

The pottery manufacture in its sanitary aspects.

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THE POTTERY MANUFACTURE

IN ITS

SANITARY ASPECTS,

BY

J. T. ARLIDGE,

M.D. and A.B. (Lond.), F.R.C.P. (Lond.)

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*With the author's
best respects*

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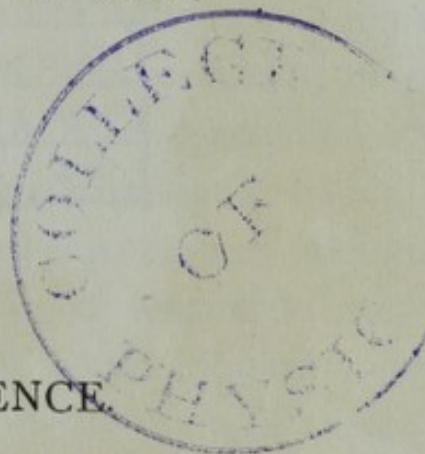
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The Pottery Manufacture in its Sanitary Aspects.

PREFACE.

SOME few years since I was requested by several towns in the Potteries to deliver some lectures on the health of potters and collateral subjects. Those lectures were very flatteringly received, and I was asked to publish them in a cheap form for distribution and sale in the district. They did not at all exhaust the subject, but left much to be said to render them complete, as a picture of the conditions of labour, of the sanitary features, and of the diseases existing in connection with the manufacture of pottery. As the circumstances of trades, in their commercial, social, and sanitary aspects, have of late been so largely brought under public notice, it seemed to me to furnish an appropriate opportunity for some comments and suggestions as to possible measures to obviate some of the evils to health entailed by certain processes connected with the potter's trade.

In carrying out this purpose, as a matter of course, I write from a medical point of view, and the value of some of my suggestions will have to be determined by practical potters.

J. T. ARLIDGE, M.D. and A.B. (Lond.), F.R.C.P. (Lond)

The High Grove, Stoke-on-Trent, December, 1892.

THE HISTORY OF THE UNITED STATES

CHAPTER I

The first part of the history of the United States is the story of the early years of the nation. It begins with the discovery of the continent by Christopher Columbus in 1492. The early years of the nation were marked by the struggle for independence from Great Britain. The American Revolution was fought between 1775 and 1783. The United States Declaration of Independence was signed on July 4, 1776. The Constitution of the United States was signed on September 17, 1787. The early years of the nation were also marked by the westward expansion of the United States. The Louisiana Purchase of 1803 doubled the size of the United States. The Mexican War of 1846-1848 resulted in the acquisition of California and New Mexico. The Civil War of 1861-1865 was fought between the Union and the Confederacy. The Civil War was the bloodiest and most destructive war in the history of the United States. The Reconstruction period followed the Civil War. The Reconstruction period was a time of great change and struggle. The Reconstruction period ended in 1877. The Reconstruction period was followed by the Gilded Age. The Gilded Age was a time of great wealth and corruption. The Gilded Age ended in 1900. The Progressive Era followed the Gilded Age. The Progressive Era was a time of great reform and change. The Progressive Era ended in 1914. The Progressive Era was followed by the World War I period. The World War I period was a time of great conflict and change. The World War I period ended in 1918. The World War I period was followed by the Roaring Twenties. The Roaring Twenties was a time of great prosperity and change. The Roaring Twenties ended in 1929. The Roaring Twenties was followed by the Great Depression. The Great Depression was a time of great hardship and change. The Great Depression ended in 1933. The Great Depression was followed by the World War II period. The World War II period was a time of great conflict and change. The World War II period ended in 1945. The World War II period was followed by the Cold War period. The Cold War period was a time of great tension and change. The Cold War period ended in 1991. The Cold War period was followed by the present day. The present day is a time of great change and challenge.

THE HISTORY OF THE UNITED STATES
CHAPTER I

THE POTTERY MANUFACTURE IN ITS SANITARY ASPECTS.

