

„	next	10	„	„	6	„	„
„	„	10	„	„	7	„	„
„	„	10	„	„	9	„	„
„	„	10	„	„	12	„	„
„	„	10	„	„	9	„	„
„	„	10	„	„	5 to 7	„	„

So that for the first forty minutes the maximum temperature is probably not more than 48° or 50° C. The practical inference is that any organisms that might be present in the centre of a loaf would be exposed for a short time only

during baking to a maximum temperature of 73° to 86° C. (163·2° to 186·8° F.) in a quartern, and of 86° to 95° C. (190·2° to 203° F.) in a half-quartern loaf.

It is known that most bacteria are not destroyed by an exposure to the temperatures above mentioned as the average for the centre of a loaf during baking. The death point of bacteria has been expressed generally by Koch and Wolfhügel in the following passage: '1. Sporeless bacteria are destroyed in one and a half hours by hot air at a temperature slightly exceeding 100° C. (212° F.). 2. Spores of fungi require one and a half hours at 110° to 115° C. (230° to 239° F.). Spores of bacilli require three hours at 140° C. (252° F.).'* It should be noted that these statements apply to dry heat only. In the middle of the loaf there is presumably moist heat, which is, of course, more destructive to organisms, and on that account we must make a considerable reduction in the figures of Koch when we apply them to fungi and their spores inside a loaf. After making ample allowance it is obvious that if the temperatures found by us in the centre of loaves be correct it will be safe to predict, on theoretical grounds alone, that bacteria and their spores need not necessarily be destroyed by baking inside a loaf.

Cultivations.

The next step was to ascertain whether ordinary bread contained organisms or their spores in a state of vitality. It is clear that even if the actual organisms were destroyed by baking, while their spores survived that process, there is nothing to prevent the subsequent development of the spores. The loaves used in the following experiments were

* 'Micro-parasites in Disease,' vol. cxv., New Sydenham Society, p. 525.

obtained from various parts of London—such as Limehouse, Belgravia, South Kensington, Minories, and Barbican. In all cases the examinations were made within a few hours of the bread leaving the oven: 1. Direct microscopic examination yielded unsatisfactory results, and was soon abandoned in favour of cultivation methods. 2. A series of twenty loaves was examined by the method of plate cultivation in nutrient gelatine.

The plate cultures were made in two different ways: 1. By the trituration method. A loaf was cut in half with a large sterilized knife, and a cut made at right angles into one of the halves by a second sterilized knife. A small portion of bread taken from the deeper part of the second incision was rapidly triturated in a stoppered weighing bottle with sterilized water, and from the resulting cloudy liquid plate cultures were poured. 2. By the 'direct' method. A morsel of bread removed in a similar way was rapidly crumbled up, and a few crumbs dropped into a tube of the liquefied gelatine, which was well mixed and poured out on a plate. The loaves used were as follows:—

List I.

A.—Limehouse.

Three ordinary (underbaked).
Two ordinary (brown outside, black in places).
One brown (fairly baked).
One tinned (underbaked).

B.—Belgravia.

Two ordinary (fairly well baked).
One tinned (fairly well baked).
One small brown tinned (well baked).
One long French roll (rather underbaked).

C.—South Kensington, No. 1.
Two ordinary (well baked).
One ordinary (rather underbaked).
One brown tinned (rather overbaked).

D.—South Kensington, No. 2.
Two ordinary (well baked).

E.—South Kensington, No. 3.
Two tinned (well baked).

In all, thirteen species of bacteria have been found in a total of sixty-two loaves examined. For convenience of reference the following table may be given :—

List II.

Giving a list of Bacteria (or their spores) found in a living condition in freshly baked loaves of bread.

1. Bacillus subtilis, Variety 1 (hay bacillus).
2. Bacillus subtilis, Variety 2 (hay bacillus).
3. Bacillus subtilis, Variety 3 (hay bacillus).
4. Sarcina (a), large.
5. Sarcina (b), smaller than (a).
6. Bacillus A (large, thick, rounded ends).
7. Bacillus B (large, thick, smaller than A).
8. Bacillus C (small, copious spore formation).
9. Bacillus D (smaller still; some spore formation).
10. Bacillus E (bacillus figurans).
11. Micrococcus A (small white colonies).
12. Micrococcus B (rosaceus (?) accidental).
13. Staphylococcus (very regular, larger than staphylococcus aureus).

List III.

*Results of Plate Cultures.**

A.—1. First loaf, first plate; colonies, 25 (1), 8 (2), 2 (4).
First loaf, second plate; colonies much more numerous.
Second loaf, first plate; results approximately same.
Third loaf; colonies, 1 (1), 1 (10).
2. First loaf, first plate; colonies, 52 (1), 8 (2), 1 (3).
First loaf, second plate; colonies (?); liquid.
Second loaf, first plate; colonies, 6 (1).
Second loaf, second plate; colonies, over 100; much liquid.
3. 3 colonies, 3 (1), 2 (10), 3 (8).
4. Colonies liquid, number doubtful.

B.—1. First loaf, first plate; colonies, 8 (1), 2 (13), 3 (2), 1 (3).
First loaf, second plate; colonies, 10 (1), 1 (13), 13 (2), 3 (7).
Second loaf, first plate; colonies, 1 (13), 6 (2), 20 (7), 2 (1).
Second loaf, second plate; 10 (? 1), plate destroyed.
2. Practically sterile.
3 and 4. Practically sterile.

C.—1. First loaf, first plate; colonies, 2 (6), 1 (9).
First loaf, second plate; colonies, 15 (6), 1 (9), 3 (1).
Second loaf, first plate; colonies, 2 (6), 2 (5).
Second loaf, second plate; colonies, 5 (6), 3 (9), 10 (5); large liquid area with many colonies.
2. Sterile; all but two surface colonies, and one of saccharomyces rosaceus.

