A brief narrative of the commencement and progress of the fetid irrigations and foul water pits around the city of Edinburgh : with proofs of their operation in creating nuisance, and in producing disease.

Contributors

Ellis Daniel.
Royal College of Physicians of Edinburgh

Publication/Creation

Edinburgh : W.F. Watson, 1840.

Persistent URL

https://wellcomecollection.org/works/bsyyf7uq

Provider

Royal College of Physicians Edinburgh

License and attribution

This material has been provided by This material has been provided by the Royal College of Physicians of Edinburgh. The original may be consulted at the Royal College of Physicians of Edinburgh. where the originals may be consulted.
This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.

wellcome collection

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org

A

BRIEF NARRATIVE

OF THE

COMMENCEMENT AND PROGRESS

OF THE

FETID IRRIGATIONS AND FOUL WATER PITS

AROUND THE

CITY OF EDINBURGH;

WITH PROOFS OF THEIR OPERATION IN CREATING NUISANCE, AND IN PRODUCING DISEASE.

EDINBURGH:

W. F. WATSON, 52, PRINCES STREET;

AND SIMPKIN, MARSHALL, & COMPANY, STATIONERS-HALL COURT, LONDON.

M.DCCC.XL.

EDINBURGH : T. CONSTABLE, 11, THISTLE STREET,
PRINTER TO HER MAJESTY.

R35472

ADVERTISEMENT.

THE facts introduced into this Pamphlet are taken almost entirely from the "Papers" published by a Committee of the Commissioners of Police only a few months ago. They appeared in that publication as independent communications from various persons. It has been the aim of the Author to condense and arrange them, so as to exhibit a brief narrative of the origin and progress of the offensive operations complained of; and of the effects which they produce on the comfort, health, and property of those who dwell in their vicinity. He has treated the subject, in the first place, as a case simply of Nuisance, and compared the results of the endeavours to put it down by law in Scotland, with the more successful efforts made lately in a case possessing many circumstances of similarity in England. The injury inflicted on the property of the Crown at Holyrood Palace, and on the health and comfort of the soldiers at Piershill Barracks,

are such as to call, in his opinion, for the earliest attention of the Government authorities, who, by the inquiries lately set on foot in many large cities and towns, have manifested a laudable disposition to investigate the condition of the people in relation to all matters by which the public health may be seriously affected. In the progress of his Narrative, the Author has supplied a few facts on particular points, in support of those selected from the Police Papers; and in treating more immediately of the fevers ascribed to *malarian* influence, he has endeavoured to distinguish between those which all regard as arising from that cause, and those of a contagious nature, which many consider to have a different origin. The views suggested respecting certain operations on the Water of Leith, he submits, with great deference, to public attention.

SECTION I.

OF THE FETID IRRIGATIONS AND FOUL WATER PITS AS CREATING NUISANCE.

In the Introductory Note to the "Papers relating to the Noxious Effects of the Fetid Irrigations around the City of Edinburgh," it is truly observed, that the elevated situation of the city itself has made it capable of the most effectual sewerage and drainage; and that the purity of the air, amid the fine scenery and noble walks of its immediate neighbourhood, rendered it, in the words of Arnot, "the most healthful of any town of equal bulk in Britain."

The sewerage and drainage, at the period referred to, though inferior to what they ought to have been, still secured to the city the character of healthiness ascribed to it by Arnot; but of late years they have been converted into an intolerable nuisance, not less offensive to the senses than injurious to the health, comfort, and property of the inhabitants.

The drainage of the city follows the natural declivity of the ground from west to east. On the south side, several small streams have from time immemorial, conveyed to the sea the refuse of the whole of the Old Town and part of that of the New. These streams, with their contents, are carried into a main covered sewer, which proceeds along the North Loch, and down the North Back of Canongate to the Water Gate in the burgh of Canongate,

into which sewer the surface water and soil of the High Street and Canongate also fall. Within these few years, another main sewer has been formed which drains the Cowgate; its contents are carried along the South Back of Canongate to the cross road to Dumbiedykes, where they enter an open ditch, and are finally discharged into the meadow in the Royal Park, between Dumbiedykes and Salisbury Crags.

A third great sewer of the Old Town receives the contents of the drains of a part of George's Square, Nicolson Street, and other contiguous districts, and proceeding as a covered drain, finally debouches in the meadow above-mentioned in the Royal Park; so that the common sewer at the Water Gate and that in the Royal Park are the two channels into which flow the contents of the drains of the Old Town. These two sewers, after running about 300 yards eastward of the Palace of Holyrood, finally deliver their contents, in one united stream, into a wide open ditch at a place near the Clock Mill; at this place, the stream takes the name of "Foul Burn," and flows in open canals towards the sea, except where it crosses the London Road. In its course, it passes the Cavalry Barracks at Piershill, proceeds through the low grounds at Restalrig belonging to the Earl of Moray, and through the lands of Craigentinny, the property of Mr. Miller; till at last it falls into the sea at "Figget Whins." These excrementitious streams, whilst permitted to remain in their original channels, deposited their contents in the sea, without creating annoyance of any kind.

The Water of Leith becomes ultimately the great receptacle of the contents of the sewerage of a portion of the southern districts of the Old, and the western districts of the New Town. From Bruntsfield Links and the the Meadows on the south side of the city, a small stream, running through the lands of Dundryan and Lochrin, found its way through the low grounds of Dalry into the Water of Leith. Into this stream the drains of the streets

in that locality were emptied. Those of the northern side of the New Town proceed in covered sewers, which debouche at once into the river at different parts of its course, as in the vicinity of Stockbridge and Canonmills. The north-eastern parts, as York Place, and the adjacent districts, are drained by a covered sewer, which debouches into an open canal at the east end of London Street; whence the stream flows in open ditches through the garden grounds below Gayfield Square, and pursuing its course afterwards under ground, falls at length into the river above the harbour: while the sewerage of the Royal Terrace, Leopold Place, and that locality, is carried to Leith in an open ditch, passing through the lands of Trinity and Heriot's Hospitals, between the London Road and Leith Walk. It thus appears, that, beside the covered sewers of the New Town, which empty themselves at once into the channel of the river, there are others which pursue their course in open ditches to the Harbour at Leith, and have to some extent been converted to purposes similar to those on the southern side of the city.

With these systems of drainage there are connected districts of meadows, one extending from Dalry and Coltbridge towards Slateford and Corstorphine on the west; a second along the low grounds between the Back of Canongate and Salisbury Crags on the south; a third, between Gayfield Square and the Newhaven Road on the north; a fourth, between the London Road and Leith Walk; and a fifth, the most extensive of all, from the Palace of Holyrood towards Restalrig and Seafield on the east of the city. Without affecting precision, a writer in the *Caledonian Mercury* estimates the meadows to the west as extending about two miles in length by one in breadth; while those to the eastward may be about two miles long by half a mile broad.

The process of collecting and preparing manure from the open ditches above-mentioned, has, in some instances, been long practised; but that of irrigation is of much later date.

It was first commenced, it is believed, on the Earl of Moray's grounds at Restalrig. An occupier of land on that property formed pits, partly for collecting manure from the foul water brought down by the burn, and in part to irrigate his fields. As the operations were then confined to a few acres, they attracted no general observation ; but about the year 1809, a Mr. Duncan, who had purchased a villa in the neighbourhood, complained of the pits as a nuisance and brought the complaint before the Courts of Law. Several medical gentlemen gave evidence on the question. The late Dr. Duncan, sen., stated, that he had attended cases of remittent fever at Restalrig, which he attributed to the marsh miasmata arising from the ponds and neighbouring morass. Dr. A. Duncan, jun. corroborated the testimony of his father, as to the offensive smells issuing from the ponds, and considered them to be " just that artificial preparation of marsh, which medical men regard as injurious to health." Dr. Hope considered exhalations, arising from putrescent animal and vegetable matter, to be prejudicial to health, and that the smell from these ponds or pits was very offensive. Dr. Rutherford stated, that the effluvia from the ponds would be noxious to health, if they were not carried away by the currents of air which pass down the valley ; that if, instead of being collected and retained in ponds, the foul water were spread over the whole surface of the meadows, the injurious effects, arising from the greater surface exposed, would be increased ; and that a residence at Restalrig was unsuited to delicate people, on account of the disagreeable effluvia which proceed from the ponds, and which he had himself felt to be very offensive. (Papers, pp. 50, 51.) Even Dr. Farquharson, who, as well as Dr. Rutherford, had been summoned for the *defence*, though he was of opinion that a patient requiring country air, might recover health as well at Restalrig as any where else, yet would not, on account of the difference of opinion among his brethren, recommend with that view a residence in that village. Notwithstanding, however, this preponderating weight

of testimony in proof of *nuisance*, the Court seems to have paid little attention to it; and the cause was decided against the pursuer, on "the double ground that he himself used similar pits, and that *he* had come to the nuisance."