The Materials Employed.

To understand the subject in hand it is necessary to consider the circumstances under which the manufacture is pursued, and the materials employed. Excepting the bones of cattle used in making china, some gum-resins which enter into the composition of "lustre," and some oils used as media in decorative processes, all other substances in use belong to the inorganic or mineral kingdom of nature. Indeed, even the bone derived from animals is reduced by calcination to the mineral state before it serves the purposes of the potter.

The most essential materials are the clays, procured from Devonshire, Cornwall, and Dorsetshire, and severally known as white or Cornish clays, and blue and ball clay. Besides these are Cornish stone and flint. The former is a partially decomposed granite, and the so-called clay itself is of the same origin, but further reduced to powder by the action of the air and of water. The flint comes as flint from chalk strata, whilst chert, used in flint mills for grinding, is the very dense, heavy flint occurring in mountain limestone. The common clay and marls of the Pottery district are turned to account in saggar making and in forming the "body" of quarries—ornamental and other, and also of terra-cotta.

Flint—after being calcined and reduced to a very fine powder—is united with clays to form the substance or "body" of earthenware, but the larger portion of it is employed as a packing material in "placing" china in the saggars preliminary to firing the enclosed ware.

Other earthy substances in use are plaster of Paris and felspar; the former for modelling and making casts; the latter chiefly for the making of Parian.

It is unnecessary to mention coal as another member of this class of mineral objects; for at present coal is the sole source of heat used for firing ovens and kilns; and its abundance in North Staffordshire is a primary reason for the existence of the Pottery manufacture in the district.

One other material which occupies a middle position between earthy minerals and metallic products, is borax, an essential constituent of glazes.

Besides the earthy minerals mentioned, various metals are required. Foremost amongst these is lead, which is a constituent of the glazes which enamel the surface of ware of all sorts, and likewise of many colours employed in the ornamentation of earthenware and china. Without glaze ware would be porous, absorbent, and practically useless. Both white and red lead are in use.

The other metals and their derivatives or salts belong to the category of materials used for ornamentation. Such are gold, platinum, silver, mercury, copper, tin, cobalt, manganese, chromium, salts of potassium and sodium, and now and then one or other of the rarer metals in minute proportions and for the highest class of ware.

Other non-organic substances of limited use are nitric, nitrohydrochloric, and hydro-fluoric acids; the two former being resorted to in making colours and in dissolving gold; the latter in biting in patterns on china by its highly corrosive action.

§ i.—CLAY-DUST.—In the foregoing list of materials, those which exert the most distinct and serious influence upon the workmen employing them, are the so-called clays, Cornish stone, flint, and lead. The two first-named are injurious by their dust evolved in various operations in the formation of pottery; and it may be asserted that this dust is noxious to the lungs in direct proportion to the amount of silica contained in it. This silica is insoluble and not acted upon by the juices or secretions of the human body. A microscopical examination of clay-dust shows it to be composed of minute siliceous particles, angular, pointed, and jagged, and suggestive of the evils they must inflict on the delicate lining (the mucous membrane) of the air-tubes and on the cells of the lungs, to which they gradually penetrate. Their presence is a cause of inflammatory action, from which, in course of time, a dense condition of the lung substance is the consequence, whereby the air is excluded, and the breathing organs rendered useless for their purpose. The mischief done is progressive and slow, and consequently escapes notice for a longer or shorter period, determined materially by the impurity of the air breathed, and by the habits, carefulness, and constitutional state of the workers.

The first symptom of the lung trouble is the desire to cough and clear the throat on first rising in the morning; then the

cough increases in frequency and severity, and the expectoration of mucus ensues, with the early development of difficulty of breathing. It is now that the sufferer finds himself getting short of breath or asthmatic, and unless the provoking cause—the dust—be avoided, the expectoration becomes yellowish and greenish, the whole system suffers and wastes, and his friends recognise that he has potters' consumption, or, in local phraseology, potters' rot, which will sooner or later carry him to the grave.