* The figures in brackets refer to the foregoing list of organisms.

3. Five surface colonies; plate remained long under bell; 1 of saccharomyces rosaceus.
4. Also practically sterile; four plates.

D.—First loaf, first plate; colonies, 1 (9), 2 (2), much liquid; could not count; one of (9) fortunate.

First loaf, second plate; colonies, number doubtful; all liquid (1).

Second loaf, first plate; practically sterile.

Second loaf; colonies, 1; bacillus fluorescens.

E.—All sterile, except moulds and surface accidental colonies; one of bacillus æruginosus.

From all the colonies, which we may assume were derived from bacteria in the bread itself, tubes were inoculated and microscopical examinations made. We do not propose to give in detail the results of numerous other plate cultivations; it may be stated, however, that all the bacteria given in the list above have at one time or another been obtained from sixty-two loaves which have been examined by plate cultivations.

Thus far our experiments have shown that thirteen different species of micro-organisms can be cultivated from the centre of loaves within a few hours of their being taken from the baker's oven.

GENERAL REMARKS ON THE PLATE CULTIVATIONS.

Conditions of Experiments. — The plates used were ordinary 5 in. by 4 in. photographic plates, carefully cleaned and sterilized at 160° to 170° C. in a box made for the purpose. The damp chambers were double dishes from Muencke, of Berlin, 22 centimetres in diameter. The shelves were made in one piece of glass and were also sterilized by heat. The chambers were sterilized, not with chloride of mercury, but with carefully boiled water, as recommended

by Dr. Percy Frankland. The incubation temperature varied from 18° to 25° C. (64° to 77° F.). The gelatine was made from fresh meat and peptonum siccum (Savory and Moore). It contained 10 per cent. of Coignet's gold label gelatine and 3 per cent. of pure glucose, and was faintly alkaline. The methods of culture have been described.

General Results.—The following points may be noticed: 1. The comparative scarcity of colonies on the plates, which may be partly accounted for by the facts that (1) the number of bacteria capable of growing in nutrient gelatine is evidently variable even in closely adjacent parts of the same loaf; (2) in the case of cultures made by the trituration method only a few of the germs present on the morsels of bread triturated are removed by the sterile water, and only a very little of this water is used for the plate culture (in every case the quantity used has been as much as could be removed in the loop of a platinum needle 3 mm. external diameter, made from wire 0·85 cm. diameter); (3) in the case of cultures made by the direct method probably almost the only germs that grow are those on the outside of the crumbs which come into actual contact with the gelatine; and (4) it is, of course, possible that many of the bacteria present will not develop colonies in nutrient gelatine. 2. While in the series of twelve plates from Bakery A there is a large preponderance of the bacillus subtilis, there are fewer other organisms than in the South Kensington and other West-End bakeries. We may, however, state that this is by no means always the case, as there is an evident relation between dirty dough and the number of bacteria found living in the baked loaf. This point we ascertained in the course of further experiments with artificially infected dough. These and other results must be reserved for future papers. A loaf from a low-class, dirty bakery will almost invariably contain more living bacteria (or their

spores) than one from a good, clean bakery. 3. More bacteria seem to grow by the method of direct culture than by the trituration method. 4. The extremely variable results obtained, not only from bakehouse to bakehouse, but also from loaf to loaf, in the same batch. This points to the necessity of further experiments. 5. The unexpectedly sterile condition of plates from some loaves—notably from tinned and small loaves (half-quarterns). This does not necessarily prove that a particular loaf is sterile, but only that in the parts examined no bacteria capable of growing were in contact with the gelatine. In the case of a tinned loaf the heat appears to penetrate more effectually, so far as the destruction of organisms is concerned, than in an ordinary loaf. In small loaves the temperature is higher on an average in the centre than in large loaves. 6. The organisms 8 and 9 (see List II.), or their spores, are killed with comparative ease—that is, their death point in dry heat is about the same as that of bacillus tuberculosus under certain conditions. We may therefore assume that if these organisms survive the baking the tubercle bacillus might also survive. We have other reasons for believing that pathogenic organisms often do survive the baking. 7. A further proof of the ubiquity of bacillus subtilis and of the bacilli resembling it is afforded by the frequent preponderance of those organisms in our cultures. On the whole, we are inclined to think that notwithstanding the comparatively low temperatures reached in the centres of loaves, the conditions are such that the greater number of the bacteria present in the unbaked dough are destroyed.

Accepting the fact that certain non-pathogenic micro-organisms (or their spores) can survive the process of baking in the centre of an ordinary loaf, we argue by analogy that pathogenic forms of bacteria (and their spores) may also pass safely through a similar ordeal. Our experiments,

however, have not been confined to mere cultures from bread. We have made many experiments with dough infected with pathogenic organisms, but, as the indispensable evidence, obtainable only by inoculation of living animals, is wanting, we are unable at this stage of the proceedings to publish our researches on this important point.

Enough has been said, we trust, to encourage other bacteriologists to repeat and extend our experiments. If it be proved, as we venture to think has been done, that certain non-pathogenic organisms are able to retain their vitality in the loaf as it leaves the baker's oven, the fact thus established will overthrow the last defence of insanitary bakehouses—namely, that bread is absolutely sterilized by baking, and is therefore harmless to consumers. Another important result may be deduced from the following data: (1) Unwholesome bakeries are exposed to infection by pathogenic bacteria—*e.g.*, typhoid fever in sewage; and (2) such bacteria may gain entrance to the dough and maintain their vitality after baking—by analogy with what has been shown to occur in the case of non-pathogenic bacteria. If these premises be true, it follows that pathogenic organisms may under certain circumstances be distributed in loaves, and so produce specific disease among consumers.

