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PUBLIC HEALTH MAGAZINE

AND
LITERARY REVIEW.

Edited by GEO. A. BAYNES, M.D., &c., &c.

JULY, 1876.

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LITERARY REVIEW.

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JULY, 1876.

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Original Communications.

10:

THE PNEUMATIC SYSTEM OF SEWERAGE AND ITS APPLICATION TO THE CITY OF MONTREAL.

BY R. CARR HARRIS, C.E., M. Inst. C.E.

Among the great questions which are still pressing upon society for solution, there is no one of more importance than that of finding out the right way of dealing with the sewerage of towns. Our old systems are on all sides acknowledged to be most unsatisfactory, leading to enormous expense, and yearly causing an amount of misery, sickness and death which can scarcely be calculated. Rich and poor are alike struck down by the fatal gases and the infectious diseases disseminated by our net-work of sewers, which not only let their deathly vapors leak through into the streets, but also discharge them into the chambers of our houses.

Custom has dulled our perception of these dangers, which, if newly presented to our minds, would startle us with their reality.

Few know how small the germ may be in zymotic diseases, and how rapidly it may develop. Like a microscopic cell of yeast, it has the power of developing countless multitudes of cells, and a single infected person may become the prolific centre of disease.

It is a matter of common prudence to maintain the body in health by removing and disposing of the dangerous matters given off by the human body in an expeditious and safe way.

All classes and politics are alike anxious to have this question of an efficient sewerage solved.

While on a visit last year to Europe we had occasion to examine professionally the celebrated system of sewerage known as the Liernur pneumatic system, the invention of an eminent sanitary engineer of Holland (Capt. Liernur). It stood the test of a full and careful examination, and fully confirmed the high reports which we had heard of it. We shall state in this paper the leading features of the system, and show how thoroughly it removes all the great evils of the water carriage system, which is the one in use in Montreal. The article will be limited to a general description of the system and its results, omitting many professional and technical details which we have collected.

This system of sewerage has been in actual operation five or six years in several large continental cities. Its success is not open to doubt; it is a fact.

The common or water carriage system may be briefly described as follows: The excremental matters, such as contents of privies, chamber and kitchen slops, scraps, &c., are hurried into common sewers, diluted with an enormous volume of water, and floated to the nearest river, lake or sea.

The pneumatic system of sewerage is governed by the fundamental principle that a system of town drainage should aim not only to remove filth and rain waters, but to keep soil, air and sub-soil water in a pure state. A moment's consideration shows how important it is to keep the soil of a city pure when we remember that every fall of rain, as it soaks down, makes the soil act as an exhaler, squeezing into the air the poisonous germs which have collected, so that a shower of rain, instead of being the natural provision for purifying the air, is converted into a disseminator of disease in its most insidious forms.

The pneumatic system separates the sewage into two distinct parts, and conveys each away by appropriate channels. The previously existing sewers are restricted to the conveying away the rain and other harmless waters. For the removal of fecal matters there is provided a system of small iron pipes, which are just large enough to admit a man's hand; no larger pipe is used than five inches in diameter. One of these pipes runs underground along each street. The closets are all connected with these street pipes by branch pipes. At convenient points, generally where two streets cross, there are small iron tanks sunk underground, called "street reservoirs." The street pipes open into these reservoirs. From each street reservoir a pipe leads to a central station and enters the main reservoir, which is also an iron tank. At the central station there is an engine for creating a vacuum or exhausting the air from the main reservoir.

By opening cocks in the pipes entering the main reservoir, the vacuum is immediately extended to the street reservoirs, and from these it is continued through every line of street pipes, and to every closet, the contents of which are at once drawn, or rather sucked, into the street pipes, thence into the street reservoirs, and finally from these into the main reservoir.

A small quantity of sulphuric acid is now added, to prevent the formation of ammonia during the evaporating process, and the whole mass is subjected to heat until it is reduced to a dry and odourless powder, or *poudrette*.

The heat is derived largely from the exhaust steam of the engine and the flame and smoke of the furnace.

The *poudrette* is sold as guano. During the whole time from first to last the fecal matter has been in a vacuum; hence no gases can have escaped. Even the air which the exhausting engine draws from the pipes and reservoirs is passed into the furnace. Thus all noxious gases and typhoid germs are literally burned up and forever disposed of.

Few can have failed to notice the unpleasant odour prevailing in even our best regulated water-closets. We are accus-

tomed to it, and pass it by as merely a little closeness. But in truth it arises largely from the presence of the most fatal and insidious gases, which come directly from the sewers.

Professor Tyndall, in a letter to the *London Times*, speaking particularly of typhoid fever, which annually infects 150,000 of the population of the city, says: "The seat of the disease "being the intestine, with well appointed water-closets, it is "not in the sick room that the mischief is done, but often at a "distance from the sick room, through the agency of the sewer, "which Dr. Budd graphically describes as a direct continuation "of the diseased intestine. Hence the mystic power of sewer "gas." We "trap" the connections between our houses and the sewers and fancy ourselves secure; but, indeed, they are but traps to deceive us.

Mr. Baldwin Latham, one of the most widely known authorities on sanitary engineering in Britain, speaks as follows about "traps": "All 'traps' are now formed either on the "water-trap or valve-trap principle, or a combination of the two. "All water-traps are liable to become untrapped, by running "full bore and acting as a syphon proper, the induced current "creates a vacuum below the 'trap,' air follows the flowing "water and drives or sucks out sufficient water from the trap "to leave the aperture unsealed. Another and not uncommon "cause of the failure of a trap is the entry of some substance "which will act as a syphon and drains every drop of water out, "leaving it unsealed. The traps of sinks are very apt to become "untrapped, in consequence of a thread or two of a dish-cloth "entering and hanging partly in the water of the trap and partly "down the drain, when it acts as a syphon and drains the trap. "Valve traps are even more defective still, for it must not be "forgotten that as traps are used with the sole intention of "preventing the back passage of sewer gas from our sewers, as "water flows down, air by the same means flows up."

Neither is it effective to have several successive traps on one line of pipe, for in this case the lower traps will frequently un-trap the upper ones. Another very common way by which

traps are rendered useless is the accumulation of gas in the sewers, consequent on the stoppage of the discharging outlets by high water. This may occur, in the case of a river, on any unusual rise in the water, such as a freshet.

In the case of tidal waters it occurs twice every twenty-four hours.

In this manner the gas has frequently been known to accumulate to such an extent as to cause a great pressure in the sewer. A small pressure is sufficient to make the gas bubble up through the water in the trap.

Mr. Latham considers that the only remedy is to "cut off all direct communication between our houses and the sewers."

Cost of maintenance is another matter in which the pneumatic system is vastly ahead of that by water carriage.

Our sewers are constantly breaking, bursting, or getting stopped up, and as for our domestic arrangements, it is needless to remind any housekeeper of the annual expense and inconvenience caused by necessary repairs to their house drainage.

The pneumatic system, by its simplicity, compactness and separation of difficulties, obviates all this.