This brief sketch of the action, the course and consequences of inhalation of potters' clay and flint, points imperatively to the necessity and duty of obviating the production, diffusion, and breathing of the mischief-working dust, by resort to every available means. These means are to be sought in the proper construction, heating, cleanliness, and ventilation of shops, coupled with prudence, sober living, cleanliness, and careful working on the part of the potters themselves.

What havoc to health and life follows upon dust inhalation is unmistakably shown by the sickness and mortality returns, published by the Registrar-General and by friendly societies in their reports; as well as by the experience furnished by the North Staffordshire Infirmary, and confirmed by that of every medical practitioner in the Potteries. But even all these sources of information do not represent the sum total of the ills traceable to the source in question; for, over and above the deaths distinctly attributed to potters' asthma and consumption, there are no few cases in which death has been assigned to other causes, or been accelerated by the existing lung affection. And could a history of morbidity, of disablement and of chronic illness be collected, as associated with the chronic malady of the potters' trade, a still stronger impression of the mischief wrought by it would be imprinted on the mind.

Some conclusions and figures arrived at by Dr. W. Ogle, the physician and statistician attached to the office of the Registrar-General, may here be adduced in illustration of the facts stated (see the supplement to the 45th Annual Report of the Registrar-General.) He first quotes the conclusion of his predecessor in office, Dr. W. Farr,—that the 'potters' employment "is one of the unhealthiest trades in the country"; and then proceeds thus—"What is most unsatisfactory to learn is, that the mortality rates on which Dr. Farr founded his opinion in the preceding decenniad (10 years) have in the subsequent 10 years' returns increased at each of the two age-periods (20 to 45, 45 to 65), and now show a comparative mortality figure of no less

than 1742, which is only exceeded in the table by the figures for costermongers, Cornish miners, and inn and hotel servants. This excessive mortality is in greatest part due to phthisis and diseases of the respiratory organs, the deaths from these two causes being represented by 1118, while the number for all males is only 402; so that the mortality under these two headings is almost three times as great in this industry as among average males. There is only one occupation, viz., mining in Cornwall, in which the mortality from these two causes is higher; and scarcely any other in which near approach is made. The mortality from diseases of the circulatory system is also extremely high (their comparative mortality figure being 160, as contrasted with the normal 120); whilst that ascribed to alcoholism and to liver disease seems to imply a certain but not very great amount of intemperance."

As physician for thirty years to our noble and large Infirmary, I have been enabled to investigate the nature and causes of the sickness prevalent in this district; and, from time to time, to express my opinions. Having also gone extensively into the statistics of mortality, I find that my conclusions accord with those of Dr. Farr and Dr. W. Ogle. My comparative inquiry respecting the mortality of potters and non-potters showed that the mean age of potters, of the age of 20 and upwards at the time of death, was $46\frac{1}{2}$ years, whilst that of non-potters was 54. Again, in the case of potters, the mortality from chest diseases, calculated on the total of deaths in Stoke parish (including Stoke, Hanley, Fenton, and Longton) amounted to 12.91 per cent., whilst in workmen, not being potters, it reached only 7.86 per cent. A like difference prevailed with regard to consumption (phthisis), which carried off 12.90 per cent. of the former class, and only 9.27 of the latter.

Further, the deaths of male potters from diseases of the respiratory organs, in relation to their *entire mortality* from all causes, were 60 in place of 27 per cent., as calculated for the entire male population. The maximum of deaths from these maladies occurs in the decennium of life from fifty to sixty, and declines progressively in each preceding decennium, as the twentieth year is approached. In the twenty years, between forty and sixty, 43.52 per cent. of the entire mortality happened. With regard to phthisis, the maximum mortality was reached between thirty and forty. The inference is, that pulmonary consumption cuts off potters predisposed to it in the highest ratio prior to the fortieth year; whilst those not so predisposed fall victims to the non-tubercular chest lesion,—the special consequence of the employment, at a later life period.