We see no particular reason why the origin of many mysterious septic invasions of the human body may not eventually be traced to the agency of bread. A generation ago milk was not suspected of being the means of spreading disease, and a similar observation applies to water. At any rate, the subject dealt with in this article seems to us to be well worthy the attention of all who are interested in the scientific developments of preventive medicine, and in the protection of the public that consumes the bread.

IV.

CHOLERA IN BREAD.*

A LETTER from a correspondent is published under the above suggestive title in another part of the present issue of the *Medical Press and Circular*. It contains a novel and somewhat startling suggestion as to a possible means by which cholera may be spread by the agency of bread. Its writer, Mr. Walsh, alludes to a paper written jointly by Dr. Waldo and himself, and read at the late Bristol meeting of the British Medical Association. On referring to that paper and to other articles from the same source, we find the main conclusion is that 'baking does not necessarily destroy the vitality of micro-organisms contained in dough.' The first step in the investigation was to ascertain the conditions of temperature in the interior of a loaf during baking. It was found that the average maximum in the centre of a quartern loaf did not exceed 186° F., and in a half-quartern 203° F. As most micro-organisms, to say nothing of their hardier spores, are able to withstand a prolonged exposure to a higher temperature, it is obvious that the heat conditions inside the loaf during baking need not be fatal to bacterial life. The next set of experiments were carried out on sixty-two newly-baked loaves, obtained from various parts of London, rich and poor. By the method of plate cultivations it was shown that thirteen different

* Reprinted (by permission) from the *Medical Press and Circular*, Oct. 10, 1894.

species of micro-organisms survived the ordeal of the baker's oven. If these results be trustworthy, as the writers remark, it is reasonable to infer that pathogenic organisms (or their spores) would also retain their vitality after being baked in dough. To test the latter point a second series of experiments was made upon dough infected with specific organisms. Although for various reasons the writers are not yet in a position to publish the conclusions arrived at in the latter part of their investigation, yet they make the important announcement that the 'comma,' or cholera bacillus, has been cultivated from bread made of dough infected with a pure culture of that organism. On these various grounds they suggest in their letter that bread manufactured in districts where cholera is prevalent, and presumably from flour that has been mixed with specifically infected water, may possibly contain the living microbes of the disease. Whether this theory be ultimately confirmed or not, it certainly appears to be based on scientific grounds. At any rate, it is to be hoped that the point will be thoroughly worked out by competent observers in countries where cholera is epidemic. In a place like Hamburg, for instance, where the late outbreak was clearly traced to a specifically polluted water-supply, a bacteriological examination of loaves from the city bakeries would most likely have afforded valuable evidence, whether positive or negative, upon this important point. There are many other cities, however, at this present moment where cholera is epidemic, and where the condition of the bread-supply might be at once put to the test. Investigators in our own country, however, will find plenty of suggestive material in the work of Messrs. Waldo and Walsh. 'There is no particular reason,' they write, 'so far as we can see, why the origin of many mysterious septic invasions of the human body may not eventually be traced to the agency

of bread.' The field thus opened up is a wide one, and no doubt will engage the attention of those who are interested in the scientific aspects of preventive medicine. It is interesting to learn that the inquiry into the sterilization, or otherwise, of bread by baking arose in the first place out of the consideration of the evils of cellar bakeries. The champions of the present system, which allows a staple article of food to be prepared in damp, unwholesome, and more or less noisome underground chambers, have always loudly asserted that the baked loaf must be absolutely free from germs. That assumption has now been disposed of by what appears to be incontrovertible scientific proof. Altogether, the suggestion that bread may be an active agent in the spread of disease, although somewhat disquieting in its nature, is likely to deal a death-blow to the unwholesome cellar bakehouses, even if it should lead to no other valuable practical result.

To the Editor of the 'Medical Press and Circular.'

'SIR,

'The way in which disease is spread is often a mystery. Cholera is held to be essentially a water-borne disease, yet it is often impossible to trace the exact means by which it has been communicated. May I be allowed to suggest a method by which cholera germs may be conveyed to consumers in bread?

'In a joint paper by Dr. Waldo and the present writer, read at the late meeting of the British Medical Association, we showed that bread is not sterilized as it leaves the baker's oven. Thirteen different species of micro-organisms were cultivated from bread taken out of the centre of newly-baked loaves. Experiments have been made with

specifically-infected dough, but these are still too incomplete to publish. In view of the fact, however, that cholera is raging in many parts of the world, it may be right to say that the "comma," or cholera bacillus, has been cultivated from bread made of dough infected with a pure culture of that organism. If this latter fact be true, it follows that bread made from dough mixed with cholera-poisoned water may contain the living microbes of cholera, which will be handed on to consumers.

'It is to be hoped that this important point will be investigated in countries where the disease is prevalent.

'I am, Sir, yours, etc.,

'DAVID WALSH.

'WELBECK STREET, W.,
'*Oct.* 5, 1894.'

V.

AN IDEAL BAKEHOUSE.*

BY F. J. WALDO, M.D., AND DAVID WALSH, M.B.

'My Lords and Gentlemen,

'Of late the subject of unwholesome bakeries has attracted a good deal of public attention, but so far there has been little practical outcome to the agitation. Your honorary secretary, Mr. Lawrence, has asked us to read a short paper on sanitary bakehouses, a request to which we gladly accede, as we believe that anything which is likely to educate people generally in these matters cannot fail to be a step in the direction of reform. First of all we will give an outline sketch of an ideal bakehouse.