Let us now draw a few comparisons between the system of water carriage, as used in Montreal, and the pneumatic system :

Firstly. The filth resulting from the life of over 100,000 people is now floated through large and foul sewers, and the sewer gas is continually escaping into our chambers.

By the pneumatic system all this is entirely averted, as any leakage of gas which does occur must necessarily be into the pipes and not out—there being a vacuum in the pipes—and the formerly foul sewers are converted into channels for conveying harmless waters.

Secondly. By the present system, the soil of the streets is poisoned by soakage of water and leakage of gas in all directions out of the sewer, thus furnishing a never-failing reservoir of fever germs to be forced out of the ground into the air by every shower of rain.

By the pneumatic system this evil entirely disappears. All

gases are closely confined until they are utterly destroyed by fire.

Thirdly. The entire sewage of the city is now discharged into the river, there to float about indefinitely and be stranded and pollute the waters.

The pneumatic system would discharge no sewage into the river.

Fourthly. The city receives yearly enormous quantities of food drawn from the surrounding country, and consisting of the most valuable constituents of the soil, scarcely any of which are ever returned to the soil.

It would be impossible, within the limits of this article, to state this evil in the alarming light in which it is shown by Baron Liebig, in his work on Agricultural Chemistry and the exhaustion of countries, to which we refer the reader.

The pneumatic system returns the whole of these constituents to the soil in a portable and harmless form, to perform their proper part in the grand cycle of production, to help the farmer in his laborious struggle with climate and soil, and to render more productive his fields, thereby reducing the cost of living in the cities.

Fifthly. Under the old system repairs are incessantly needed in our houses as well as in our streets. All are aware of the high charges, the annoying delays and the stupid blunders of plumbers: the round has to be gone through every year, and must be fresh in the minds of us all.

By the pneumatic system this is entirely removed—there are no valves to get out of order; the arrangements, indoors and out, are simple and compact, while the great inward pressure, caused by the vacuum in the pipes, sweeps instantly before it what might, in the water carriage system, cause a vexatious stoppage.

Dr. Edgeling, the Senior Medical Government Inspector of Holland, says: "The Liernur Pneumatic System of dealing with the subject (of sewerage) is just the reverse of what has been done hitherto by engineers. They all mixed the

“ various kinds of refuse matters with large quantities of water
“ in one general mass, obtaining thus scientifically an enigma
“ which nobody could unravel, and practically a bulky semi-
“ fluid mass which no one knew what to do with.

“ The pneumatic system, on the contrary, keeps the various
“ kinds apart, and prevents confusion at the outset, while the
“ most troublesome of all kinds of refuse, the fecal matter, is
“ not scattered in a thousand different directions, but is kept
“ isolated and a close prisoner until it is deprived of all power
“ to hurt, and has become again a useful participant in nature’s
“ eternal circuit of matter.”

The system is quite as suitable to the lowest lying parts of the city as to the highest, and probably its introduction to some of the very low and flat parts of Montreal, as, for instance, the neighborhood of the river and canal banks, would obviate the necessity of those pumping works, which would otherwise be required in order to give the sewage of those districts the fall necessary under the water carriage system.

Viewed in this light, its applications to some districts of the city might result in a saving to the Corporation of the expense of pumping works, in addition to the advantages we have already pointed out.

There is a period in the growth of all large cities when they are forced for self-preservation to re-organize their sewerage system ; this has generally been done at an enormous expense, and in the case of those cities which have hitherto done so, it has resulted in the construction of works admirable in their engineering character and vast in extent, but which have thus far, in nearly all cases, failed in a sanitary point of view.

If the city of Montreal has not already been forced to re-organize her sewerage, the day cannot be far distant when she will be obliged to do so. Is it not evidently to her advantage, before that day shall come, to give a practical trial to the enlightened system which we have been describing, and which must ultimately supersede all others, having already stood the severest tests, and received the unqualified approbation of many

of the leading engineers, medical men and statesmen of Europe? Her example would probably be quickly followed by other cities in Canada, and every member of the Corporation would have the satisfaction of knowing that he had helped on the work of improving the health of his fellow citizens, and rendering their lives more secure.

The Berlin (Prussia) Tribune states that Dr. Strousberg, an eminent financier and contractor for public works, has just entered into a contract for putting the Liernur sewerage system into the whole of St. Petersburg for nearly £1,000,000.

“The war of systems had been going on for some time in their capital, and their chief engineer, Count Stuckenberg, was appointed to examine and report on the water carriage and the Liernur systems. He spent some time in Holland examining the Liernur system, and reported upon it in the highest terms with the above result. The system is worthy the most attentive consideration of our municipal authorities, sanitary engineers, and medical officers of health.”

HOLIDAYS.

The time for athletics has come. Let the schoolboys now enjoy their field sports so as to recruit for the studies of next winter. Parents, let them enjoy cricket, lacrosse, football, swimming, bowls, as much as they please; in fact, promote it in every way. Every muscle ought to be used, which, in a variety of athletic exercises, they are. It is the strong and healthy boy who best fights his way in the world. A good arm helps a good brain; indeed, the latter is often powerless without the former. The possessor of an overworked brain and an underworked arm very frequently dies of consumption. Oh, that we could convince parents through the length and breadth of the land, and proclaim trumpet-tongued the intense folly of overworking the brain of youth. Exercise—active exercise is pointed out by nature; all things above us, around us, beneath us—the air, the earth, they are in perpetual motion, never are they for one moment idle. Parents, now the holidays are come, let the books be put away for two months, and allow your sons full pleasure, in fact obtain it for them, and you will be amply repaid by seeing your child grow up a fine, handsome, well-made man, instead of a sickly over-worked nervous-minded weakling.

Sanitary Reports.

MORTALITY OF THE CITY AND SUBURBS OF MONTREAL, FOR MAY, 1876.

CLASS.	ORDER.	DISEASES.	Total by Sex.		Total Both Sexes.
			Male.	Female.	
I. ZYMOTIC.	I. Miasmatic.	1. Small Pox.....	9	6	15
		2. Measles.....			
		3. Scarlatina.....		1	1
		4. Diphtheria.....	2	2	4
		5. Quinsy.....			
		6. Croup.....	6	4	10
		7. Whooping Cough.....	1	1	2
		8. Typhoid Fever, (Infantile Remittent Fever)	3	3	6
		9. Typhus, and Infantile Fever.....			
		10. Relapsing Fever.....			
		11. Continued Fever.....			
		12. Erysipelas.....	3		3
		13. Metria, (Puerperal Fever).....		1	1
		14. Carbuncle.....			
		15. Influenza.....			
		16. Dysentery.....	1		1
		17. Diarrhœa.....	3	1	4
		18. Pyæmia.....			
		19. Cholera Infantum.....			
		20. Cholera.....			
		21. Ague.....			
		22. Remittent Fever.....			
		23. Cerebro-Spinal Meningitis.....	1		1
II. CONSTITUTIONAL.	II. Embolico.	1. Syphilis.....			
		2. Hydrophobia.....			
		3. Glanders.....			
	III. Diabetic.	1. Privation.....			
		2. Purpura and Scurvy.....			
		3. Delirium Tremens.....			
		4. Intemperance..... } Alcoholism			
	IV. Parasitic.	1. Thrush.....			
		2. Worms, &c.....			
	II. Tubercular.	I. Diabetic.	1. Gout.....		
2. Rheumatism.....					
3. Dropsy and Anæmia.....			3	3	6
4. Cancer.....			1		1
5. Noma (or Canker).....					
6. Mortification.....					
1. Tubercular Meningitis.....				2	2
2. Tabes Mesenterica.....			2		2
3. Phthisis (Cons. of Lungs).....			12	17	29
4. Hydrocephalus.....			2	2	4
<i>Carried forward.....</i>			49	43	92

MORTALITY OF THE CITY AND SUBURBS OF MONTREAL.—(Con.)