The very extensive outpatient practice of the Infirmary furnishes ample statistics of the diseases for which treatment is sought. Of 800 treated, all of whom were occupied in some department of the pottery manufacture, 463 were males, and 337 females. The percentage of the diseases found in the two sexes stood thus :—

	MALES.	FEMALES.
Bronchitis - - - -	36·57	7·14
Phthisis - - - -	20·90	16·96
Rheumatic Affections - -	7·79	4·46
Stomach Disorders - -	8·44	19·64
Plumbism - - - -	8·00	5·06
Cerebro Spinal Diseases -	4·32	2·97
Cardiac Disease - - -	2·81	2·08
Epilepsy - - - -	1·73	4·46

This table may be contrasted with the following similar one for *non-potters* :—

	MALES.	FEMALES.
Bronchitis - - - -	18·00	16·00
Phthisis - - - -	13·00	11·00
Rheumatic Affections - -	21·00	1·00
Stomach Disorders - -	19·00	31·00
Plumbism - - - -	0·00	0·00
Cerebro Spinal Diseases -	5·00	2·00
Cardiac Disease - - -	6·00	3·00
Epilepsy - - - -	5·00	7·00

These figures distinctly prove that there must be something special in the work of male potters to account for the occurrence of bronchitis among them to the extent of double what happens among workmen of like ages engaged in pursuits of all sorts other than potting. On the other hand, the variation in the proportion of phthisis between the two classes is far less marked, although this malady indicates a higher frequency among potters of both sexes. Gastric troubles abound far more among non-potters than with potters—a fact accounted for by the circumstance that the average age, especially of female out-patients, is greater in the case of the former; and that amongst them is a larger proportion of hard-working, ill-fed and broken-down housewives, wanting the means possessed by the working pottery hands for securing proper food and lodging. The last-named again have the advantage of better protection against inclemencies of weather—a fact that further displays itself by the

lesser frequency of rheumatism among them. But the higher ratio of phthisis among potters indicates that causes are at work with them more favourable to the onset of that malady—such, for instance, as mineral dust, confinement in hot shops, and sedentary work—than prevail in the general mass of poor women.

Whence arises the astonishing high ratio of bronchitis among male potters is demonstrated by the following table of the registered illness of pressers—a class of workmen exposed more than any other to dust inhalation:—

MALE PRESSERS—263.

Bronchitis was present in	-	-	55·5	per cent.
Phthisis	„	-	17·8	„
Stomach Disorders	„	-	10·6	„
Cardiac Diseases	„	-	2·28	„
Epilepsy	„	-	1·52	„

Strange to say, there have been some Quixotic attempts to deny the unhealthiness of the potters' craft. They certainly cannot have proceeded from any person practically acquainted with the health-history of the trade, or with the statistical information available to any honest inquirer. There are, indeed, potters who reach three score, and even four score years, but such constitute rare exceptions, and investigation will sufficiently explain why they have escaped the usual fate of early death. Their history is that of careful, regular-living, sober men, of good constitution, who have used every precaution against the dangers of their calling, and enjoyed sanitary advantages in the places where they have worked and dwelt. But even these long-lived specimens will almost all be found "touched in the wind," and sufferers with chronic cough for years before death.

A young potter, of good physical development, commencing his career, and others who may have carried on work for some few years, leading temperate lives, using care and observing cleanliness in clothes, in person, and in the performance of their task, may feel no ill effects, and give their trade a good character for healthfulness; but prolonged experience will assuredly compel them to modify their views. The disease from dust is no acute malady with pronounced symptoms from the very first; but one that stealthily and insidiously, but most surely, advances to the destruction of the lungs as respiratory organs, and to a fatal termination.

The Conditions, Circumstances, and Kind of Employment

greatly modify the morbid results of the trade, in regard to severity and duration.