After this period, the system of irrigation, thus commenced at Restalrig, spread rapidly, and has gradually increased from a few acres to many hundreds on the east, west, south, and north of the city. The mode in which the process is carried into execution is thus described by Mr. Ramsay, the active and intelligent inspector of Police, in a letter dated Oct. 9, 1839. In this process, says Mr. Ramsay, the water is conveyed from the main channels into lateral ones, approximating in level as closely to a horizontal plane as merely to permit the water to flow. It is admitted from the main drains into the lateral ones, either by sluices or dams; both being here in use. The lateral drains are in general small and numerous; and irrigation is effected either by making openings in their sides, or by damming up the water so as to cause it to overflow. In either case, it oozes slowly over the surface till it is wholly absorbed by the soil, or exhaled into the atmosphere. It is an important principle in irrigation, that the water shall flow over the surface, not rapidly, but in a current so slow as to insure its gradual absorption, the object being completely and equally to saturate the land; and when that has been accomplished, the sluices and dams are shut till a farther supply is required. In the application of these filthy streams to the purposes of irrigation, the smell becomes greatly more offensive; arising, no doubt, as Mr. Ramsay suggests, from being spread over a much larger surface, and from the accelerated evaporation which an easterly wind, so common at that period, occasions.

In addition to this nuisance from irrigation, another arises from collecting the soil of these foul burns into tanks or pits, prepared for the purpose. These pits are numerous; the first being immediately to the westward of the Palace of Holyrood, on the grounds and gardens belonging to Mr.

Fletcher of Saltoun; and the remainder to the eastward of the palace—beyond which there is a continued series to the east of Jock's Lodge. In collecting this soil, the foul water is let into the tanks by sluices, where it is suffered to remain till the soil, held in suspension by the water, is deposited in the shape of soft half-liquid mud. When this muddy or sludgy deposit has obtained consistence enough to admit of being lifted with shovels, the surface water is drawn off, and the mud is thrown out on the banks till it gives off a farther portion of water. In the course of a few weeks, it has acquired consistence enough to be carted off for the purpose of manure.

The operations of thus collecting and preparing manure in these ponds, commences generally in September, or early in October, when the foul water is no longer required for the purpose of irrigation; and they are continued till the April following, when the water is again wanted for irrigation. Thus, for five or six months, in the spring and summer season of the year, says Mr. Ramsay, you have the process of irrigation going on, with all its offensive exhalations, in the manner already described; and for the remainder of the year you have the contents of the tanks fermenting around you, with all the accompanying nuisance of preparing and and carting off the soil which has been deposited in them.—(Papers, p. 65.)

On the farm of Lochend, belonging to the Earl of Moray, there is a regular Manure manufactory, of which a gentleman, intimately conversant with the operation in all its branches, and who has been an attentive observer of its rise and progress, gives the following information.—When the tanks were first formed they received principally the surface-water, and what it brought with it, as at that time the principal part of the soil of Edinburgh was carried away by carts; but since the introduction of water into almost all the houses, and of soil-pipes communicating with the common sewers made in the Cowgate and the North Back of the Canongate, the whole of the soil has been thus conveyed;

so that, independently of the arrestment of part at the ponds or places already mentioned, one individual has increased the receptacles for foul water on his farm to more than four times their original size; and which furnish more manure than would be sufficient for a farm of ten times the extent. Last year (1838) hundreds of carts' load, says the writer, went to a farm on the Duddingstone estate, and much, he was credibly informed, went to another near Kirkliston. (Papers, p. 65.)

When the good people of Edinburgh voluntarily subjected themselves, a few years ago, to a heavy annual charge, in order to obtain an abundant supply of water, they little anticipated that an article, which has so largely contributed to the health and comfort of every class of inhabitants, should, by an unrighteous thirst for gain in a few wealthy individuals, be turned to purposes which contribute directly to fill the air they breathe with the most disgusting odours; surrounding them at the same time with unwholesome exhalations, from which those who most require fresh and pure air can with the greatest difficulty escape; and that too, at the very season when nature invites them abroad to share, with all other organized beings, in the delights of returning spring.

From lands which have been soaked or drenched with this excrementitious mixture a luxuriant vegetation quickly follows, and many successive crops are produced, yielding extraordinary profits to the proprietors; but with the necessary consequence of poisoning the air for miles around with fetid exhalations. A writer on agriculture, Mr. Johnstone, in his Treatise on the Draining of Land, thus alludes to the irrigated marshes around Edinburgh. In the immediate vicinity of that town there are, he says, several hundred acres of the richest water-meadow, producing about £40 an acre annually, part of which, in its original state, was not worth a shilling per acre. The discharge from the common sewers that drain the city affords a full supply for this foul irrigation. But though it adds to the *rental* of the land-

lords it contributes *nothing* to the health of those who live near it. In the summer months, he adds, the malaria is almost insufferable. (Papers, p. 64.)

With respect to the herbage raised on these irrigated meadows, no horse or animal of any kind, says Mr. Glass, will eat a particle of the produce, either while growing, or when it is recently cut. When first put to eat it, the cattle have for some days an absolute loathing of it; but when at length they are brought to feed on it, it causes an immense flow of milk. Several cowfeeders, however, affirm, that it is injurious to the health of the cattle; that some die from eating it, and none live beyond twelve or fifteen months. Yet it is calculated that the food which is annually raised in these meadows from November to April, supports probably no fewer than 3300 milch cows in Edinburgh, and 600 in Leith. Neither the milk afforded by these cows, nor butter made from it, will keep sweet the usual time, but soon putrifies; and the milk itself is said to be unsuited to children.—(Papers, p. 62.)

Having stated the nature and extent of these noxious operations, more especially of those carried on to the eastward of the city, we shall now give the substance of the evidence of several public officers and private individuals who have actually once lived, or do now reside, within reach of their baleful influence.

In 1831, Dr. Barlow, surgeon of the regiment then in Piershill Barracks, in a Report to the Army Medical Department, describes this fetid irrigation in the immediate vicinity of the barracks as covering several hundred acres. The smell proceeding from it at all times, especially in a mild evening, is, he says, most offensive; and, at times, actually perceptible within the wards of the hospital. The late Dr. Hennen, a military surgeon of the highest reputation, in a topographical report of Piershill Barracks, speaks of the summer of 1813 as having been extremely hot, rendering the exhalations from the morass near the barracks excessively offensive; and which became more so, from the operation of raking out

the sediment for manure. " To these effluvia, and the exhalations from the lakes in the neighbourhood of the barracks, the dysentery which raged among the troops in the summer and autumn of that year, and also among the inhabitants of that district, was attributed." Some cases of ague also have at times, he adds, appeared among the inhabitants.—(Papers, pp. 40–41.)