CLASS.	ORDER.	DISEASES.	Total by Sex.		Total both Sexes		
			Male.	Female.			
		<i>Brought forward</i>	49	43	92		
III. LOCAL.	II. Or- gans of I. Brain and Nervous System.	1. Cephalitis.....	2	2	4		
		2. Apoplexy.....	1	1	2		
		3. Paralysis.....	2	3	5		
		4. Insanity.....		1	1		
		5. Chorea.....					
		6. Epilepsy.....		1	1		
		7. Tetanus.....					
		8. Convulsions.....	7	2	9		
		9. Other Brain diseases, &c.....	7	7	14		
	II. Or- gans of II. Respi- ratory System.	1. Carditis, Pericarditis and Endocarditis.....	2		2		
		2. Aneurism.....					
		3. Other Heart diseases, &c.....	6	11	17		
		1. Epistaxis.....		1	1		
		2. Laryngitis and Trachitis.....					
		3. Bronchitis.....	15	6	21		
III. LOCAL.	III. Respi- ratory Organs.	4. Pleurisy.....	2	1	3		
		5. Pneumonia.....	3	4	7		
		6. Asthma.....	1		1		
		7. Other Lung diseases, &c.....	2	1	3		
		1. Gastritis.....	2		2		
		2. Enteritis.....	3	1	4		
	III. LOCAL.	IV. Or- gans of Digestion.	3. Peritonitis.....	2	1	3	
			4. Ascites.....				
			5. Ulceration of Intestines.....	1		1	
			6. Hernia.....				
			7. Ileus and Intussusception.....	1		1	
			8. Stricture of Intestines.....				
			9. Fistula.....				
			10. Diseases of Stomach and Intestines, &c.....				
			11. Pancreas Diseases, &c.....				
12. Hepatitis.....				1	1		
13. jaundice.....			1		1		
14. Liver Disease, &c.....							
15. Spleen Disease, &c.....							
III. LOCAL.			V. Uri- nary Organs.	1. Nephritis.....			
				2. Ischuria.....			
	3. Nephria (Bright's Disease).....						
	4. Diabetes.....						
	5. Calculus, (Gravel, &c).....						
	6. Cystitis and Cystorrhœa.....	1			1		
	7. Stricture.....						
	8. Kidney Disease, &c.....			1	1		
	VI. Gen- erative Organs	1. Ovarian Disease.....		1	1		
		2. Disease of Uterus, &c.....					
	VII. Or- gans of Loco- motion	1. Arthritis.....					
		2. Joint Disease, &c.....					
			<i>Carried over</i>	110	89	199	

MORTALITY OF THE CITY AND SUBURBS OF MONTREAL.—(Cont).

CLASS.	ORDER.	DISEASES.	Total by Sex.		Total both Sexes.
			Male.	Female.	
		<i>Brought over</i>	110	89	199
V. VIOLENT DEATHS, & Developmental Diseases	VII. Integumentary System.	1 Abscess.....		2	2
		2. Ulcer.....			
	I. Of Children.	3. Skin Diseases, &c.....			
		1. Stillborn.....	6	7	13
		2. Premature Birth.....	5	4	9
		3. Infantile Debility.....	21	10	31
		4. Cyanosis.....	1	1	2
		5. Spina Bifida and other Malformation.....			
	II. Of Women	6. During Dentition.....	2	2	4
		1. Paramenia.....		2	2
	III. Of Old People.	2. Childbirth.....			
		1. Old Age ..	7	3	10
	IV. Of Nutrition.	2. Atrophy and Debility.....	1	3	4
		I. From Accident or Negligence.	1. Fractures, Contusions, Wounds.....		1
	2. Burns and Scalds.....				
	3. Poison.....				
	4. Drowning.....		1		1
	5. Otherwise.....		3	2	5
	II. From homicide.	1. Murder, Manslaughter.....			
		2. Execution.....			
III. Suicide.	1. Wounds.....				
	2. Poison.....				
IV.	3. Drowning.....				
	4. Otherwise.....				
		1. Chirurgici.....	1		1
		Not known.....	1	3	4
		Total.....	161	127	288

SYNOPSIS OF METEOROLOGICAL OBSERVATIONS IN APRIL, FROM MCGILL COLLEGE OBSERVATORY.

Barometer readings reduced to sea-level and temperature of 32° Fahr. † Pressure of vapor in inches mercury. ‡ Humidity, relative Saturation, 100. § Observed. ° Ten inches of snow is taken as equal to one inch of water.

Mean temperature of month, 50.4. Mean of maxima and minima temperature, 51.36. Greatest heat was 80.5 on the 27th; greatest cold was 30.8 on the 1st,—giving a range of temperature for the month of 49.7 degrees. Greatest range of the thermometer in one day was 33.2, on the 22nd; least range was 7.1 degrees on the 10th. Mean range for the month was 17.2 degrees. Mean height of the barometer was 29.9765. Highest reading was 30.438 on the 16th; lowest reading was 29.562, on the 22nd, giving a range of .876 inches. Mean elastic force of vapor in the atmosphere was equal to .2610 inches of mercury. Mean relative humidity was 69.8. Maximum relative humidity was 100 on the 6th and 8th. Minimum relative humidity was 34 on the 26th. Mean velocity of the wind was 10.2 miles per hour; greatest mileage in one hour was 27 on the 1st. Mean direction of the wind, W. N. W. Mean of sky clouded was 66 per cent.

Rain fell on 21 days. Snow fell on 1 day. Rain or snow fell on 21 days. Total rainfall, 3.45 inches. Total snowfall, 0.3 inches. Total precipitation in inches of water, 3.48.

TOTAL MORTALITY BY AGES.

Under 1 year.....	111
From 1 to 5 years.....	43
" 5 to 10 ".....	8
" 10 to 15 ".....	5
" 15 to 20 ".....	4
" 20 to 40 ".....	38
" 40 to 60 ".....	32
" 60 to 70 ".....	22
" 70 to 80 ".....	16
" 80 to 90 ".....	6
" 90 to 100 ".....	2
100 years and over.....	..
Not known.....	1
	<hr/>
Total.....	288

TOTAL MORTALITY BY NATIONALITY.