'By the term "ideal bakehouse" we mean a place for the making of bread, so constructed that it may be healthy for the workmen and be devoid of sources of contamination to the bread. It should, wherever possible, be above ground. Its walls should be furnished with a damp-proof course below the floor level, and by a "dry area" or hollow space, so arranged as to prevent the soil coming in contact with the main building. Without these precautions it would be impossible to prevent dampness, especially where porous bricks are used in the construction. The inner surface of the walls should be smooth, non-absorbent, and made of

* A paper read before the Church Sanitary Association at the Church House, Westminster, Nov. 13, 1894.

some material that can be easily washed. These conditions may be fulfilled by using glazed bricks or tiles, or by a good lining plaster, such as the best Portland or Parian cement. Whitewash over brick or plaster is undesirable, as it soon gets dirty, has a rough surface, and cannot be properly cleansed.

'The floor should be of good concrete. Its surface should be made smooth and even with a layer of cement or with brick tiles, and there should be on no account a gully-opening or sink in the floor. Any drain-pipe passing beneath the floor should be a foot or more below the concrete. The drain-pipes must be surrounded by at least six inches of concrete, and all the joints made gas-tight with Portland cement. Better still, the pipes may be of iron, prepared by the Barff process or lined with Angus Smith's solution; such pipes should be laid on concrete and cemented at the joints.

'The roof should be ceiled with plaster, or with tongued match-boarding, or with a smooth glazed material that can be periodically cleansed.

'All the rooms in our ideal bakehouse should be light, airy, and lofty. Natural light should be obtained in the daytime from windows of good size reaching to the ceiling, and having an area not less than one-tenth of the floor-space. Artificial light can be obtained from gas, preferably from incandescent lamps with ventilating outlets, or, best of all, from electric lamps. Airiness is secured by a proper system of ventilation. Where there is no "cross" ventilation—that is to say, where there is not a through current of air between windows in opposite external walls—some of the following means must be adopted. Inlets may be provided by means of windows, Tobin's tubes, perforated bricks, Sherringham valves, McKinnel's roof-ventilators and other methods, but in all cases it is absolutely essential

that they should be beyond the control of the workmen. Outlets must be through exit tubes or exhaust shafts, the draught of which may be created by waste heat from the furnace flue, by gas-burners, by a steam-jet, or by a mechanically driven fan. In dusty situations the inlets must be furnished with filters of wire, gauze or other suitable material. Whatever the scheme of ventilation, it must be so arranged that the air of the bakery is renewed without draught at least three times in an hour. Loftiness is a point which must be to some extent regulated by the special circumstances of the case. It may, however, be stated generally, that in no case should the height between floor and ceiling be less than eight feet in every part.

'The furnace, fire, and fuel should be outside the bake-house, while the oven can be easily arranged to open inside. This plan of construction could be adopted only in cases where there is a good system of ventilation. If found to be structurally impossible, so that there is an inside fire, the oven damper should be so made that the workman cannot cut off the whole of the flue, unless there be an alternative or "sulphur" flue to carry off the pent-up furnace fumes. The object of this precaution is to prevent the place being charged with poisonous products from the furnace when the baker closes the damper in order to save fuel as soon as his oven is hot. It has been remarked elsewhere that this effect may be rehearsed by any person curious on the point if he first gets up a good fire in his sitting-room grate and then suddenly blocks the chimney by pulling down the register. In all cases coal and other fuel should be stored away from the bakehouse.

'The water-supply should come from a tap connected directly with the rising main, and should not be drawn from a cistern, as such receptacles are often dirty and

liable to pollution from sewer-gases. Filters are worse than useless.

'Flour should be kept in a cool, dry place, away from the bakehouse. All empty sacks should be systematically cleansed, and not be allowed to lie about the bakehouse.

'The dough-troughs should be of glazed iron, and movable. If made of wood, the inner surface must be perfectly smooth and free from cracks, so as to prevent the lodgment of dough and other putrescible matter. The best lining for a wooden trough is one made of zinc.

'The loaves should be taken as soon as baked to a special bread or cooling room.

'Lavatory arrangements should be ample, including every facility for washing. At the same time this department should be cut off from direct communication with the bakehouse.

'As to the breathing-space for workmen, we consider that, in view of the nature of the trade, there should be an allowance of at least 500 cubic feet for each adult.

'The foregoing points embrace the main essentials of our ideal bakehouse. It will be noted that their adoption does not necessarily mean either that retail bakeries must be replaced by factories, or hand labour by machinery. Nor does it say that a properly constructed basement should not be used as a bakehouse.

'With regard to underground bakeries, however, one absolutely indispensable feature is the presence of a clear and open area on at least two sides, preferably back and front. If the other conditions as to lighting, ventilation, height, structure of walls, floor and roof, water-supply, construction of furnace, and drainage, be fulfilled, together with a proper provision of cubic space for workmen, there is no reason why a basement may not be used for making bread. At the same time it would be always better to

place such workshops above-ground wherever possible. Nor should the adaptation of an ordinary cellar to the purposes of a bakery be allowed under any conceivable circumstances.

'As regards the areas, we would suggest that every bakehouse altogether below the general surface of the adjoining ground should have an outside area along its entire frontage; that the said area be properly drained and paved, be at least four feet in width in all parts, and extend to six inches below the level of the bakehouse floor. The second area, whether at the back or the side of the house, to be of similar construction, except that it may be three feet in width in all parts. In the case of basement bakehouses having two feet of their height above the general adjoining surface level, the width of the front area might also be reduced to three feet. The windows opening into these areas should reach to the top of the walls, and cover a superficies equal to one-tenth or more of the floor space of the bakehouse. At the same time each window should be made to open in its upper half.

'In dealing with the bakehouse question, beside the need of fixing structural and sanitary standards, there are other important points which call for consideration, such as, for example, the limitation of the hours of labour and the abolition of night work.