In confirmation of these facts, respecting the unhealthy situation of Piershill Barracks, it may be added, that, from " Statistical Reports on the sickness, mortality, and invaliding among the troops in the United Kingdom," which, during the year 1839 have been laid before Parliament, and published under the authority of the Medical Department of the Army, the following results have been deduced:— These Reports contain tables, exhibiting the extent of sickness and mortality among the dragoon guards and dragoons, serving in the United Kingdom, during 7¼ years, from January 1830, to the end of March 1837. From the general average results, drawn by the reporters of these extensive returns, Dr. J. Y. Simpson selected those which relate to the Barracks at Piershill, and comparing them with the corresponding returns furnished by other stations, obtained the following results:—" That while the cavalry troops of the United Kingdom in general are admitted into hospital in the ratio of 929 per 1000 of force, those stationed at Piershill are admitted, during the same period, into hospital in the much higher ratio of 1029 per 1000 of force. In other words, nearly 100 more men yearly per 1000 of force, are affected with sickness at Piershill than in the collective cavalry stations of the United Kingdom; or, the sickness is nearly 10 per cent. greater among the troops there, than among the same and similar troops elsewhere in Great Britain and Ireland." Such is the result as regards the comparative insalubrity of the station at Piershill. With respect to *mortality*, it was further ascertained, that while " the average number of deaths per 1000 of force is fourteen only among the cavalry stationed throughout the United King-

dom, at Piershill, during the period alluded to, it has been above sixteen per 1000 of force, or *two* per 1000 greater." (Papers, p. 43.)

To these opinions of several eminent army surgeons with respect to the noxious character of these fetid exhalations at Piershill Barracks, supported by the results of comparative returns of the sickness and mortality incident to other cavalry barracks, we shall add that of Mr. Liston, formerly residing in this city, and who, therefore speaks directly from personal observation. That distinguished surgeon, in enumerating the various causes producing erysipelas, (while lecturing on that disease at the North London Hospital,) observed that it "often arises from putrid exhalations, and the exposure of patients to miasmata. A very remarkable instance of this occurred," says he, "sometime ago in the cavalry barracks in the neighbourhood of Edinburgh,"—he then describes the nature of the fetid irrigations before mentioned, and the almost suffocating effects they sometimes produce on persons passing along the road, especially just before the setting in of wet weather; and declares his "astonishment that so great a nuisance is not abated. The cavalry barracks," he adds, "stand pretty nearly in the middle of this swamp; and some time after a regiment of dragoons was stationed there, and on the very day following that upon which the sluices were opened, and the irrigation commenced, eight cases of erysipelas appeared among the troops, who were previously perfectly healthy; and before that regiment left the barracks, a considerable number of men, and two or three of the officers were destroyed by the disease." (Papers, p. 33.)

This statement of Mr. Liston may perhaps be considered as throwing light on the following query proposed by Dr. Simpson.—"Among the troops in Great Britain, the *autumnal* months," says he, "are the most sickly, (see Official Report, p. 21.) Among the French troops also, the greater unhealthiness of the autumnal months has been shewn by recent statistical returns. At Piershill, May and

June give the largest returns of sick into hospital. Is this *advance* of the most sickly season at Piershill to the earlier months of summer connected in any way with the exposure of the new troops, (who generally *arrive* here in May) to the unhealthy influence of the effluvia from the neighbouring lands, which are at this period under active irrigation? We venture to speak, he adds, of the comparatively greater degree of sickness at Piershill as an effect of the location of the barracks near the irrigated lands, because we are not aware of the troops there being exposed to any other unhealthy influence, *additional* to those that may be in operation in other cavalry stations." (Papers, p. 44.)

After these general observations on the evil effects produced by the aforesaid fetid irrigations on the health and comfort of the officers and soldiers who are compelled to take up their residence in the midst of them, we shall next select a few examples of their operation on private persons, following very different pursuits, and occupying various localities within reach of their influence. In a lady who resides at Fyfe Place, Leith Walk, these exhalations, when brought to that locality by an easterly wind, always create nausea, with perspirations, violent pain in the temples, vomiting, fainting, and great prostration of strength. So intolerable is the nuisance, and so injurious to her health, that she and her husband, who suffers in the same way, but in a less degree, will, if it continue, be forced to leave their residence. (Papers, p. 56.)

At Comely Green, on the London Road, the smell was so intolerable, and the effects on the health so injurious to one member of the family, that they were actually obliged to leave it. They had come there in perfect health, and recovered gradually from the time they left it. On one occasion, while they resided there, a gentleman, calling one day when the atmosphere was loaded with the fetid effluvia, was so overcome by it, that he actually fell down at the gate. (Ibid. p. 57.)

Mr. Rankin, Manager of the Dalkeith and Edinburgh

Railway, when employed in conducting that work through the irrigated meadows, says, that many of the workmen, during that time, " grew very sallow, some quite yellow, as if they had jaundice, and several left the work from sickness, and never returned." Mr. Rankin himself, when he walked through the meadows, exposed for an hour at a time to the effluvia, always suffered from headache, with a degree of swelling in the throat.—(Ibid. 64–5.) He mentions also, a family who lived for a year at Seafield Toll-bar, close to the foul meadows, all of whom were at that time remarkable for their sallow, flabby, dull, and languid looks. Under his direction, they were removed to another dry and healthy station at Sheriffhall, and gradually became quite healthy in appearance, looking clear in complexion, firm, happy, and spirited. (Ibid. p. 57.)

Mr. Miller of the King's Park, where he has resided upwards of thirty years, speaks of the great increase of the foul water tanks and irrigation within these few years. The main drain, leading from the city, opens up at its entry into Comely Gardens, in the vicinity of the Palace Royal. It runs open through the garden into a very large tank in its centre, where the soil is deposited, and afterwards sold as manure in the mode already described. The stench arising from these operations, and from the neighbouring marshes, is so dreadful, that the windows of his house frequently cannot be opened. Comely Gardens, he adds, were formerly an extensive Botanic Garden and Nursery, and, as a place of amusement, were the resort of all the fashion of Edinburgh. At that time, the drain was covered in through its whole extent, and there were no dung tanks. It is now open through its whole extent, and various dung tanks exist. (Papers, p. 48.)

To the same import is the evidence of Mr. Gavin, who resides in the immediate neighbourhood of Holyrood House. When he first knew St. Ann's grounds, there were no ponds in them, but many now exist there ; and their state is such as must drive away respectable persons from the neighbour-

hood. Mrs. Gavin experiences dreadful sickness, and cannot keep her health; when the wind comes from the east, no window can be kept open. The house is large and in excellent repair, and was once the property of Regent Murray, and the abode of nobles. He (Mr. G.) is now unable to let it, and contemplates the sale of it, with the garden, and nearly three acres of land; which would have the effect of laying the ground, some of it within an hundred yards of the north side of the palace, open to the erection of steam engines, and the accompanying buildings for various manufactories. (Ibid. p. 49.)

To these testimonies of proprietors in the immediate vicinity of the Palace, we may add that of Mr. Hamilton of Kames, who has lived in the palace itself for nearly a quarter of a century. According to his statement, there is not a spot in the vicinity of the city more exposed to the nauseous effluvia emanating from the sewers than her Majesty's Royal Palace of Holyrood. When he first resided there, the nuisance was inconsiderable; but so greatly has it increased from the artificial irrigations spread over such an immense tract of country, that there is not a wind that blows that does not carry stench and pestilence along with it, directed, as it were, on every side, against the Royal Palace. All the lanes and avenues are proverbially pestilential, and the palace is encircled by pestilential sources. When the wind blows from the east, on which side of the Palace Mr. H. resides, the stench and effluvia oblige him to shut down the windows of his drawing-room even in the finest weather. "If the grievance continues to increase, as it has done, under my own observation, your city of Modern Athens," adds Mr. Hamilton, addressing the Lord Provost, "will soon become the City of the Plague."—(Papers, p. 47.)