French Canadians.....	184
British Canadians.....	83
Irish.....	5
English.....	8
Scotch.....	5
Other Countries.....	2
Not known.....	1
	<hr/>
Total.....	288

TOTAL BY WARDS.

St. Ann Ward.....	45
St. Antoine ".....	58
St. Lawrence ".....	30
St. Louis ".....	15
St. James ".....	47
St. Mary ".....	58
West.....	1
Centre.....	4
East.....	3
Not known.....	4
	<hr/>
City Hospital.....	1
Hotel Dieu.....	10
Montreal General Hospital.....	8
Foundlings.....	30
Other Institutions.....	4
Outside City Limits.....	80
	<hr/>
Total.....	398

N. B.—The foundlings and deaths outside city limits are not included in classification of diseases, ages or nationalities.

Correspondence.

To the Editor Public Health Magazine.

SIR,—You have been discussing one of the most important of Sanitary subjects of late—that is, drainage; but allow me to suggest that there is one other subject that is of equal importance, and that is Scavenging. This, I maintain, is the most miserably carried out of all our civic works. I have been an agriculturist, and have always been contriving how to utilize everything for the improvement of the land, and, as every one knows, nothing is better for a compost on farm land than street scrapings. This, I see, is most sinfully wasted.

I contend that no corporation council, mayor, alderman, or city official, are capable of performing such a duty along with their other duties. They may observe it, and wish to remove it, but cannot. I recollect, many years ago, one city in particular that was noted for being the dirtiest in Europe. They had tried by one committee of council and then another to perform it, but failed. At last they appointed one man to perform this duty, who was solely responsible. They paid him well for his work, but in a few years they saw that he was making money at it, so they taxed him for the privilege of scavenging. He utilized the scraping for farm purposes, and the farmers were glad to get it. Here we have new land, and our farmers are ruining their land by not dressing it, and we in our cities are allowing them to impoverish the earth, when we might easily assist them by educating them in the use of top-dressing. Thus from one good work, two valuable results would flow, viz. : making our city atmosphere, which is now reeking with vile odors, sweet and clean; and, secondly, enriching our neighbors' already impoverished land. There is not an acre on this island that is not in want of the very refuse that we despise.

Hoping I have not trespassed too much on your space,

I am, sir,

Yours truly,

J. WESTBY.

Reviews.

DISEASES OF MODERN LIFE. By Benjamin Ward Richardson, M.D., M.A., F.R.S., &c. New York: D. Appleton & Co. (From C. Hill, Dorchester street.)

This is an American reprint of a most valuable work lately published in England by the Messrs. Macmillan. Several years ago, Dr. Richardson wrote a series of essays on diseases resulting from severe mental and physical strain, from various professions and occupations, and from indulgence in the use of alcohol, tobacco, and different narcotics. Great public interest was excited by these essays when they appeared, and in answer to repeated solicitations for their reprint in a collected form, the author has carefully revised the original series, and added to them new lectures on subjects of similar interest and importance. The work, as it now stands, is intended as much for the study of the intelligent public, as for purely professional men, and contains the latest opinions of strict science on all matters of sanitary reform, admirably popularised in a style at once clear and eloquent.

The volume is so interesting, that few readers who begin it will refrain from perusing it to the last page; and a short summary of practical applications, at the conclusion, will materially assist the memory of the student. Throughout the volume, the science of prevention rather than the art of curing "diseases of modern life" is considered; and the second part of the work "on the phenomena of disease, induced and special," will probably attract the attention of the reading world for many a day to come. The three chapters which deal with diseases originating from the use of alcohol, are of especial value to the young people of Canada, and should be carefully studied by all who have an opportunity of reading the sixty

pages devoted to the subject. Though Dr. Richardson has unmistakably stated his belief that to escape the evils arising from the use of alcohol there is only one perfect course, namely, to abstain from alcohol altogether, still we could wish that, with his sound views on the question of total abstinence, he had not used the following language which we find at p. 233, and which, in oblivion of all else that he has written, is sure to be quoted by moderate and immoderate drinkers as his final opinion: "It will be said that alcohol cheers the weary, and that to take a little wine for the stomach's sake is one of those lessons that comes from the deep recesses of human nature. I am not so obstinate as to deny this argument. There are times in the life of man when the heart is oppressed, when the resistance to its motion is excessive, and when blood flows languidly to the centres of life, nervous and muscular. *In these moments alcohol cheers.* It lets loose the heart from its oppression; it lets flow a brisker current of blood into the failing organs; *it aids nutritive changes, and altogether is of temporary service to man. So far alcohol may be good;* and if its use could be limited to this one action, this one purpose, it would be amongst the most excellent of the gifts of science to mankind." To counteract the possible effects of language like this, the whole of the three chapters previously referred to should be the subject of close and intelligent study. After that, no danger is likely to ensue.

ENGLISH LITERATURE. By the Rev. Stopford A. Brooke, M.A.
London: Macmillan & Co. (From C. Hill, Dorchester street.)

This surprisingly full little volume, which consists of not quite 200 pages, and may be purchased for thirty cents, is one of the *Literature Primers* edited by Mr. Green, whose *English History*, published a short time ago, attained an immense circulation. Mr. Brooke, the biographer of Robertson, of Brighton, and himself an eminent preacher, has long been known by his writings as an accomplished English scholar. The present work is the most satisfactory manual that has ever been written

on the subject, and, on account of its pregnant brevity, must have cost the author considerable toil and trouble. The reader of almost any age who thoroughly masters the eight chapters of Mr. Brooke's *English Literature*, will have laid a strong foundation on which to build his future studies in this absorbing subject.

BACON *versus* SHAKSPERE: A Plea for the Defendant. By Thomas D. King. Lovell Printing and Publishing Co.

(Continued from Vol. I., p. 375.)

We now return to Mr. King's defamation of Ben Jonson. At p. 14, in language which is not faultless, he writes:

"Ben Jonson, *envious as he was of Shakspeare, and even girded at his York and Lancaster plays, at 'The Winter's Tale' and 'The Tempest,' in the prologue to 'Every Man in his Humour,' acknowledges Shakspeare's good qualities as a man.*" And again, at p. 19, with respect to Jonson's famous eulogy: "I believe it to be the genuine welling up of Jonson's over-charged heart; his spring of gratitude for Shakspeare's kindness and magnanimity in obtaining a first hearing of "Every Man in His Own Humour," and his painstaking in not only bringing the play before the public, but acting a part in it, together with Burbage, Heminge and Condell; otherwise the play would in all probability have been consigned to *Limbo Patrum*," &c. "This magnanimity of Shakspeare's," he adds, "is worthy to be treasured in our mind;—the Divine lesson of Charity—no indwelling of Jonson's envious girds, but the rather overcoming unkindness with kindness."

These sentences are replete with error. Let us examine them. Mr. King deliberately states that Ben Jonson, in the prologue to his comedy *enviously girded at certain of Shakspeare's plays*, but that Shakspeare nevertheless, "overcoming unkindness with kindness," magnanimously obtained a first hearing for the very drama that satirized him, brought it before

the public and acted a part in it—without which acts of magnanimity it must forthwith have been consigned to oblivion.