1.—Clay-dust is pre-eminently the disease factor in the case of pressers—both hollow and flat, of turners, throwers, and lookers to ware, and in a much less degree of clay-pressers and placers ; and, among the young, in the instance of jiggerers, mould-runners, and those who do odd jobs for the adults, often spoken of as “doing kail.”

Among women its hurtful character is illustrated in the case of wheel and lathe turners, of handlers and handle-makers, of fettlers of the ware, and to some extent of stilt and spur-makers.

But far more murderous to women is flint-dust, given off in the process of scouring china—an occupation that can be carried on but for a brief period before it precipitates the onset of chronic bronchitis, asthma, and pulmonary consumption.

Largely contributory to the serious consequences of dust inhalation are the insanitary conditions under which work is carried on. Few workshops approach what, from a sanitary point of view, they should be. Their cubic capacity and ventilation are deficient, and, even if capacious enough, they have no regular inflow of fresh, and outflow of vitiated, air ; and when crude attempts are made to ventilate, they are commonly only productive of draughts. The modern system of heating by steam or hot-air pipes will sufficiently warm the places of work ; but when unaccompanied by means for changing the air, the shops get filled with stagnant air, vitiated by the breath and exhalations of the workpeople, and often over-heated. This last-named circumstance entails the more rapid drying of the clay in use, and the consequent larger development of dust. Besides, undue heat gives rise to unhealthy sweating, to lassitude, and to a morbid susceptibility of the body to cold and its protean results ; whilst it at the same time favours the production of cold draughts whenever an outer door or window is opened.

Another insanitary circumstance is the dirty state in which so many shops are kept. It is inevitable that portions of clay become detached in the processes of pressing, turning, throwing, and handle-making ; but to allow the fragments to accumulate on the bench, or to fall and remain on the floor for a whole or even half a day, is not unavoidable. Common sense suggests that they should be gathered before becoming quite dry ; and if this cannot be achieved, they certainly should be speedily removed from the floor, where they become a fertile source of

dust by the trampling and movements of the workpeople. Moreover, in some factories the accumulation and diffusion of dust is made worse by the presence of high-placed racks and shelves filled with unfinished ware, or moulds not in use, all necessarily coated with fine dust, which every current of air displaces and showers down upon the heads of the artisans at the bench.

How and when best to clean the shops and benches from clay and dust is a question well deserving consideration. It stands to reason that the sooner the offending matter can be removed the better. Cannot sweeping be carried on by supernumeraries during the dinner hour? And would it not be better to sweep at night, after the conclusion of the day's labour, than to do so in the morning, prior to work commencing? The business is usually assigned to lads, for the most part young ones, who have just embarked on factory labour. In such hands we naturally look for rough, careless performance, and the production of unnecessary clouds of dust, which have not time to settle down before the artisans begin their morning toil. Were the business done at night the up-raised dust from sweeping would have ample time to settle before the entrance on work in the morning. The Factory Act might prove a hindrance to this plan, involving, as it would, evening work, where young persons or children are employed; but this difficulty might be got over by putting an adult male on the job, and making it his special business.

To obviate the raising of dust, sprinkling the floor with water before sweeping has been recommended. The objection to this is, that if injudiciously done, the floor gets coated with a greasy dirt, uncomfortable to everyone, and very soon by heat converted into fine dust. The use of some material like wet sawdust suggests itself as partly removing the inconvenience.

Again, no observer can fail to notice that there is great room for attention to the windows and yards of factories. The windows are supposably intended to give light; but, from their usual state, they suggest that potters require a very subdued light. And as for the yards, in many establishments when wet weather prevails, mud and puddles abound. What an ordinary observer might expect is, the assiduous use of brooms. But a more excellent way to improve matters would be to pave the yards.