No spot, indeed, through the whole extent of the irrigated lands is more exposed to increase of nuisance from the varying direction of the winds, than that on which the Palace stands. In Edinburgh, the winds are said to blow either from the east or west, in about the proportion of 230 of the

latter to 135 of the former. With the rare exception, therefore, of such as blow due north and south, scarcely any wind can prevail at Edinburgh without sweeping over the Corstorphine meadows on the west, or the Restalrig meadows on the east of the city. Now, the configuration of the higher ground, and the direction of the intervening vallies, modify the course of the aërial currents in such a way, that, whether they originate on the east or the west side, they must, in passing from one to the other, partly encounter the Palace of Holyrood, and discharge upon it a considerable portion of the offensive matters with which they are laden. No wonder, therefore, that when in anticipation of Her Majesty visiting Edinburgh, and taking up her residence at Holyrood Palace, the Crown officers should require the opinion of the medical authorities, as to the propriety and safety of such a project. Accordingly, Sir George Ballingall, professor of military surgery, and Dr. Peebles, after inspecting the low grounds between Salisbury Crags and Holyrood, laid under irrigation from the common sewers of the city, reported, that "during the prevalence of south and south-westerly winds, the whole of the effluvia thence arising would be carried on Holyrood, and the Palace would be rendered thereby an unsafe place of residence in the warm weather." Again, if, to avoid this nuisance from the west, Her Majesty should retire to the east front of the Palace, on which Mr. Hamilton resides, the "stench and effluvia during an east wind are so great, that even in the finest weather in summer, he, Mr. H., is obliged to shut down the windows of his drawing-room to exclude the winds of heaven." It is therefore most desirable that before our young Queen and her Royal Consort make a visit to this country, "the whole of these grounds," as Dr. Peebles recommends, "should be well drained and cultivated, so as to remove effectually all the offensive exhalations from the locality of the Palace of Holyrood."

So much, indeed, is the nuisance extended by the agency of the winds, that the new terraces on the Calton Hill are,

on this account, beginning to fall in estimation as places of residence. When, in the year 1833, Dr. Mackenzie first occupied the house, No. 14, Carlton Place, he sometimes perceived disagreeable smells when the wind was from the east or north-east. During the prevalence of easterly winds in March, April, and May of the following year, and, indeed, through the summer, the sickening effect of these winds was almost intolerable; and since then till now (1839) says Dr. M., it has not only increased greatly on the Terrace itself, but actually within our rooms, even when the windows are not open; until at length, he adds, "I have all but resolved to quit a situation which I deem to be the most delightful in Edinburgh, but for this nuisance." (Papers, p. 59.)

Although, from situation, say the Committee of the Commissioners of Police, the inhabitants of certain districts of the town are more exposed to this nuisance than others, there is no district entirely exempt from its effects. Encircling, as these irrigated fields do, nearly three-fourths of our landward frontier, there is no ingress or egress to or from the city without encountering the annoyance. Half the pleasure-walks in the neighbourhood are deteriorated by its presence. To all classes, in their out-door recreations, the disgusting odours, ever present in the atmosphere, are an intolerable annoyance. The richer man may indeed get beyond the reach of their influence; but the artizan, who seeks for health and enjoyment in a rural walk near home, is perpetually exposed to the inhalation of these nauseating exhalations, and is thus compelled to seek, as it were, on the very verge of this Lernian marsh, that health which its putrid effluvia forbid him to enjoy.—(Papers, p. 61.) The nuisance forms also a never-ending subject of complaint and execration among the company of the railway train and stage coaches, which have to pass through or near to the fetid marsh; so much so, "that the servants of the company make it a practice to propel the coaches as rapidly as possible through these meadows, to prevent the passengers from

being disgusted with the railway."—(*Ib.* p. 62.) Nor is it a light consideration that strangers who may visit Edinburgh, either on business or pleasure, where there is so much to raise and to gratify an enlightened curiosity, should be afraid almost to draw their breath, lest they inhale with it a full dose of these most disgusting odours.

The effects of this nuisance in driving people from their residence, and thus *depreciating the value of property*, has been already mentioned, but deserves yet farther notice. In the case of the Rev. Principal Lee, this result was particularly striking. He had resided for seven years at Milton House, near the foot of the Canongate; but at length became convinced that the situation was unfavourable to health, in consequence, as he believed, of the "offensive exhalations arising from some of the fields in the neighbourhood, which, says he, had been recently irrigated by a fluid of most loathsome odour." In the course of the last Winter of his abode there, one of his sons was carried off by a malignant fever, another of his family was seized with the disease, and he himself suffered from a violent attack of dysentery. "Other causes," says he, "might have produced these maladies; but that they were aggravated by the state of the atmosphere, loaded with fetid vapour, he entertained no doubt." From the accumulation of nuisances, also, the King's Park, the only open ground where his children had been accustomed to walk, ceased to be a fit place for their recreation. "These considerations weighed so strongly on my mind," says Dr. Lee, "that I was induced to remove to another house, for which, though inferior in point of accommodation, I paid three times the rent." (Papers, p. 58.)

In this same Park, from which Dr. Lee felt it necessary to prohibit the occasional visits of his children, Mr. Miller and Mr. H. Gavin are fated always to reside. The latter gentleman actually occupies the house which was once the property of the Regent Murray and the abode of nobles; but which the state of the grounds will, he says, compel him, as well as others, to quit. It is not a little remarkable

that a descendant of that illustrious person should have commenced, and now carries to the greatest extent, that most disgusting process, which not only renders the ancient abode of his family no longer habitable, but the Palace itself an unsafe place of residence for the Sovereign.

In the action raised against Lord Moray in 1809, the Court, as before stated, passed from the question of nuisance, and decided against the pursuer, "on the double ground that he himself used similar pits, and that *he* had come to the nuisance." On the present occasion, not one of the complainants can be charged either with having used similar pits, or with having "come to the nuisance." The houses of Mr. Miller in the King's Park, and of Mr. Gavin in St. Ann's grounds, were built and occupied long before the first pit was formed, or irrigation practised, on the estate of Lord Moray at Restalrig. Dr. Lee, too, resided many years at Milton House with satisfaction to himself, until driven from it by the "offensive exhalations, then recently increased" by extending the irrigation in that vicinity. Formerly, the whole of Comely Garden was the resort of all the fashion of Edinburgh. At that time, says Mr. Miller, the drain through the whole extent of the garden was covered in, and there were no dung-tanks: it is now open through its whole extent, and dung-tanks exist. Holyrood Palace, too, has been occupied for many generations by the most illustrious of the land, yet, till lately, no complaints of nuisance have been heard; but now, says Mr. Hamilton, "the discharges from the common sewers have so much increased, and been thrown, by *artificial* means, over such an immense tract of country, that there is not a wind that blows which does not carry stench and pestilence along with it, directed, as it were, on every side, against the Royal Palace. Even the gardens around," he adds, "are made cess-pools and depôts for collecting this material of warfare against not only human comfort, but human life."—(Papers, p. 47.)

In all these instances, it is not the complainant who has

gone to the nuisance, but the nuisance that has come to him; and instead of having assisted in uncovering drains, in sinking pits for manure, and spreading foul water over the land to poison the air with its fetid exhalations, these complainants only ask that such abominations be put an end to; that the drains which have been opened be again closed, the stinking pits filled up, and the "Foul Burn," which heretofore pursued its course almost unnoticed and unregarded, be permitted, as in the olden time, to discharge its impurities at once into the boundless ocean.

A nuisance such as that described above would not, says the editor of the "Police Papers," be tolerated in the neighbourhood of London for an hour. The Court or Parliament would forbid it; and in England, the remedy by *indictment* is effectual. But Edinburgh has neither a resident Court nor Parliament within its walls; and the remedy of indictment has no place in the law of Scotland. (Papers, p. 8.) In illustration of the mode in which such things are managed in England, we beg to refer to a recent decision at Liverpool.

At the assizes at Liverpool, 1837, an indictment was preferred by the Mayor, Aldermen, and Burgesses of Liverpool against James Muspratt for creating and maintaining a nuisance within the Borough.

This nuisance was created by the establishment of works for the manufacture of soda, obtained by the decomposition of muriate of soda (common salt) by sulphuric acid. About 12 tons of salt were stated to be decomposed daily, every ton of which is said to have yielded about 14,000 cubic feet of muriatic acid gas. When thus set free, this muriatic gas, in union with the aqueous vapour and other gases, formed by the combustion of the coal employed, escaped by the chimney into the atmosphere, and produced the nuisance complained of. It was sworn to occasion sensations of smarting in the eyes; to excite cough and sneezing in some, nausea in others; to corrode and tarnish metallic surfaces, and discolour painted surfaces and printed cottons. When the

vapour reached the grass fields, it rendered the grass distasteful to the cattle, as well as the water in the adjoining ponds. To garden produce it was very injurious, turning it brown, and drying and curling up the leaves of plants as if they had been scorched. Shrubs in the village of Everton, nearly a mile from the works, flourished well till the vapours from these works reached them, but they had since gradually decayed. There was no difficulty in distinguishing these vapours from common smoke. They often came in a stream, and could be easily traced back to the chimney of the works. When brought by the prevailing wind to any locality, doors and windows were obliged to be shut. Many persons had quitted their residences in the vicinity of the works; and both there and in the village of Everton the value of property had been greatly depreciated. No such injury to persons and property was known before the establishment of these works, and at one period, during the suspension of the manufacture, the nuisance ceased to exist.