'In this short paper the question has been considered mainly from the point of view of the bread-producer. The importance of the matter to the bread-consumer, on the other hand, has been advanced in a joint paper read at the last meeting of the British Medical Association, in which we showed that baking does not necessarily destroy the germs that may be contained in dough. If the microbes, for instance, of typhoid fever and of tubercle were to gain admission to dough in a foul bakery, it is

quite possible that they might be distributed to consumers in a condition capable of setting up disease. The regulation of bakeries, therefore, is a matter in which the well-being of the community may be far more closely involved than the master bakers would have us imagine.

'In concluding, we would suggest that bakeries proved to be injurious to workmen and dangerous to consumers should be forthwith closed. The bakery must either (*a*) be reconstructed; (*b*) be removed to a back yard or to the top of the house; or (*c*) the baker must find other quarters. The journeymen and the public must not go on suffering because a certain number of bakers have been permitted in the past to carry on their trade upon too scanty a capital. To allow such evils to continue would be to run counter to the accepted canon that it is a first duty of Government to look after the health of its citizens. In the enforcing of structural reforms we would throw the burden upon the ground landlord and the house owners, unless, perhaps, where the occupier is in possession of a long lease, say of fourteen to twenty-one years, not less than ten of which are unexpired.

'We would offer the following practical conclusions:—

'1. In future all bakehouses, if underground, should be provided with back and front areas of good size, with concrete floors, damp-proof walls, full provision for light and ventilation, a height of at least eight feet, proper allowance of cubic space for workmen, separate water-supply from the main, impermeable drains, and entire separation of lavatory arrangements. In short, that the sanitary conditions should reach a high modern standard.

'2. That in future no building be allowed to be used as a bakery unless above-ground or in a properly constructed basement, as above outlined.

'3. That provision be made whereby the present cellar

bakeries, which cannot be made to answer the above requirements, shall be abolished within a certain fixed time.'

* * * * *

(The following points are not purely sanitary, but are so closely connected with the bakehouse question as to merit careful consideration) :—

'4. That the present hours of labour are excessive and require limitation.

'5. That night-work should, if possible, be done away with.

'6. That the retail bakehouse industry, as at present conducted, might with advantage be included within the schedule of the dangerous trades.'

NOTE.—In cases where the front of the house abuts on the pavement and there is consequently no room for a basement area, we suggest the construction of a 'borrowed area,' full particulars of which will be shortly published.

VI.

BAD BAKEHOUSES IN COURT.

A Series of Cases yielding Evidence as to Unwholesome Bakeries—Chiefly Underground—in various Districts of London.

The following facts throw into high relief the worst features of underground bakeries. They are taken from actual evidence sworn to in the course of Police and Coroner's Court proceedings. Such instances might readily be multiplied, but the few here given will suffice to prove the reality and the widespread nature of the abuse. In the face of vested interests, it is likely that nothing short of a skilled and searching inquiry by an impartial body would ever reveal the actual extent of the evils of underground bakeries. The bakers' journals assert that the bad bakehouses are few and far between. If that be so, one would imagine that in their own interests they would be anxious for an exhaustive inquiry. In the following notes names have been suppressed for reasons that will be sufficiently obvious.

Case A (St. George's, Southwark).

Proceedings taken by the Vestry against the occupier of two cellar bakeries in the Borough High Street.

Dr. Waldo, Medical Officer of Health, gave evidence to the following effect: On January 22 he visited the premises in question. He found the basement imperfectly

divided into two compartments by means of a wooden partition. The length of these two cellars together was 34 feet 3 inches; breadth, 11 feet 3 inches; and their average height 6 feet 7 inches, giving a capacity of 2,516 cubic feet (without deduction for troughs). The atmosphere was hot and stifling and the whole place discoloured, dirty, and greasy. The cross-beams and joists were rotten and unsafe, and the ceiling formed by the flooring of the shop above. Large cracks between the boards of the latter had been closed with brown paper, so as to prevent dust falling from the shop upon the pastry below.

The Front Cellar, used for pastry-making, was occupied by a man and a youth of seventeen. The flooring was defective, composed of brick and cement. Projecting underneath the footway was an old-fashioned brick oven, with fire burning and damper closed, so that the chimney outlet of the furnace was completely blocked. No 'sulphur' flue was provided. The only ventilation was through an open iron grating 2 feet by 1 foot 10 inches, admitting dirt and dust from the High Street. Men worked from 6.30 a.m. to 8 p.m.

Back Cellar.—Condition similar to that of front. It contained an oven without 'sulphur' flue. A skylight—7 feet by 2 feet—opened into the yard, but at the time of visit this ventilator was closed. A heap of coals was piled up near the furnace. Wall damp, owing to condensation of vapour on water-pipe nailed against wall. Two men work here at bread-making from 1.30 early morning to 2 in the afternoon.

There was no damp course in either cellar. The place would be dark in the absence of artificial light. On the assumption that each of the five gas-jets consumes as much oxygen as three adults = 15, to which we add the four journeymen = 19, the latter number divided into 2,516 cubic feet (cubic space of cellars without allowing for

troughs, etc.) gives in round numbers the extremely inadequate allowance of 130 cubic feet of breathing-space for each workman.

The learned counsel for the defence asked Mr. Slade, the magistrate, to grant a remand in order to allow his client to render the bakehouses fit for occupancy. Dr. Waldo said that in his opinion it was impossible, owing to structural faults, as the cellars had never been built for the purpose, to render them fit either (*a*) for human beings to work in, or (*b*) for the wholesome manufacture of bread.

Mr. Slade inflicted the full penalty of forty shillings and costs. He refused to order means to be adopted by the occupier within a certain time to remove the ground of complaint, on the evidence of the Medical Officer that it was impossible to render the bakehouses fit for use or for occupation.