Whilst on this subject of factory cleanliness, a few words on personal cleanliness will not be out of place. Men at work, for the most part, wear overalls, or at least aprons. The wisdom of this proceeding is apparent, because such articles, made of linen,

do not permit the accumulation of dust upon the clothes, as would woollen tissues ; and, besides this, they lend themselves easily to washing. The best form of such working attire seems to me to be that of the blouse, so generally worn by Continental workmen ; and the potter, thoughtful for his health, will wear as little outside woollen clothing as he conveniently can. But women "working in the clay" appear to think any special covering unnecessary. They seem to prefer cast-off woollen and other dresses, rich in plaits and folds and other finery, and to cover their heads with some dilapidated adorned hat, or else to work uncovered, except for the layer of dust accumulated on and in the hair. At the same time, especially with the younger ones, the neck and chest are encompassed in some fluffy dust-holding article, selected for its colour and pattern, and usually of bygone beauty. These dusty clothes are carried to their homes, and along with them, some of the evils of their occupation.

How best to guard against the raising and diffusion of dust in the manufacture of pottery is pre-eminently a question for engineers. Thirty years ago, engineers found no scope for their invention and skill. It is now otherwise ; every year some new and improved method of working is introduced, whereby manual labour is saved, production increased, and the evils of the trade for the most part diminished.

The value of the engineer's skill is well illustrated in connection with the process of "towing." On the introduction of this process, it threatened to rival, by the generation of dust, the mischievous business of "scouring." But mechanical skill has robbed it of most of its terrors. It will ever be a dusty operation, but by the introduction of ventilating fans to abstract the dusty air and to introduce fresh air from without, the dust of towing shops is now comparatively little. Moreover, by the ingenuity of Mr. Turner, himself a potter at Tunstall, enclosed working boxes have been introduced, which prevent the diffusion of the dust produced, possibly to the greatest extent that can be attained.

The value of fans for ventilation, is now generally recognised, and the Factory Inspectors wisely aim at their still wider introduction into potteries. The obstacle to their general adoption is that in many of the older factories the workshops are so awkwardly arranged that the transmission of power is difficult ; or else the establishments are of small size and possess no engines to supply steam power ; an impediment however not insuperable, seeing that gas engines of very efficient power, and not very costly, can be substituted for steam apparatus.

It occurs to me whether the benches of pressers could not be

arranged so as to allow the dust settling on them to be withdrawn, by a strong extracting fan acting beneath them. In the instance of turners, where the dust from the lathes falls in front of them, it could be collected and drawn away through a funnel-shaped tube by extracting air-force, on the same principle as seen in operation in needle factories, and generally where grinding of metal is carried on. Here again the ingenuity of engineers is called for.

To rob the work of women scourers of its destructive energy it seems feasible to perform the scouring over and upon a perforated bench, with a strong underdraft to prevent the rising upward of the dust, and to withdraw it by an extracting fan.

It is well worthy the consideration of manufacturers, and a problem for solution on the part of architects and engineers, whether the position of the hot-drying closets immediately behind the pressers at work is an essential arrangement. If not, their removal would materially lessen the heat and dust of shops, and otherwise add to the health and comfort of the men. How best to effect this, and to substitute drying rooms, may be left to the professional gentlemen alluded to, in consultation with practical potters. It is as clear as the day that the pottery trade in technical matters and arrangements has fallen into a well-worn groove; the requirements of the day and the progress of general and technical knowledge, demand its being lifted out of it.

The preceding remarks have pertained to clay and flint dust, but potters are exposed to other sorts of dust; chief among which are those of plaster of Paris and lead. The former has a limited range of action, and those who suffer from it are the mouldmakers and modellers, comparatively a very limited body of artisans. Happily this dust is far less injurious than that of clay and flint; and, in the occupations adverted to, it is almost wholly under the control of those employing it, who need only ordinary care and prudence in handling it, to obviate its diffusion through the shop.