Various attempts were made to put down this nuisance, and these were at last successful. The works, it is stated, were first established in 1822, and gradually brought to perfection, at an expense of between £30,000 and £40,000. In 1828, they were indicted as a nuisance by the Churchwardens and Overseers; but, on proposals of improvements being made which should abate the nuisance, the prosecution was withdrawn. The proposed improvement consisted in raising the chimney to a great height (250 feet) with the view of carrying off the offensive vapours from the vicinity. To a certain degree this succeeded in relieving those who lived near the works, except on days when the atmosphere was damp and heavy, when the acid vapour fell down and produced its usual effects near the works. By thus raising the chimney and relieving those in the neighbourhood of the works, the nuisance was not, however, abated, but only removed to a greater distance; and accordingly, the proprietors at Everton now became the sufferers. In 1832, they joined therefore in another indictment against Mr. Muspratt, who, on this occasion, succeeded in obtaining an acquittal.

From that period, no further molestation was given till the year 1837, when the Magistrates raised the indictment above mentioned. The leading facts adduced in evidence have been already given, and the result is now to be stated.

After a large body of evidence had been gone through, during a trial which lasted nearly three days, Mr. Justice Coleridge, in addressing the jury, stated, That the defendant was charged by the Magistrates of the Borough with having created a nuisance in the neighbourhood. To prove such an allegation, the injury, he said, must be tangible and substantial—an injury to the health, comfort, and property of the people residing within its influence. If, therefore, property has been depreciated in value, furniture spoiled, iron and other metallic articles tarnished—these would amount to tangible injury. So likewise, if the daily comforts of the inhabitants were broken in upon, although it produced no serious or dangerous effects, such also would be a tangible and substantial injury, could it be brought home to the defendant, unencumbered with any reasonable doubt. At the request of the jury, the Judge then read the testimony of some of the witnesses as to the noxious operation of the vapours at Everton, and concluded by saying, If the evidence did not carry conviction to their minds they would at once dismiss the case; but if they were satisfied that Mr. Muspratt had produced such a nuisance as had caused serious loss and discomfort, then they would decide against the defendant. The jury retired, and in two and a half hours returned a verdict of *guilty*.

Although differing in its nature, yet, in several of its features, and in the effects which it produced, the Liverpool nuisance resembles much that of which we complain. The elastic vapours and gases, which it diffused through the atmosphere, affected the senses, the health, and property of those within reach of their influence, though in a way less disgusting than the fetid exhalations described above. Our Commissioners of Police, like the Magistracy of Liverpool, were anxious to put down the nuisance: but in the opinion of counsel, even assuming in point of fact, that the operations

complained of are a nuisance, the Commissioners, in their *representative* capacity, are not competent to bring any action for putting a stop to them (Papers, p. 10); so that the body, elected specially, as we conceived, to look after and guard the public health and property, (both of which may, as already shown, suffer greatly from the alleged nuisance) are by law incompetent to execute such an office. Any *individual aggrieved* may, however, seek for a remedy by means of an action of declarator or interdict, before the Court of Session. The courts of law, we are told, are open to all, and so, it has been said, is the Royal Hotel. But who, it is asked, (in the Police Papers, p. 9), will be found willing to enter into protracted and expensive litigation with the Earl of Moray and Mr. Miller, who are enriched, by the very operations complained of, to the extent of several thousands a-year. They too, can not only feed the litigation, for an unlimited period, with the unhallowed profits derived from the nuisance, but can escape from its noxious operation to more healthy and congenial abodes; whilst the poor artizan, or day-labourer, in seeking his daily bread, is compelled to breathe constantly a polluted air, and to feel his strength and the health of his family gradually sinking beneath the slow poison of this invisible foe.

In 1832, the Commissioners of Police introduced into a bill, then before Parliament, clauses which had for their object the abatement of the nuisance; but they were vehemently opposed by the Earl of Moray and Mr. Miller, who had even sufficient influence to obtain the insertion of a provision, "That in making any main drain, or sewer, or conducting drain, the water at present carried into any existing outlet, shall not be diverted therefrom." This clause, now forming part of the Edinburgh Police Act, prevents, it is said, the execution of any plan for "carrying the impurities of Edinburgh to the river or the sea by any channel different from the present, except by a repeal of the statute," (Papers, p. 9.)

It is no small aggravation of the mischief of this clause to

be informed, that, by the Police Acts, the whole refuse and impurities of the city belong to the said Commissioners; whose first duty it is to see that they are removed, so as to give as little annoyance as possible to the lieges, and effectually to check and prevent such practices in relation to them, as can be proved to be injurious to the public health. The inhabitants, also, or the Commissioners, their representatives, have further, "on the principles of common law, a right to divert the course of the polluted streams, in so far as they consist of the rain water which descends within the bounds of the city, and of the water brought into the city by the Water Company; but they cannot do so in so far as the streams are supplied by *natural* springs." Now, it has been already stated, that the great increase of this nuisance has taken place since the Crawley water was brought into the city; and, indeed, the water afforded at present by the *natural* springs is said to be but a small part of the whole. Were it practicable to separate these two sources of water, then, it is believed, they might be conveyed away in different channels; but this, it is declared, cannot be done; and even if it could, the Commissioners are barred from making any alteration whatever in the course of the present channels, by the clause in the Police Act already quoted. Thus though the refuse matter itself be the property of the inhabitants, and probably nine-tenths of the water by which it is conveyed away belong to them, on the principles of common law; yet they are compelled, not only to forego all benefit from its use, but to see it, with an utter disregard of the feelings and interests of others, converted, by a few individuals, into a source of inordinate gain, by processes injurious alike to the comfort, the health, and the property of all who dwell within reach of their influence.

In the opinion of counsel, therefore, it is not expedient to attempt to abate the nuisance by an action at law at the instance of the Commissioners of Police. The evil, it is truly stated, is so great, and so deeply affects the public health and welfare of the city, as to bring it under the

principles of General Police Legislation. The most effectual and the most expeditious course is, therefore, to apply to Parliament for authority, by means of drains or otherwise, to abate the nuisance," (Papers, p. 10.) From the extent to which the property of the Crown is affected, the Commissioners of Police have laid the information they have acquired before the Commissioners of Woods and Forests; also before the Board of Ordnance, and the Crown counsel. The body first named have already so far interfered as to have directed notice to be given to the Earl of Haddington, that his irrigations below Salisbury Crags must proceed no farther. The Board of Ordnance and the Director-General of the Army Medical Department will, we presume, ere long, direct attention to the state of Piershill Barracks, where the nuisance has been shown to exist in such force as not only to affect the general health of the men in an unusual manner, but to augment the rate of mortality. And, lastly, there is reason to hope that the Crown counsel may take up the subject as a matter of general sanatory police, and carry it through as a public act: Or that the Commissioners of Woods and Forests, acting for the Crown, against whom the plea of prescription cannot be maintained, may proceed to get the nuisance abated at common law.

SECTION II.

OF THE FETID IRRIGATIONS AND FOUL WATER PITS AS PRODUCING DISEASE.

HITHERTO we have spoken of the foul pits and irrigations chiefly as creating nuisance: We have next to submit a few observations on the degree in which they contribute to impair health and induce disease. It has already been shown that persons who live in their vicinity, or even continue to work daily in their neighbourhood, gradually lose their healthy complexion, become sallow in appearance, and exhibit a manifest diminution in spirit, activity, and vigour. To use the words of an experienced physician, Dr. James Johnson, they have that peculiar and morbid aspect which malarian districts impress on the human countenance—a complexion neither yellow nor sallow, but an unsightly and unearthly compound of the two, presenting infallible indications of a slow poison, circulating with the current of the blood through every organ of the body, and gradually sapping the foundations of health and life. "On change of air," &c.