This prosecution was taken under section 16 of the Factory and Workshop Act, 1883.

Case B (St. George's, Southwark).*

On April 4, at the Southwark Police Court, a baker, lately carrying on business in the Borough, appeared to a summons, taken out at the instance of the Vestry of St. George the Martyr, charging him with permitting his bakehouse to be in an insanitary condition, contrary to the Factory and Workshop Act, 1883. Dr. F. J. Waldo, Medical Officer of Health for the Vestry, deposed that since January 1 he had repeatedly visited the defendant's premises, which consisted of a basement of a block of buildings erected by one of Mr. Jabez Balfour's Companies.

* From the *Bakers' Record* April 6, 1894.

The bakehouse was approached by a long, narrow, dark, unventilated passage, off which there were two living-rooms and a w.c. The bakehouse was entirely underground, and had one oven. To the latter there was only one damper, instead of two, which had the effect of filling the bakehouse with vitiated air and steam. Stretched across the bakehouse there were five clothes-lines, on which he found the wearing apparel of the defendant and his family hung up to dry. On a small raised platform he found a mangle and a quantity of dirty clothes, by the side of which sacks of flour were stacked. The only daylight that could possibly reach the bakehouse was through a window, but the glass was broken, and the window covered and blocked by a sack. This window was only two feet above the street-level, and the bakehouse became the receptacle for the dust that blew about the street. The water used for making the bread was supplied from a tap, which was fixed over a small trap. In this trap he found a rolling-pin, which the defendant said he placed there to prevent an influx of sewage, which repeatedly came up into the bakehouse. The witness said the defendant had closed the premises, and the Vestry did not wish to press the matter unduly, and were willing, now that the object of the proceedings had been accomplished, to ask for the costs only. These the defendant agreed to pay, and the matter dropped.

NOTE.—In this case the bedroom occupied by the baker and his wife was separated from the bakehouse by a partition of match-boarding. Proceedings, therefore, could not be taken under the Factory and Workshop Act, 1878. Neither could the occupant be proceeded against under section 96 of the Public Health (London) Act. His bedroom and that of his children opened the one into the other; but he had a shop and sitting-room on the ground-floor above, so that

the underground rooms were not let or occupied *separately* as a dwelling, and were accordingly outside the operation of section 96.

Case C (St. George's, Southwark).*

At the Southwark Police Court, on April 24, 1894, a baker, carrying on business in the Borough, appeared to a summons taken out by Dr. Waldo, at the instance of the Vestry of St. George the Martyr, Southwark, charging him with 'having, on March 12, unlawfully used a room at Tabard Street as a bakehouse whilst such room was in such a state as to be on sanitary grounds unfit for use or occupancy as a bakehouse.' Mr. Watson, barrister, appeared for the defendant, and took objection to the vague terms of the summons which, in his opinion, disclosed no offence in detail, nor supplied any details of a sanitary character which would enable the defendant to remedy the alleged insanitary condition. Mr. Slade replied that the summons used the identical words laid down in section 16 of the 1883 Act. The Act did not place the *onus probandi* upon the Medical Officer of showing the defendant what he should do with an insanitary bakehouse.

Dr. Waldo said that on March 12 last he visited the premises, accompanied by Mr. Edwards, the Chief Sanitary Inspector, and after passing through the shop he came upon a passage. The latter was in a dirty condition, the wall being covered with cobwebs, and it led to a small landing at the top of a most dangerous flight of stairs leading to the bakehouse. On the small landing he found a w.c., also in a very dirty condition, and absolutely without any ventilation, save through the bakehouse. On the

* From the *Baker and Confectioner*, April 27, 1894, with the addition of a few details of evidence inserted for the sake of clearness.

landing also he found a large quantity of house refuse strewn about. The steps leading to the bakehouse were steep, and witness was forced to climb down them sailor-like, backwards. Mr. Watson: I did the same myself.—Dr. Waldo: Then you know the difficulty there is in entering. Upon reaching the basement, or cellar, he found that half of it was used as a coal cellar and for the storage of flour. The bakehouse was exceedingly dirty, one remarkable feature being the number and size of the spiders and their webs. The only ventilation was by a few small windows which were below the level of the street, and admitted large quantities of dust. Just over the board where the dough was kneaded he found an enormous number of spiders—'all large and evidently well fed,' added the witness. The walls were dirty and covered with cockroaches; the ceiling was broken in many places, and dangerous. The furnace was an old one, without a damper, or a 'sulphur flue,' as it was called in the trade. The result of this would be that the bakehouse would be filled with carbonic acid gas, carbon, carbon monoxide gas, and sulphurous acid gas, highly dangerous and injurious to the men working in the bakehouse. The dust and dirt blew in from the street, and some time since, when he visited the premises, he ascertained that there was often an influx of sewage. A trap, however, had been fixed, but it was not efficient. Two journeymen were working in the cellar at the time of his visit. No damp-proof courses existed in the walls. The ceiling was dilapidated, and the plaster had fallen away from the laths in many places. In his (witness's) opinion, the premises were quite unfit for a bakehouse, and it was his firm conviction, as a medical man, that no such underground bakehouse could possibly be made fit for use, yet there was no Act to prevent them being built even now. In cross-examination, Dr. Waldo

admitted that the premises had been repaired and cleaned. Mr. Watson: Do you know that since 1878, at least two district surveyors and several medical officers and sanitary inspectors, who have inspected the premises, found no fault?—Dr. Waldo: No; I am only able to report what I have seen myself, and to express an opinion that the faults discovered are many and serious.—Mr. Watson: They did not make themselves so busy as you do, did they?—Dr. Waldo: Their official duties are many and varied, and formerly in this district they had not the time to visit these places more than once or, at most, twice in a year. The staff has recently been doubled, and the bakehouses are now inspected once every three months. Chief Sanitary Inspector Edwards corroborated Dr. Waldo's testimony. Mr. Watson, for the defence, said his client was quite willing to conform with the law, and since the visit of Dr. Waldo he had thoroughly repaired the premises. In support of this a surveyor named Lansdowne, son of the late district surveyor to the London County Council, was called, and stated that his father had frequently inspected the premises before his death. Witness had visited the premises that afternoon, and he found them in as perfect sanitary condition as it was possible for a cellar bakery to be.—Mr. Slade: There will be a conviction. I shall fine the defendant the full penalty of forty shillings and costs, and after hearing the evidence of the Medical Officer, I refuse to order means to be adopted by the occupier to remove, within a time named, the ground of complaint.