§ ii.—Lead.—The other dust noted, viz., that of lead, exhibits injurious results exceeding those of all other kinds of dust in severity, by reason of its highly poisonous properties. The group of maladies provoked by it go by the useful general name of *Plumbism*; a condition represented by colic, paralysis, severe brain phenomena, obstinate constipation, and general deterioration of the blood and nutrition of the body.

The poison finds its way gradually into the whole mass of the circulating blood, and exerts its effects mainly on the nervous

system, paralyzing nerve force, and with it muscular power. Its victims become of a sallow-waxy hue; the functions of the stomach and bowels are deranged, appetite fails, and painful colic with constipation supervenes. The loss of power is generally shown first in the fingers, hands and wrists, and the condition known as "wrist-drop" soon follows, rendering the victim useless for work. The palsy will extend to the shoulders, and after no long time to the legs also. Other organs frequently involved are the kidneys, the tissue of which becomes permanently damaged; whilst the sight is weakened or even lost.

Commonly the evils of lead poisoning are of slow growth; months and even years will at times elapse without the lead-worker experiencing them in a very tangible form. At other times, two months, and, exceptionally, a less period—suffice to produce the symptoms of plumbism. In fact, one of the most remarkable phenomena of the poison is, its very different activity in different persons, so that some will work for a long series of years without any grave consequences from it, whilst others fall victims to it within a few months. To account for such divergencies it is common to appeal to constitutional peculiarity, or what is called idiosyncrasy; and there is no denying the operation of this cause; nevertheless, in the majority of cases, the difference is to be explained on more obvious grounds, existing in carelessness at work, indifference to cleanliness of the person and clothing, in reckless eating and drinking in the place of work, and in wearing the clothing begrimed with glaze, whereby the poison is carried to the homes. Lastly, ill-constructed, dirty, confined shops and want of free ventilation contribute an important factor.

A yet further circumstance has to do with the varying results observed, and one of considerable importance, viz., that the glazes employed by different manufacturers vary greatly in the proportion of contained lead, and especially that of the crude carbonate finally added to the "frit." Whether this addition be necessary to ensure a good glaze is a problem to be solved by experiment and practice. But this much may be said, that in the matter of economy there is little to be gained by using a heavy proportion of lead, regarded as the cheaper ingredient, since the price of borax has of late years been so very greatly reduced, that the obstacle to its more liberal employment is removed.

With respect to the entrance of lead into the system. This happens to a very inconsiderable extent through the skin, but in far greater measure through the mouth and nose from diffused lead dust, and from articles of food eaten with unwashed hands

and in the dipping-house. If fritted glaze only were used, without the superadded raw white lead, I feel convinced that the amount of plumbism would be greatly reduced ; for "frit" itself is practically insoluble.

Considering that women and children are more readily affected by poisons, a good reason is found for excluding them, as far as possible, from the dipping-house and dipping-tub. The dress of women and their long hair furnish media for the accumulation and carrying away of the poisonous dust, and far too commonly they are unwilling to lessen their proclivity by suitable coverings. In the case of young people, the greater activity of the functions of absorption, circulation and respiration, lends itself to the more ready reception of the poison. Hence an additional argument for limiting the employment of women, and still more strongly that of young persons. In fact a salutary rule that none be employed in dipping houses under the age of sixteen, appears called for. Another rule would be to require special protective dresses readily washable ; the covering of the head, and the disuse of soft fluffy articles, so widely worn around the neck as mufflers and shawls. And in the third place, ample means for washing should be provided. It were well if the aprons and overalls never went to the workmen's homes, but were kept at the place of work and washed when necessary on the premises.

Another question is, whether the hours of work of dippers and glost placers, although adults, should not be curtailed and kept within a fixed limit. Practically, this takes place with a considerable proportion of dippers, who work eight hours or less per day ; when longer hours are imposed, this for the most part happens only when large orders of common ware have to be hurried off for exportation. In these cases it suggests itself, that a larger number of dippers be set on the work to expedite its completion without prolonging the hours of labour.