At the barracks of Piershill, which are situated in the very midst of these abominations, both the number of sick and the rate of mortality have been shown to be greater than in any other barrack in the United Kingdom. The sickness too is greatest in the *summer*, not in the autumnal quarter of the year, as occurs in every other barrack.—That is, although the time of greatest sickness be out of the ordinary period, it falls in exactly with that in which the irrigating system is in full activity. Nor is the noxious operation of this atmosphere confined to the soldier alone: The veterinary surgeon of the regiment informed Dr. M'-Kenzie that, when the wind blew across the irrigated grounds

near these barracks the cases of the diseased horses in the hospital were sensibly rendered worse by it. (Papers, p. 42.) To the same deleterious influence must we ascribe the fact mentioned by Mr. H. Marshall, Deputy Inspector-General of Hospitals, that the messman of the 7th Dragoon Guards could not keep the butcher-meat, provided for the mess, without its becoming tainted much sooner than in any other place having the same temperature. (Ibid. p. 42.) The messman himself, Mr. H. Jennings, adds, that all kinds of meat and poultry would, in one night, become covered with a greenish slimy matter during the summer months, which he attributed to the nauseous effluvia brought by the winds from the valley below. (Ibid. p. 55.) Add to these facts the very striking observation of Mr. Liston, which we desire here to repeat, that, "On the very day following that upon which the sluices were opened, and the irrigation commenced, eight cases of erysipelas appeared among the troops, who were previously perfectly healthy;" and that, "before the regiment left the barracks, a considerable number of men, and two or three of the officers, were destroyed by the disease. We should like to hear what other or better reason for so fatal an occurrence any of those who have assisted in creating such a nuisance, and who fill their pockets with its profits, can give for it than that assigned by Mr. Liston. And a similar remark may be extended to the cases of dysentery recorded by Dr. Hennen and Dr. Lee.

To the same malarian influence do we attribute the following fact communicated by Mr. Glass of Marionville. "Any person, says he, employed in these meadows, who chances to receive a wound, however small, is immediately affected with violent pain and swelling of the parts, terminating in gangrene." "All who are conversant with this neighbourhood," he adds, "are familiar with the above fact." A gentleman, who has had experience in this quarter for many years, gives the same statement, which is corroborated by some of the oldest inhabitants of Restalrig, whose acquaintance with

the irrigating process and all its effects, dates from the commencement of the present system." (Papers, p. 54–5.) This action of a malarian atmosphere in preventing wounds from closing, or, when healed, disposing them to break out afresh, is mentioned by Sir J. Pringle in his work on "Diseases of the Army:" and in tropical climes where the exciting cause acts with so much greater intensity, the effects are far more rapid and decisive. At Batavia, during the prevalence of a violent remitting fever, "a slight cut of the skin, the least scratch of a nail," says Dr. Lind, "turned quickly into a putrid spreading ulcer, which, in twenty-four hours, consumed the flesh even to the bone." (On Diseases of Hot Climates, p. 91, 5th Edition.) So likewise, in the island of Balambangan, which lies to the westward of Borneo, and is covered with sands and swamps, such is the malignant disposition of the air which blows over the marshes of this island, and produces fevers of the most malignant nature, that, during the south-west monsoon, no wound, says Lind, would heal: even the slightest cut, or a mosquito bite when scratched, degenerated into a large ulcer: whereas, during the north-east monsoon, when the wind came from the sea, the settlement was perfectly healthy; wounds then easily healed; and a gentleman, who had his arm amputated, during that monsoon, was quickly cured. (Ibid. p. 99, 103.) Now, comparing the facts mentioned by Mr. Glass with those recorded by Lind, we regard them as differing only in degree, not in kind; and that this difference arises from the greater intensity with which the exciting cause acts in the latter case than in the former. Similar facts, regarding the direct influence which the varying condition of the air exerts in promoting or retarding the curative process in the treatment of wounds, are recorded by Baron Larrey, in his account of the campaigns of the French army in Egypt.

Another effect of this tainted atmosphere, in impairing health, is thus stated by Mr. Millar, surgeon, York Place. A large family, which has been under his professional care for some years past, are constantly exposed to the effect of

the "irrigation nuisance" when at home. The apparent consequence, says Mr. Millar, has been, that every spring, as soon as the "flood-gates are opened," the whole family, with scarcely any exception, are stricken with boils; they appear in successive crops, are very painful, and accompanied with much constitutional disturbance; and are obstinate to cure. The elder members of the family suffer most; and on one occasion the life of the father was actually endangered by the degeneration of a boil into a formidable carbuncle. "Those of the family," continues Mr. Millar, "*who happen to be from home* during the prevalence of the pestilential vapours, escape all such evils; and *previously* to their residence in Edinburgh, they all enjoyed much better health than they do now." (Papers, p. 57.) Here then we have a whole family, whose members, when inhabiting a particular locality exposed to the irrigation nuisance, are stricken *every spring* with a painful disease as soon as the nuisance is put in operation; who escape the disease entirely, if they stay away from the locality at that season; and all of whom enjoyed much better health before they took up their residence in that pestilential locality than they do now.

Of the great extent of land subjected to these noisome exhalations, some portions or localities are doubtless more unhealthy than others, and accordingly inflict on those who dwell within them not only that constant nausea which accompanies their inhalation, but that malarian influence which produces fever. Thus, as we have already seen, Dr. Duncan, senior, long ago "ascribed the remittent fevers, which he had attended at Restalrig, to the marsh miasmata arising from the ponds and neighbouring morass." Dr. Balfour also states, that the members of his father's family, who reside on St. John's Hill, are much annoyed by the effluvia arising from the irrigated grounds at the foot of Salisbury Crags; and that some of them are subject to repeated febrile attacks of an intermittent nature, which yield to the use of bark. These attacks were attributed by his father to the

miasma from the marshy ground in the neighbourhood." (Papers, p. 47.) A physician also communicated to the Editor of the Papers, a written statement respecting a lady whom he attended in St. John Street, stating that, during her residence there, she was afflicted with a protracted fever, *of the type usually occasioned by marsh miasmata;* and that he found it absolutely necessary to remove her to another locality, when it subsided; any thing short of that, though long persevered in, having been quite unsuccessful. (Ibid. p. 58.) The case of the Reverend Principal Lee, while residing in that vicinity, has been already referred to. Although the term *malignant*, applied to the fever which afflicted his family, does not enable us to specify its particular nature, yet the attendant circumstances make it probable that both it and the dysentery under which he suffered, arose from malarian influence. This opinion is strengthened by the report of two cases of fever communicated by Dr. Huie. Some years ago, he attended the manager of the Caledonian Dairy Company and his servant maid, then residing at Meadowbank. Neither of these persons, says Dr. Huie, had been exposed to contagion; they were attacked simultaneously with a violent fever, which required the most energetic treatment. Both patients recovered; and at that time and now Dr. Huie is convinced that both cases arose from malaria. They occurred in the latter end of July, when the weather was very warm, and the noisome exhalations from the irrigated lands in the vicinity were very offensive. (Papers, p. 36.) In several instances, Mr. Miller, who resides in the King's Park, and different members of his family have been seized with severe remittent fever, which was uniformly attributed to the noxious exhalations to which they were there exposed. (Ibid. p. 58.)

Formerly, in England, intermittent fevers were very common. In the year 1765, between four and five hundred persons, afflicted with that disease, fell under the care of Dr. Lind alone, then acting as physician at Haslar Hospital;

(On Diseases in Hot Climates, p. 302,) "and the disease," he adds, "spread itself over the greatest part of England; (Ibid. p. 294.) whilst, at the present time, ague, in ordinary seasons is, in England, a rare disease. At a still earlier period, agues were comparatively rare in Scotland; and in Edinburgh they were almost unknown. It is mentioned by Mr. Boyle, that the Duke of York, during his stay in Scotland, observed, that agues which were then frequent in England, but seldom appeared in that country. "A Scotch nobleman," adds Mr. Boyle, "afterwards confirmed the same, adding, that it was once thought very strange when a certain gentleman happened there to fall ill of one; and that quartans, which are frequently brought from England to Edinburgh, are usually cured by any considerable stay in that city."—(Works by Shaw, vol. III. p. 70, 2d edit.) It can hardly be doubted, that if the present plans of irrigation and of forming pits be allowed to continue and extend, Edinburgh, in addition to the noisome exhalations which now cross every path of business and pleasure during the Spring season, will have to encounter in Autumn the long train of intermittent fevers and their consequences, which the malarian influence of swamps and marshes are so well known to produce.