Now, the first edition of "Every Man in his Humour" was written in 1596, and was acted eleven times within a few months. "Its success," says Gifford, "encouraged Jonson to render it yet more popular. Accordingly, he transferred the scene from Florence to London, and changed the Italian names to English ones." In 1598, thus altered, it was acted at the Globe Theatre, when Shakspeare played the part of old Knowell. But all scholars are agreed that "The Winter's Tale" and "The Tempest" were Shakspeare's latest productions, written about 1611. How then, in the name of all that is wonderful, could Ben Jonson in his prologue of 1596 or 1598 have "girded at" plays that were not in existence until 1611? It will tax Mr. King's ingenuity to explain the miracle.

Again, as must be obvious to every one, it was no mark of Shakspeare's condescension to take a part in Jonson's comedy. He was an actor by profession—he derived his income from the Theatre, and was, besides, too keen a critic not to recognize a good play, and too experienced in theatrical business to risk loss of money or of reputation by acting in a bad one. Moreover, in 1598—though Mr. King, on no authority whatever, insists that "at this time Jonson's plays would hardly pay expenses"—Ben must have been well known as a successful dramatist; for in that very year he is named by Francis Meres in his *Wit's Treasury* as being, with Peele, Marlowe, Shakspeare, Chapman, Decker, and others, "our best for tragedie." The assertion, therefore, that his play would have been consigned to Limbo, but for the kindness and magnanimity of Shakspeare, is simply a gratuitous assumption, opposed alike to probability and reason. A verdict favorable to the comedy was pronounced in the reign of Elizabeth; time has confirmed the justice of that verdict, and a sneering sentence from the pen of Mr. King will not now, we imagine, have the power to reverse it. If that gentleman will refer to Forster's *Life of Dickens*, he will find that Jonson's disparaged drama was selected after due delibera-

tion as the one in which Charles Dickens, Douglas Jerrold, John Leech, Mark Lemon, Gilbert à Beckett, and John Forster, made their successful *debut* before a refined and critical audience. Here is a brief account of the event: "The play was played on the 21st of September (1845), with a success that outran the wildest expectation, and turned our little enterprise into one of the sensations of the day. The applause of the theatre found so loud an echo in the press, that for a time nothing else was talked about in private circles; and after a week or two we had to yield to a demand for a more public performance in a larger theatre," &c., &c. Yet Mr. King asks us to believe that a play thus chosen on its own merits, and acted by a company of amateurs about 280 years after its original production, would have proved a dead failure at first, without the magnanimous exertions of Shakspeare:

Quodcumque ostendis mihi sic, incredulus odi!

The following quotation will show our readers that Mr. King's contempt for Ben Jonson is not shared by recent critics. It is taken from p. 597, Part II., of *Some Recollections of a Reader*, published in the *Cornhill Magazine*: "The first perusal of *Every Man in his Humour* marks an epoch in a man's life. Brainworm and Bobadil and Master Stephen are realities, which, with other Jonsonian creations, score themselves ineffaceably into the memory. The costumes and the manners are, of course, in some respects, out of date. But human nature is human nature at all times, and the truth of these pictures is as patent to us now, and the humour is as fresh as ever, after a lapse of more than two centuries. I was, accordingly, not surprised to learn that one of the greatest humourists of the Victorian era had chosen the part of Bobadil, in which to demonstrate that he could act nearly as well as he could write; and that other pregnant wits of the day had taken part with him in the performance of rare Ben's great satire-in-action."

The whole story of Jonson's ingratitude to and envy of Shakspeare is a baseless fabrication. On a topic so important to the fair fame of the former we are induced to quote

from a critic more competent than Mr. King. At p. 198 of his *Lives of the Poets* (Edit. 1861, revised by Peter Cunningham), the poet Campbell writes: "The charges of malice and jealousy that have been heaped on his name turn out to be without foundation. *He did not receive benefits from Shakspeare, and did not sneer at him in the passages that have been taken to prove his ingratitude; and instead of envying that great poet, he gave him his noblest praise.*" The Rev. Alexander Dyce, who had a thorough knowledge of all the Elizabethan literature, expresses himself in similar terms, and declares that "after Gifford's *Life of Jonson* no one can ever doubt that a *sincere friendship animated the two poets.*" So, also, Mr. Minto, at p. 443 of his *Characteristics of English Poets*—a valuable critical work, lately published by Blackwood—: "*Gifford, who makes a good many mistakes in the course of his rabidly one-sided memoir of Jonson, is certainly right in saying that he was not an envious man. There is no evidence to support his alleged jealousy of Shakspeare.*" As a final paragraph on the subject, we extract the following testimony from the well-known *Life of Shakspeare* by Byron's school-fellow and friend, the Rev. William Harness: "It is certain that an intimacy the most sincere and affectionate subsisted between these two distinguished men. On the part of Jonson, indeed, the memorial of their attachment has been handed down to us in expressions as strong and unequivocal as any which the power of language can combine. *No hint of the existence of any difference or unkindness between these celebrated individuals is to be found in any contemporary author.* Rowe, in the first edition of his *Life of Shakspeare* insinuated a doubt of the sincerity of Jonson's friendship; but, before the publication of his second edition, he found cause to reject a suspicion so injurious to the reputation of Jonson, and had the honesty to erase the passage from the work. The words, however, did not escape the vigilance of Malone; they were reprinted and the sentiment readopted. For years the friend and eulogist of Shakspeare *was aspersed as envious and ungrateful; but the judicious exertions of Gilchrist*

and Gifford have exposed the fallacy of such uncarranted imputations, and demonstrated beyond the possibility of future doubt that Jonson and Shakspeare were friends and associates—that no feud or jealousy ever disturbed their connexion—that Shakspeare was pleased with Jonson, and that Jonson loved and admired Shakspeare.*

The serious errors into which Mr. King has fallen seem attributable to the fact that he has blindly followed Mr.ione—"a laborious but dull commentator," in the opinion of Hallam. The real question at issue is—Do Ben Jonson's own writings furnish us with proofs that he was envious of Shakspeare's fame and treated him with unkindness? Here are a few of his lines (from the First Folio of 1623) addressed "To the memory of my beloved, the author, Mr. William Shakspeare, and what he hath left us:"

"To draw no envy, Shakspeare, on thy name,
Am I thus ample to thy Booke and Fame:
While I confesse thy writings to be such
As neither Man nor Muse can praise too much.
'Tis true, and all men's suffrage. * * * * *
* * * * * Soule of the Age,
The applause! delight! the wonder of our Stage!
My Shakspeare, rise. * * * * *
Triumph, my Britaine, thou hast one to shewe
To whom all Scenes of Europe homage owe.
He was not of an age, but for all time!
Sweet Swan of Avon!" &c.

The vision must indeed be distorted which can discover in this magnificent eulogy the faintest trace of envy or unkindness.*

Let us pass on to another of Mr. King's facts. At p. 58, he tells us: "Alas! Shakspeare had no desire for fame, that glorious immortality of true greatness."