The serious evils of lead dust are not peculiar to dippers and glost-placers, but prevail in greater or less force among groundlayers, majolica painters, and colour mixers. In the case of such workers, suitable clothing, personal cleanliness, careful use of the poisonous colours, and spacious, well-ventilated shops are the remedial measures of first necessity. Too many majolica paintresses get their dresses very unnecessarily besmeared with the paint ; sometimes hold the brushes in the mouth, or indulge in eating knick-knacks, while at work, conveyed in their pockets. For groundlayers, a perforated underdrawn working bench of a similar kind to that recommended for scourers, suggests itself as likely to be useful.

I have met with a few instances of slight plumbism among girls engaged in painting, with water colours, some of the rudely ornamented ware exported to less civilised countries. Such cases ought not to happen and imply simply want of care and cleanliness.

The conditions of labour in the decorative department of the pottery manufacture, are primarily those common to all forms of sedentary hand occupation, and need no special elucidation.

The remaining circumstances of labour to be noted, are those attaching to the business of oven and kilnmen. Foremost among these is the high degree of heat such men are subjected to, chiefly when ovens are drawn; the practice being to do this long before the ware has cooled. The reason for this practice mostly is the demand for the rapid completion of the orders; and we read of ovenmen proceeding with their work at temperatures approaching 200 degrees. Such proceedings ought not to be tolerated. A few robust men can accomplish this work, but there must be always danger in the case of some at least, of the hands so occupied, of heart failure and fainting, and of heavy falls from ladders and steps required to reach the topmost rows of saggars. Other evils of the practice, are the occurrence of scorching and burning the hands and face, and the risk of rheumatism and chest inflammations, when in a highly heated condition, from exposure to cold draughts. Whence it would seem no unnecessary or improper encroachment upon the freedom of oven and kilnmen, although adults, to ordain a special rule fixing the maximum temperature by a thermometer, at which they may enter upon and carry on ovenwork. A heat of 105 degrees occurs to me as a prudent maximum.

But besides heat, ovenmen are subjected to much dust, coal smoke, and sulphurous vapours, in the task of emptying ovens and saggars, derived from expiring fires, and dust clinging to the articles fired, particularly flint dust. What remedy for these ills is to be found, lies greatly in their own mode of working and the care observed.

The observations just made on heat as a cause of illness, recall the fact that its effects are not limited to ovenmen.

In many shops, an excessive heat is developed by hot pipes, defective ventilation, the heat of sun in summer, and of numerous gas lights in winter. It is not a heat to scorch as does that of ovens, but it is one to enervate, to cause excessive sweating, with languor, and to induce proclivity to taking cold. This catalogue of consequences suggests, as in the instance of ovenmen, the issuing of a special rule fixing a maximum tempera-

ture not exceeding 70 degrees. Indeed, this is a temperature at which work cannot be carried on with ease and alacrity, and perhaps not with impunity as regards health ; but it must be considered a maximum one.

The foregoing remarks may be accepted as presenting a general sketch of the sanitary aspects of the business of potters. They are by no means exhaustive, for many less prominent insanitary features are discoverable in the technical details, alike of the clay and of the finishing departments. Nevertheless, what has been written suffices to point out directions in which the health conditions of the trade may be ameliorated, and to show that substantial improvement must be the work of employers and employed conjointly. The owner of a factory is called upon to do all he can structurally to render it sanitary ; the occupier, if distinct from the owner, must concur with him in effecting the same object, as well as in securing cleanliness, in fulfilling the requirements of the Factory Act, and in exercising the requisite control over his workpeople by well considered rules for work : lastly, the employed, male and female, must forward by their own efforts, whatever plans are instituted to guard their health, and to provide for the efficient performance of their labour. There can be no conflicting interests between employers and employed in all matters that concern their sanitary welfare, the efficiency of their work, and the advancement and prosperity of their calling. The sooner the idea of antagonistic interests perishes, and the two parties can perceive they have but one common end, the more healthy and happy will be the population of the Potteries