In the Police Papers, many other cases of fever are stated as having occurred in the House of Refuge; but it is not said that they belonged to the class of intermittent or remittent fever, which are the ordinary diseases arising from the malarian influence of marshes. Indeed, these fevers are said to have occurred during the winter months, between October and April, the season least likely to produce ague; since, even in marshy countries, that disease appears to be always checked by frost. In like manner, the cases of fever recorded by Mr. Imrie, are stated to have occurred between September and March; of which fevers, nearly one-fifth are said to have exhibited the worst symptoms of typhus, and the remaining four-fifths to have been of a mild

inflammatory character.—(Ibid. p. 38.) In a statement, also, of the comparative healthiness of the south and north sides of the Abbey-hill Street, it is said that the south side, which is nearest to the foul burn, is more unhealthy than the opposite side of the same street; so that the degree of disease and sickness among the resident inhabitants is more than *tripled* by their greater propinquity to that source of disease. Without attributing the actual occurrence of typhus fever to the direct operation of the "foul burn," it will be readily granted, that if its exhalations affect individuals who reside in its vicinity in the way already stated, such persons will be more predisposed than others to take on any occasional disease. Malarian influence, however, as it is ordinarily exerted in the production of intermittent fever, is not considered, we believe, as giving rise to typhus; on the other hand, this latter disease is generated in hospitals, gaols, or other crowded abodes of the poor and destitute, where no malaria from swamps, &c. can be supposed to operate. For these reasons, we do not therefore hold the fetid irrigations as accountable for the alarming increase of typhus fever in this city, within the few last years; they may, however, in certain instances, be deemed a predisposing cause; but should we be visited by a Summer and Autumn at the same time warm and wet, we do not doubt that the city and its suburbs would become a favourite seat of malarian fever.

SECTION III.

HINTS TOWARDS A PLAN FOR MAINTAINING A CONSTANT CURRENT IN THE CHANNEL OF THE WATER OF LEITH, TO CARRY OFF THE IMPURITIES OF THE COMMON SEWERS.

The foregoing remarks apply chiefly to the sewerage and drainage of the Old Town, all the drains in which run on the south side of the city, and will, it is hoped, ere long proceed, as covered sewers, to the sea; but the sewers of the southern and western districts, passing through the lands of Dalry, fall, as before stated, into the Water of Leith at Colt-Bridge. At various other places, as at Stockbridge and Canonmills, other common sewers open into the same river. The channel of this river, as is well known, is robbed of its ordinary supply of water to serve the mills seated on its banks, so that, for many months in the year, the bed of the river is, in many places, nearly or entirely laid dry. During the cooler season of the year, and before the common sewers above mentioned terminated in its channel, this circumstance, though it greatly impaired the beauty of the river, created no offensive smells; but now, in a dry summer, the exhalations from the mouths of the sewers, and the stagnant water in the river are sometimes very annoying. In the future extension of the city and its suburbs to the north, this evil will necessarily go on increasing, and will, therefore, render it still more desirable to augment the supply of water in the river during the summer season, in order to carry off these impurities.

Many years ago it was proposed to increase this supply of water, for the service of some large works, employing mill-machinery, we believe, at Bonnington; and some steps

were then taken to ascertain if reservoirs could not be formed, in the upper portions of the river, to collect the superfluous water of winter, and store it up to supply the deficiency of the summer season. Since then, the late Mr. Linning renewed the project, and was desirous of getting reservoirs constructed on his property at Colzium for that purpose. We do not know what were his plans for accomplishing this desirable object; nor are we sufficiently acquainted with the localities and circumstances of the scheme to give an opinion of its practicability; but, in reference to some such plan, as a measure of police, it deserves, we think, further consideration.

The proposition to construct reservoirs for the purpose of mill-machinery, would seem to show that the project might be rendered useful in a commercial view, to an extent perhaps that would go far to repay the expense of the undertaking. For not only might the mill-works, already on the river, receive much improvement from a greater and steadier supply of water, especially during the summer season, but new works might rise up in addition to those already established; and certainly, the beauty and healthiness of every property, through which the river passes, would be benefited thereby. On its approach towards Edinburgh, it seems not difficult to imagine, that, by deepening a little the channel in the middle of the river, into which the mouths of the common sewers should be made to discharge their contents, a perpetual current of water might easily be kept up, which would silently and constantly carry off the excrementitious matters in a state so diluted, as to prevent that stagnation which now, in certain seasons, so much offends the senses.

Of the practicability of forming such reservoirs of water, and letting it off in any desired quantity, at times and seasons when it is more needed, we have an excellent example in the Compensation Pond, formed in the Pentland Hills. This pond was constructed expressly to accumulate

water in the winter season, to supply the deficiency, occasioned by withdrawing that of the Crawley Spring from the Glencorse Burn, when it was most needed in summer; and this it does with perfect accuracy, both as to the time when the water is required, and the quantity actually supplied.

Another example of a similar kind is furnished by the formation of the Shaw Water-Works at Greenock. At these works, reservoirs, drains, and aqueducts, occupying nearly 400 acres of land, have been constructed, which receive and store up the drainage of about 5000 imperial acres. The water from the Grand Reservoir is conveyed by an aqueduct, six miles and half long, to the Whin-hill reservoir, in the vicinity of the town of Greenock. This hill is about 512 feet above the level of the Clyde at high water. From the reservoir on its top, two lines of mills extend, the first having sites for nineteen mills, of about twenty-seven feet fall on the average; and the second for thirteen mills, each of about twenty-eight feet fall on the average. The Grand Reservoir itself is capable of supplying 2400 cubic feet of water per minute; giving an amount of power equivalent to that of 2000 horses. In connection with the smaller reservoirs and the aqueduct, it will contain 310 millions of cubic feet of water; and is capable of supplying annually no less than 600 millions of cubic feet of that fluid. By these works, therefore, the inhabitants of Greenock are not only abundantly supplied with water for all ordinary purposes, but they possess a *water* power for working machinery to an immense amount; and which, it is said, may be put in operation at an expense at least ten times less than must be paid for a similar amount of *steam* power in Glasgow, (Mechanics' Pocket Guide, by R. Wallace, A.M., p. 28.)

According to a report by Professors Leslie and Jameson, the Water of Leith, by means of a fall of 884 feet, is capable of furnishing a power even more than that of the Shaws Water; being equivalent to that of 106 steam engines of

twenty horse power each. (Mechanic's Guide, p. 31.)—It seems, therefore, almost certain, that the interests of commercial enterprise might be made to combine its efforts in improving the capabilities of the river for working machinery, with those operations which have been suggested for increasing the supply of water for the purposes of police.

SECTION IV.

EFFECTS OF THE IRRIGATION PROCESS ON THE PRESENT INTERESTS AND FUTURE PROSPECTS OF THE CITY.

The facts detailed in the preceding pages afford sufficient proof that the methods of collecting, preparing, and using the refuse materials of the Common Sewers in the process of irrigation, create a nuisance most offensive to the senses, and injurious to the health and property of those who dwell in its neighbourhood. Our remarks have been confined almost solely to the eastern quarter of the city. It was in it that the nuisance first sprang up; it is there that it has best thriven; and it is there also that it has proved most injurious to property and health. Other districts to the west, the north, and the south have been more or less subjected to these noisome operations; but of the extent to which they have been carried, we are less accurately informed. It is understood, however, that a plan or map of all the irrigated districts will, ere long, be prepared, which will exhibit the course of the common sewers, and of the drains which deliver their contents into them. The number and size of the foul water pits and their situations, will, it is expected, be also described, as well as the actual quantity of land now under irrigation. When all this shall be done, the public will, perhaps, feel surprise at the extent to which

the nuisance has been already carried in different quarters. Still, in the opinion of a gentleman extremely well informed on the subject, it must at present be considered as confined within narrow limits, compared with the degree in which it is capable of extension. "There are," says he, "thousands of acres not yet irrigated, which may, with the utmost ease, be submitted to the process, and that with prodigious profit to the proprietors."