* Mr. King is strangely inconsistent. At p. 10 he speaks of "Rare Ben Jonson, who is worthy of our love and respect." Soon, forgetting his own words, he wantonly traduces Ben's character in two passages, and, finally—in reference to Judge Holmes and Shakspeare—declares that "it is wicked to assail the righteous memory of the dead." We may with truth say: *Mutato nomine de te Fabula narratur.*

We are far from wishing to seem "rashly importunate," or even mildly inquisitive; but we really would like to know upon what authority Mr. King hazards his pathetic assertion. He may have evolved the supposed fact from the depths of his own consciousness, or, possibly, have borrowed it from his friend, Malone—but assuredly he did not glean it from Shakspeare's works. He must know that on the point in question we are more likely to learn something from Shakspeare's Sonnets, as being to a certain extent autobiographical, than from any of his other writings. A few quotations from these poems, which were first published in 1609, will at once solve the problem. At the end of the 18th Sonnet, Shakspeare writes:

" So long as men can breathe, or eyes can see,
So long lives this, and this gives life to thee."

Compare with this the last lines of the 19th. The 55th begins thus:

" Not marble, nor the gilded monuments
Of princes, shall out-live this powerful rhyme," &c.

The language of the 81st is equally strong:—

" Your monument shall be my gentle verse,
Which eyes not yet created shall o'er-read;
And tongues to be your being shall rehearse,
When all the breathers of this world are dead:
You still shall live (such virtue hath my pen)
Where breath most breathes, e'en in the mouths of men."

We may add the conclusion of the 107th Sonnet:

" Death to me subscribes—
Since, spite of him, I'll live in this poor rhyme,
While he insults o'er poor and speechless tribes:
And thou in this shalt find thy monument,
When tyrants' crests and tombs of brass are spent."

It was the frequent recurrence of passages like these that occasioned the following remarks of Payne Collier: "In many of the Sonnets there are to be found most remarkable indications of self-confidence, and of assurance in the immortality of his verses; and in this respect Shakspeare's opinion was constant

and uniform. He never scrupled to express it, and perhaps there is no writer of ancient or modern times, who, for the quantity of such writings left behind him, has so frequently or so strongly declared his firm belief that what he had written the world would not willingly let die." To this testimony we append that of one of the best and latest essayists on Shakspeare. It may be found in the *London Quarterly Review*, of July, 1871; "*Shakspeare's supposed indifference to fame finds no countenance in his writings, still less in the evidence of his contemporaries.*" For further discussion of the question we refer Mr. King to this article, in which, from a careful consideration of the words of Heminge and Condell in their dedication of the First Folio, it is plausibly and consistently inferred that death alone prevented Shakspeare from collecting and publishing his own dramas, and rescuing them from the inaccuracies of surreptitious copyists.

(To be continued.)

BOOKS RECEIVED.

OUR BIRDS OF PREY; OR, THE EAGLES, HAWKS, AND OWLS OF CANADA. By Henry G. Vennor, F.G.S., of the Geological Survey of Canada.

We have received a sample copy of the above work from Messrs. Dawson Brothers. It is too valuable and complete a work for a hurried review. We must, for this reason, defer further comment on it until our next number.

PUBLIC HEALTH MAGAZINE

AND

LITERARY REVIEW

JULY, 1876.

MINISTER OF PUBLIC HEALTH.

It is becoming more and more apparent that the great want of the time, as regards the sanitary condition of the people, is the want of a Minister of Health. Mr. Mackenzie would confer the greatest boon on the country if he would create such an office; without this step on his part, there will be a continuous waste of life that will be a source of weakness to the nation, and a constant drain on its resources. It is amazing that there should be no such functionary in our present system of government; that while Trade and Finance, Education, Public Works, and so on, are all represented in Parliament by distinct ministers, Public Health has really no representative at all. In England, the President of Local Government Board represents, in some degree, this department; but what is really wanted is a Minister of Public Health.

The health of the people, is, *par excellence*, a federal question. Every month shows us the impossibility of one place suffering without, sooner or later, involving other places—even remote ones. Let any statesman consider for five minutes the inconvenience, the misery, and the expense that are entailed on the community by such epidemics as those of scarlet-fever, or small-pox. The only report on any sanitary question is through the Minister of Agriculture, but how can such an important functionary have time to devote to the health of the people, when his own particular branch requires his sole supervision. We

do not mean to say that it is not right and well to use the channels we already have, and we do so as much as possible, but epidemics only mock at local governments, and call for Dominion supervision. It would be a grand testimony on the part of the present government, to the importance of public health, to appoint a Minister for such a purpose. There is no question so urgent. Health and luxury abound, trade and commerce flourish, but preventable disease still wastes the national life. But there is an indifference among political men that paralyzes sanitary action. The appointment of a Minister of Health would be a sign that this government believes, above all things, that the wealth and strength of a nation depend on its sound health.

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SYNOPSIS OF MORTALITY FOR MAY.

The total mortality for the month of May is very considerably reduced as compared with the previous month, there being a difference of 150 deaths on the total for suburbs and city. This improvement is very great and reduces our mortality per 1,000 10 per cent. There were only 4 deaths from small-pox, one of which was at the City Hospital.

The death-rate among children under one year is only 111, last month it having reached 261. Among those, from 1 to 5 years, there is also a decrease from 79 in April to 43 this May. We are pleased to note that the number of deaths between those from 20 to 40 has been reduced to half, there being only 38 for May.

According to nationality, there were 83 British Canadians died, 5 Irish, 8 English, 5 Scotch, 2 other countries not known—total 104. The French-Canadians death-rate again predominates; although reduced as compared with the previous month, it still is more than all the other nationalities put together—it is 184.

St. Antoine and St. Mary's Wards are equal in numbers this month, there being 58 in each; St. James, 47; St. Ann's,

45 ; St. Lawrence, 30 ; St. Louis, 15 ; West, 1 ; Centre, 4 ; and East, 3. This return shews a very large reduction as compared with April in every ward except Centre, which has increased by 3. Among the charitable institutions we find that the death-rate in the Hotel Dieu has increased to 10. The Montreal General Hospital has only half the number of deaths it had in April. The deaths among foundlings has greatly increased, there being a return of 30.