Case D (St. George's, Southwark).

Dr. F. J. Waldo, on behalf of the Vestry, prosecuted a baker in the Old Kent Road for occupying and using as a bakehouse a place unfit, on sanitary grounds, for such

use. The summons was issued under Section 16 of the Factory and Workshop Act, 1883. The case came before Mr. Slade, magistrate, in the Southwark Police Court, and was, by consent, remanded by him.

During the year 1893 the above premises were used as a bakery by another occupier, and bread and pastry baked therein by three men and two boys.

Evidence by Dr. Waldo: Premises rented by agreement (three months) from the Corporation of the City of London. Visit paid with Mr. Edwards, Chief Sanitary Inspector, March 21, 1894. Descended stairs to cellar, varying from six and a half to seven feet in height. Topmost part of cellar unceiled and forming floor of shop above. Was able to look through cracks in same from below into shop. Floor of bakery dirty, with accumulations of rubbish near bottom of stairs and near oven. Floor composed of bricks and stone, and in parts of earth only. Walls, no damp-course, dirty and discoloured. Old-fashioned brick oven under footway. No 'sulphur flue' to furnace. Ventilation imperfect, opening level with footway, 4 ft. long and 16 in. high, half of which was covered up with a sack, remaining half glazed, but broken. At back part of cellar a hole 3 ft. by 2 ft. opened into a small back yard. Sacks in bakery contained flour and currants. Back-yard had w.c. 3 or 4 ft. from bakery: contained much decomposing and decomposed vegetable refuse.

This bakehouse was old and dilapidated, and structurally unfitted for use as a bakehouse. It could not, in Dr. Waldo's opinion, be rendered dangerless (*a*) to food-producers; (*b*) to consumers.

Occupier consented to disuse cellar for baking.

Case E (St. George's, Southwark).

(*Not Prosecuted.*)

Extract from Special Report to the Vestry of St. George's, Southwark, November 7, 1893, on 'Sewage Flooding of Basements, due to the inadequacy of Main Sewers vested in the London County Council.' 'The last house visited on October 10, 1893, and reported on by me to the London County Council, contained a baker's shop, beneath which was a cellar. Here bread was in process of manufacture by the master and a journeyman baker, who worked, as best they could, in a flood of sewage, the while their heads and the bread were subjected to a downward draught of dust and dirt, which blew in eddies through a ventilating grating level with the street above. In one corner of this workshop a row of sacks filled with flour rested on a rude wooden platform raised to a height of 3 in. The sewage had forced its way through a gully-trap, and when this no longer served as a safety-valve, had then risen between the junctures of the bricks and stones forming the paving of the bakehouse, so great and irrepressible was the power of the backward-driving current of main-sewer sewage. The stain of the sewage was plainly visible at a height of 4 in. The fluid had fouled the under surface of the sacks, and penetrated to the flour, so that it was caked together in lumps.'

P.S.—The master baker told me in the presence of Mr. Edwards, Chief Sanitary Inspector, that he had passed as much of the lumpy flour as possible. With the fine flour he had made bread, and what remained on the sieve he had given to his fowls.

Case F (Whitechapel).*

At the Worship Street Police Court, on Saturday last, a baker, carrying on business at 52, Brushfield Street, Spitalfields, was summoned, before Mr. Bushby, by the sanitary inspector of Whitechapel parish, for permitting a nuisance to exist in his bakehouse. The inspector, Mr. Harvey, said the defendant was tenant not of the whole house, but of a shop, a room behind, and a bakehouse behind. The witness visited the premises on February 27, and inspected the bakehouse. He found a w.c. divided from the bakehouse by a rough partition, the approach to the place being by a dark passage with wooden walls. All along the passage, and percolating through the wooden sides into the bakehouse, sewage matter was flowing inches deep. At one side of the bakehouse was the trough for mixing the dough. It was within a few inches of the w.c., and the wet and ooze from that place had soaked under the trough for all its length. The sleeping-room behind the shop occupied by the defendant and his wife was over the passage, which was flooded with human excreta. The w.c. was choked up, and it was evident that the passage was used by the people of the house without resorting to the w.c. There were forty-eight people living or working in the house, seventeen of them being children. A notice was served on the defendant to do away with the nuisance, and two days later the place was visited again. The defendant was then in bed, but a man and a boy were making tarts in the bakehouse, bread being made and baked at night, the trough mentioned being used. Nothing had been done, and a summons was at once applied for.

* From the *Bakers' Record*, March 9, 1894.