When these fetid exhalations, with their malarian accompaniments, shall have invaded other quarters like that to the east, the position of the inhabitants within the city will somewhat resemble that of persons in a besieged town. Few, at present, we believe would voluntarily encounter the nauseating vapours of the eastern road in search merely of health or recreation; and in the further extension of the noisome practices to other districts of the city, nuisance barriers will, as it were, be raised at every place of exit around it. Whoever doubts this result, may put it to the proof, by strolling on a summer evening to the bathing-stations at Portobello when the wind is in the east; and should he, on his return to town, meet a western breeze, he may then gain double proof of the fact. What is now true of this eastern approach, will soon, it is believed, become more or less true of others, so that neither ingress nor egress can at any part be made, without the risk of encountering this most disgusting annoyance.

"Individuals of wealth and respectability who have taken up their residence in Edinburgh, for the education of their families, have, says the editor of the Police Papers, become alarmed at this state of things; and some have even intimated their determination to reside elsewhere, unless the nuisance created by this fetid irrigation, be put down," (Papers, p. 10.) "If to these we add the number who, but for this cause, might be induced to reside among us from the many attractions which Edinburgh offers, as the central and meeting point of the more refined society of Scotland,—and

as a favoured seat for the cultivation of all varieties of literary, classical, and scientific pursuits, we may then have some idea of a present and impending pecuniary loss to all classes of the community." (Papers, p. 45.)

There is another consideration that claims our notice. An eminent physician has lately put forth a very able pamphlet on the condition of the poor, which has made a great impression on the public mind. In this treatise, he attributes a large portion of the late increase of typhus fever within the city to the extreme poverty, destitution, and want of cleanliness and ventilation in the crowded apartments in which great numbers of the lower orders frequently live. Now, in addition to other remedial means, we believe that nothing is more essential to the cure of typhus fever than the respiration of wholesome air, wholly purged of all the impurities which a malarian district may impart. But is such an atmosphere to be always met with, either on the east or west side of the city? That the impurities, given off from these noxious meadows, may be conveyed by the winds, is quite certain, since, when thus conveyed, they have been shown to carry nuisance to a great distance from its source; and it is equally certain that they may, in the same manner, bear with them the seeds of disease. Lancisius, says Dr. Lind, relates that thirty gentlemen and ladies of the first rank in Rome, having made an excursion on a party of pleasure towards the mouth of the Tyber, the wind suddenly shifted and blew from the south over the putrid marshes, when twenty-nine were immediately seized with a tertian fever, one only escaping," (On Hot Climates, p. 26.) In tropical climes, where the same causes act with much greater intensity, the effects, as before stated, are more fatal. The same south-west wind which, blowing over the marshes, hurried the slightest fresh wound into a gangrenous sore at Balambangan, excited sickness in the settlers, which " raged with such violence that not one in ten survived—cutting off the stoutest men in twelve or four-

teen hours:" whilst the north-east wind, which came from the sea, rendered the settlement perfectly healthy; and, as we have seen, wounds then rapidly healed. (Ibid. p. 100.)

It may well be deemed an aggravation of the mischief produced by these malarian districts, both on the east and west of the city, that they not only furnish an unwholesome atmosphere to those who traverse them, but equally beset those who may prefer to remain at home. Thus Dr. Mackenzie was almost as much annoyed by the fetid exhalations at his house in Carlton Place, as if he had descended into the valley below. Mr. Irvine, surgeon, states, that when the air is moist, and an easterly wind blows, there is generally a great increase in the number of diseases in the localities about the lower part of the Canongate, the street of Abbey Hill, and for a considerable way eastward to Jock's Lodge and Restalrig. On the contrary, when the wind is in any other direction, or even in the same direction if accompanied with a severe frost, there is a proportional decrease in the number of new cases. (Papers, p. 38.) Whatever, therefore, may be the origin of typhus within the walls of the city, ventilation, by air loaded with noxious matters, cannot be suitable even for those in health, and must be unfit for such as already labour under febrile disease.

Looking, therefore, to the serious aspect which the nuisance in its present state exhibits, and to the frightful prospect which its extension to the degree contemplated would produce, we earnestly hope that the citizens, not only of Edinburgh, but of Leith and Portobello, (who are almost equally interested) will cordially join in aiding the Edinburgh Commissioners of Police in getting the nuisance abated. Some time ago, the subject was discussed at meetings of the Magistrates and Town Council, and of the Burgh of Canongate and the Southern District, when the practice was unanimously condemned, and resolutions passed that it ought to be suppressed. (Papers, p. 10.) If,

indeed, the offensive operations be permitted to continue much longer, and be pushed to the extent to which allusion has been made, they will gain possession of every approach to the city ; so as not only to destroy its amenity as a place of residence, but reduce it ultimately to that state which a malarian atmosphere seems to be exerting, at the present moment, on one of the most renowned cities in the history of the world. Example, it is said, sometimes affords instruction where precept may have failed ; and under that impression, we subjoin a few notices of the ancient, as compared with the modern condition of Rome, in regard to its salubrity as a place of residence.

Towards the termination of the republic, the population of Rome was estimated at about four millions ; and at a later period, it has been said to have amounted to nearly seven millions, including that of the suburbs. At that period, the city itself must have been healthy, and in addition to the supplies it might receive from other States, the country around it must have been well cultivated, to enable it to sustain so vast a population. It was then also profusely supplied with water brought in by aqueducts, at various distances of from ten to sixty miles. So great was the quantity, that whole rivers seemed to flow through the streets and down the sewers. The system of sewers also was extensive ; they poured their contents into the great sewer or *cloaca*, which discharged itself at once into the Tiber. Such was the state of things in former days ; at present, they are very different.

In 1791, when M. Chateauvieux first visited Rome, its population was estimated at 166,000 ; and when, in 1813, he paid it a second visit, the number did not exceed 100,000. This extraordinary diminution in twenty-two years may in part be attributed to the changes arising out of political revolutions ; but, in the opinion of M. Chateauvieux, it is to be ascribed, in great part, to the increased action of malaria, which appears to be investing the city on every side. The hills and elevated grounds within the walls of the city,

where this insalubrity in former times was never felt, are now in summer visited by it, as the Quirinal, the Palatine, &c.; and the villas Borghese and Pamfili, in the suburbs, are deserted from the same cause. The country around Rome was once extremely populous, though it be now a wilderness almost without inhabitants. During the summer and autumnal months it is so unhealthy that the shepherds and others come every night to take shelter within the walls of Rome, to avoid the danger to which they would be exposed by passing the night in the country. (Letters written from Italy by Chateauvieux, Edinburgh Review, No. 55, p. 57.)

Whilst the desolation kept at a certain distance from the walls, the indifference with which men too often view the calamities of their neighbours, might prevent the citizens of Rome from sympathizing deeply with the inhabitants of the country; but that the present inhabitants of that city should be under no alarm,—that the Government should be taking no steps to discover the cause or the remedy for this great calamity, is not easily explained. Were liberty to restore to Italy that activity and exertion which once prevailed in it, there is reason to think that the same effects would result from it which took place in former ages; and that the insalubrity of the Campagna would either be exterminated, or reduced within narrow bounds. If measures of this kind are not pursued, the consequences must be fatal. "The great city, which has arrogated to itself the name of 'Eternal,' which has already experienced the extremes of good and bad fortune; which, after being reared by heroes, has suffered itself to be ravaged by barbarians, and finally to be governed by priests; which, in the days of its prosperity, conquered the world by its arms, and in the days of its weakness enslaved mankind by its opinions:—That city is about to fall a prey to an invisible enemy, which a vigilant and wise administration would have enabled it to resist." (Ibid., p. 58.)