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A TRIP TO ST. HILAIRE,

—————
BELCEIL MOUNTAIN.
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We were invited to take part in a recent trip to Belœil Mountain, which we much enjoyed. The objects of interest are many, and we regret that space will not permit more than a very cursory notice of them. Upon arriving at St. Hilaire station, we were driven in country waggons to the Iroquois House, which we were requested to inspect sanitarily. Upon entering by the main entrance, you are received in a large hall, to the right is a bright and airy parlor, to the left is a long passage with nineteen bedrooms on each side, leading to the dining-room, off which is the pantry and kitchen, fitted up with all the new culinary appliances, a Burn's French range with ventilating apparatus attached. Returning to the hall, we were asked to look at the conveniences for bathing, &c. These are perfect as far as indoor baths are concerned, all supplied with water *ad libitum* from a reservoir. Mounting the main stair-case, we land in a long passage running west and east, on each side of which are forty-six bedrooms, two baths, and modern conveniences beautifully fitted up. Upon mounting to the third flat, we have in the east wing sixteen bedrooms, and leading from this, for the protection of guests in case of fire, is a bridge to the west wing, which contains fifteen bedrooms. Above all this is a dome, fitted up with seats and Venetian blinds, from which may be seen Lake Champlain, Montreal, and for miles round a most beauti-

ful and varied view. The equipment of the house is unsurpassed by any city hotel. The cooking is sanitarily correct under an experienced cook,—we can speak feelingly, for we enjoyed a most excellent dinner, wanting nothing, not even a sauce for our salad, which, by the way, we can highly recommend as made from a special receipt held a secret by Mr. Campbell's steward. After replenishing the inner man, we wended our way up the woody slopes to the lake. It is a fine sheet of water, of an irregular oval shape, a mile and a half in circumference, and of unknown depth. The lake affords admirable facilities for fishing, boating, and bathing to guests; boats are supplied by the proprietor. On all sides the lake is encircled by the densely wooded slopes of the mountain, the summit, with the pilgrim chapel, the goal or Calvary of the *Chemin de la Croix*, being grandly supereminent towards the north. In 1841 Count Charles Auguste de Forbin-Janson, Bishop of Nancy, visited this country. Being anxious to improve the religious condition of the people, he urged on Bishop Bourget, of Montreal, the advisability of making a *Chemin de la Croix* from the Lake to the summit of the mountain. The latter, inspired by courtesy as well as piety, anxious, no doubt, to commemorate the visit of so distinguished a prelate and nobleman, and at the same time to benefit spiritually his own people, gave his sanction to the work. The chapel was accordingly built, and seven crosses marked the roads that lead to it—the whole memorializing the passion of our Saviour. Effect was solemnly given to the work in October of the same year by the Bishop of Nancy, assisted by the Bishops of Montreal, Quebec and Kingston, a large number of priests, and a great concourse of people; and in the November following the chapel was consecrated, and mass celebrated by the same illustrious personage. It was dedicated to the Holy Cross and to St. Charles Borromée, and, after several eloquent speeches, the vast assemblage descended the mountain, chanting the "Te Deum." We, having remained a short time by the Lake, then ascended to the summit. Notwithstanding the steepness in some places of the ascent, it was accomplished apparently with-

out much fatigue, even by the ladies of the party. If any was experienced, the glorious spectacle which met the eye, and the refreshing breeze which swept around the chapel, were sufficient restoratives. It was indeed, a magnificent sight—one that once seen can never be forgotten, or, save under peculiarly exceptional circumstances, ever recalled without pleasure. To those who had never been there before, or who were unaccustomed to mountaineering, it was a new sensation—an elevating sensation, in more senses than one. The first feeling was of surprise at a fresh revelation of the beauty and grandeur of this world of ours. Then came the simple delight—childish almost—in using one's eyes, with something of the sense of power superadded. Away over there are the spires and domes of Montreal, with its mountain back ground, where they sleep together. So do our thoughts run away with us. But neither contemplation nor reverie is gregarious, and we are not, perhaps, under the influence of the *genius loci*. We know of no place so easy of access and so beautiful as Belœil. Intending pleasure-seekers should not fail to visit this spot. For those with families who desire to give fresh air and new life to their children, no place can be found of such easy access to the city, and combining fresh air and the beauties of nature withal.

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FILTRATION OF WATER.

We informed our readers that we had had one of *Cheavin's Water Filters* sent to us for examination and test, by J. Gardner, Chemist, 233 St. James street. We find it performs its work most satisfactorily, rendering our filthy water wholesome and sweet. In looking up a record of its examination in England we find the following in the *Lancet*, Dec. 13th, 1873:—

“CHEAVIN'S WATER FILTER.—The extensive adoption of this effective Water Filter absolves us from the task of pointing out its merits from personal experience of its use. We can attest the efficiency and rapidity with which it renders river, rain, pond, or canal water wholesome and sweet; it materially reduces hardness, while retaining the sparkling qualities the water owes to carbonic acid. It can be cleansed in a few minutes by anyone with scarcely any trouble, and its purifying powers will last for twenty years. When we add that its cost brings it within the reach of the most modest purse, we have said enough to commend it to very general favour.”

Miscellaneous.

DISINFECTANTS.

As the summer weather is approaching, the value of disinfecting agents must force itself upon public attention. The term itself has been used in rather a lax way, and indiscriminately employed to describe various operations. The different properties ascribed to it are: (1) That of checking chemical changes (catalysis) due to the action of azotized ferments, independent of the presence of organisms; (2) that of arresting decompositions in which the presence of organisms is necessary; embracing such changes as fermentations in acid media, and putrefactions, occurring in alkaline media; (3) that of destroying the products of the above processes and rendering them innocuous; (4) that of destroying contagia of communicable diseases. Such are the various meanings attached to the word "disinfectant." Dr. Baxter, in his Report on an "Experimental Study of Certain Disinfectants," published in the Public Health Reports of the Medical Officer of the Local Government Board, endeavors to circumscribe the term, and the definition he gives is, we think, a very desirable limitation. It is this—"Any agent capable of so modifying the contagium of a communicable disease during its transit from a sick to a healthy individual, as to deprive it of its specific power of infecting the latter." "A disinfectant is only designed to act upon contagious matter after it has been given off by the generating organism, and before it penetrates into a healthy one." In cases of small-pox, scarlet fever, and other diseases communicable at a distance, the value of such an agent is great. Such a definition as we have quoted will, by narrowing the scope of enquiry, assist in the attainment of a precise knowledge of this invaluable chemical aid to preventive medicine. If medicine is to serve sanitary purposes it must take cognizances of *preventive* measures rather than curative ones, and in this respect chemistry comes greatly to our aid, and disinfectants are a kind of agents which ought to be more largely used than at present.