The defendant said the closet was not his, but was used by the whole house. Mr. Bushby asked how long the nuisance had been existing. The sanitary inspector said he thought the defendant had been there three months. It was usual to visit bakehouses twice a year. Mr. Bushby thought a visit twice a week would better secure public protection. He remarked that he had never heard anything more horrible. It was a wonder the defendant was alive to tell the tale. The defendant said he was only a weekly tenant, and could not do the work. There was a tailor's shop on the same floor as the bakehouse, and tailors' workrooms on the third-floor of the house. The inspector said that the house was rated to a foreigner, and was rack-rented to various tenants. The defendant said he paid thirty-three shillings a week for the shop, bakehouse, and sleeping-room, and had paid the landlord thirty pounds to get possession. Mr. Bushby said the place had better be closed without delay. The inspector said it was necessary, as the filth was over his boot-tops. He would serve a notice on the owner to cleanse and purify, but also to remove the w.c., which was not allowed so near the bakehouse. Mr. Bushby made an order to close the place forthwith under Section 5 (6) of the Public Health Act.

Case G (Bermondsey).*

Mr. E. H. Wood, Deputy Coroner, concluded a long inquiry at the Town Hall, Bermondsey, last night respecting the death of Henry Bortsh, aged twenty-eight years, a journeyman baker, of New Buildings, Fendall Street, Bermondsey.—Helen Bortsh, the widow, said that deceased was employed by a retail baker, of 49, Abbey Street,

* From the *Echo*, August 22, 1894.

Bermondsey. She last saw him alive at midnight on Sunday, when he went to his work. He had been twice previously to the bakehouse during the day. Last Friday he started work at midnight, and reached home at nine o'clock on Saturday night. This occurred every week. His wages were twenty-seven shillings per week and two loaves of bread. He was unable to eat his meals regularly, as the bakehouse was so hot.—A Juryman: Did he have to work the twenty-four hours right off?—Witness: Yes, he was in the bakehouse the whole time.

Evidence having been given as to the deceased suddenly falling insensible in the bakehouse on Sunday night, and dying soon after, William Pound, coroner's officer, stated that he had measured the bakehouse. It was 16 feet long, 10 feet wide, and 8 feet high. The only ventilation was a grating, 9 feet wide, and a staircase leading to a shed.—Henry Thomas, Chief Sanitary Inspector to the Vestry, stated that he had examined the bakehouse, which was an ordinary underground one. It was clean and fairly well ventilated. There was plenty of air space for one man to work in.—The Coroner: But there were two working there. Do you think it safe for a man to work in such a place twenty-one hours right off?—Witness: It was much too long in my opinion.—The Coroner: Is this a fair specimen of the Bermondsey bakehouses?—Witness: It is superior to some, and inferior to others.—The Coroner: Is it fit for two people to work in?—Witness: I think not.

The master baker said that the deceased had worked for him three months.—The Coroner: What hours did he work?—Witness: It all depended on his own management.—The Coroner: What were his average hours a week?—Witness: About thirteen hours a day.—The Coroner: We hear he worked twenty-one hours right off on Fridays; is that so?—Witness: It might have happened.—The Coroner:

Then I consider it is most outrageous. Is it customary for Bermondsey bakers to work their men for twenty-one hours at a stretch?—Witness: A good many do.—Dr. J. H. Coulahan stated that death was due to an apoplectic fit following acute indigestion.—The Coroner: Was he strong enough to undergo the number of hours mentioned? —Witness: It is a great strain on a man unless he takes sufficient food.—The Jury eventually returned a verdict according to medical testimony.

NOTE.—The foregoing case illustrates the excessive hours of work exacted from journeymen bakers, and affords a startling contrast from the eight hours a day demanded by many workers in healthier trades. When taken with Case F (Whitechapel) it disposes of the assertion freely made in some of the bakers' journals that the bad bakeries are confined to Southwark. The fact that two such cases could possibly occur in a so-called Christian and civilized country is more than enough to condemn the present system. In reference to the Bermondsey inquest, the *Medical Press and Circular* called attention to the absence of the Medical Officer of Health in so important a case.

The following letter appeared in the *Daily Chronicle* for August 25, 1894:

To the Editor of the 'Daily Chronicle.'

'SIR,

'The death of the unfortunate young journeyman in the Bermondsey bakery points the moral of a tale, the horror of which has often enough been laid before the public. The reported dimensions of the cellar bakery give 1,280 cubic feet, from which must be deducted at least 200 cubic feet taken up by the troughs. This leaves a space of 1,080 cubic feet, in which two men were boxed up nightly for

long hours of laborious work. The atmosphere, be it remembered, was poisoned not only by breathing but also by the noxious gases given off by the fermenting dough, by the gas-jets, and by the furnace. Ventilation, as usual, appears to have been absolutely inadequate. In this den of darkness, heat, and foul air, the unfortunate baker who is now at rest was fated to spend, according to his master's admission, ninety-two hours of each week. In a prison cell each inmate has an allowance of 600 cubic feet of air space, which is renewed frequently, that is to say, there is good ventilation. Compared with that of many of our London cellar bakeries the atmosphere of a convict cell is a paradise.

'The master bakers resist any attempt at reform, because it will cost them money to build proper bakeries, and lessen their profits to place their workmen under wholesome conditions. How long are they to be allowed to batten on the lives of their journeymen? Such a state of things is tolerated in no other trade.

'I would ask the Medical Officer of Health of Bermondsey, and not his subordinate sanitary inspector, how many of these underground noisome bakeries exist in his district, and what steps have been taken either to close them or to set them in order?

'I am, Sir, yours faithfully,

'SCRUTATOR.

'LONDON, *August* 23.'

THE END.

London: Baillière, Tindall and Cox, 20 and 21, King William Street, Strand.

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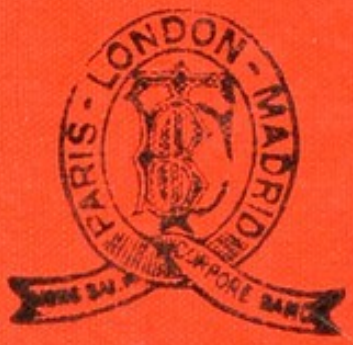
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