If disinfection is to take its proper place as a preventive

measure, accuracy in prescribing is of the first importance, and, as Dr. John Simon says, "prescriptions for disinfection ought to have the same sort of exactness as those for therapeutical purposes." Of course the value of each disinfectant must be experimentally determined according to varying conditions. Dr. Baxter's experiments tend to place the phenomena of disinfection on a surer ground than chemical analogy, and he has experimented on four agents, viz:—Permanganate of potash, sulphurous acid, chlorine and carbolic acid. The morbid contagia made the subjects of these experiments are those of vaccinia, of glanders, and of intensified (infective) inflammation, and the results arrived at we shall presently lay before our readers. It is quite certain, as Dr. Baxter asserts, that until pathologists can agree on the nature of contagium of enteric fever the use of or value to be attached to disinfectants must remain empirical. As to enteric fever, it is still uncertain how the contagium is transmitted—whether it be derived from a previous case, or generated *de novo* in any putrefying matter, such as sewage; and we cannot, therefore, assign the efficacy of any disinfectant. Dr. Parkes, in his "Practical Hygiene," has shown the inaccuracy of our knowledge in testing the value of disinfectants, and the clumsy and unscientific methods we employ, which are purely tentative. The theories of contagion are diverse too. Some believe it is propagated by albuminoid principles in a state of molecular change, while others believe the germ theory, and each theory dictates a mode of disinfection. The difference between contagion and infection must be understood also. "Contagion is communication by direct contact, infection is communication at a distance; but the mode is the same in both cases, viz., the transfer of certain solid particles from the infected to the healthy organism." But the contagious principle may be transferred from the sick to the healthy, either by means of a solid, a liquid, or a gas. The latter are the media of conveyance in which the contagium may remain for a long period, still possessing its infectious property. Thus the virus of small-pox may be conveyed in a liquid, or dry, or aëriiform manner, but a disinfectant may act powerfully on them differently. Hence we see the consideration of the medium of conveyance of a disease, or of its virulent particles, is most essential, as giving us a clue to the proper disinfecting agent to be employed. The contagious principle may be regarded as neither soluble, nor diffusible, nor volatile, but consisting invariably of solid particles of extreme minuteness, and the results of experiment confirm this supposition. Thus, if contagium were volatile, the air surrounding a patient suffering from small-pox would become a uniform infective

medium, in which no person could remain for a few moments without risk. But the actual facts do not confirm this, but lead to the *a priori* idea that the infective matter is unequally distributed. The virus of vaccinia has been preserved either in a liquid or a solid medium, but our limits here preclude our giving the methods of testing the action of disinfectants detailed in Dr. Baxter's interesting report. The nature of the medium in which the particles, septic or contagious, are suspended has a modifying influence of a striking kind on them and their susceptibility to disinfectant means. Thus the alkalinity of the virulent media impairs the power of chlorine as a disinfectant, and albumen also neutralises its effect.

But we may here give a general *résumé* of the inferences from Dr. Baxter's researches. First the disinfectant powers of carbolic acid, sulphur dioxide, potassic permanganate, and chlorine are various; and on the nature of the medium through which the infective matter is distributed greatly depends the disinfectant operations, especially of chlorine and permanganate of potash. A virulent liquid cannot be regarded as completely disinfected by sulphur dioxide, unless it has been rendered permanently and completely acid. This agent, from its greater solubility, is preferable to chlorine and carbolic acid for the disinfection of liquid media. "No virulent liquid can be considered disinfected by carbolic acid unless it contains 2 per cent. by weight of the pure acid." Disinfectants should be well incorporated with a liquid, and no solid matters should be overlooked. Aërial disinfection is useless or objectionable, owing to the false sense of security it affords. Thus, to make the air of a room smell of carbolic acid by scattering the powder about the floor, or of chlorine, by a tray of chloride of lime, is futile as regards the destruction of the specific contagia. Sulphur dioxide is considered more effectual than chlorine or carbolic vapour for aërial disinfection. The space to be disinfected should be kept saturated with the gas for a sufficient time, not less than an hour. Virulent particles must be considered as shielded by an envelope of dried albuminous matter. "It is probable that all contagia disappear sooner or later under the influence of air and moisture, and that the absence of these may act as a preservative." "Dry heat is probably the most efficient of all disinfectants." But the desired temperature must be distributed equally over the space to be disinfected: this has been established by Dr. Ransome, and the particles should be exposed to the heat either for a sufficient time, or to a certain degree of heat. These conclusions are important additions to our knowledge of disinfect-

ing agents and their operation. If, as Dr. Baxter says, all contagia like scarlet fever and small-pox are generated in the infected organism, we may not despair of doing a great deal to check and destroy; but if the contagium of a disease is capable of being generated outside the body (pythogenic origin of enteric fever), such contagium cannot be destroyed by artificial disinfection. Drainage, ventilation, and clean water are then the only preventatives.—*Public Health.*

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THE HYGIENIC USES OF PAPER.

The value of paper as a substitute for bed-clothes is well-known to those who have tried it as a supplementary counterpane or coverlet during the cold weather; but it would seem that the idea of using paper for keeping one warm in winter is capable of greater development than might at first thought appear possible. Amongst the poorer classes there is, naturally enough, a great reluctance to destroy bedding which has been used by persons suffering from infectious disease, and there is only too much reason to fear that in many cases the bedclothes and bedding are not even disinfected, and, as regards the latter, not even cleansed, after they have been used in a case of infectious disease. It would appear from the specification of a recent patent that paper sheets, paper coverlets, and even paper beds and mattresses are novelties that may be expected to be introduced in the immediate future, and if they can be made as comfortable to the patient as the ordinary materials they will undoubtedly be largely patronized. As an indication of how far invention has proceeded in this direction we learn from the specification of Mr. Loder, of Southampton-row, that for certain purposes, as for the coverlets for beds, and as a substitute for blankets, and such like articles of covering, sheets of paper are perforated with holes of suitable size and according to any design, so that when two thicknesses of paper are employed the holes are so disposed as not to be immediately opposite each other when they are superimposed or combined together. In some cases a tape binding or edging may be added or applied, to strengthen and protect the edges and to prevent tearing. The patentee prefers the best quality of brown paper, not heavy or thick, but made from tarred rope, without the addition of clay or similar matter, although for many purposes strong white or colored paper may be used instead.

Articles of personal wear and for application to, and use about,

the person, are formed of various shapes in paper, perforated as before described, and either with or without tape, ribbon, or other strip bindings and strengthenings, as for example, chest warmers and lung protectors, waist and abdominal belts, knee and elbow cap protectors, night and travelling socks, railway travelling foot warmers or heat retainers, and a variety of other purposes, where, by local application of such articles, the heat of the body may be healthfully retained, and the radiation or escape of animal or bodily heat checked, controlled, and regulated.

For use in the presence of certain diseases, or under diseased conditions of the person or body, the articles may be first steeped in or otherwise treated with antiseptic preparations, or be coated or prepared with or be combined with medicinal or medicated materials (such as carbolic acid, camphorated preparations, vaporisable antiseptics, or antiseptics employed in the form of fine powders either directly applied or in sachets) suitable for or adapted to the particular nature of the disease or disorder.

For articles intended for external use and wear, and also where worn in view, as for example for chest protectors, they may be made up of two thicknesses and of two or more kinds of material; thus the external one for instance may be printed or ornamented according to taste, and in some cases and for certain purposes, to imitate, say, shirt patterns or other designs. For railway travelling and more particularly to give third-class passengers some of the personal comforts in cold weather afforded to first-class passengers, paper materials are made up into such articles as travelling leg warmers or "over boots" and leggings for men, leggings and stockings for use by ladies, sleeves and armlets or arm coverings, sleeveless jackets, &c. For certain purposes the paper may be used in conjunction with a textile fabric.—*Ibid.*

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Editorial Notice.

COMMUNICATIONS RECEIVED.—We have received a communication from Mr. John Mathewson, in reference to a disinfectant much used by himself, and one which he has found most useful. Want of space compels us to postpone its description till the next number.