PUBLIC HEALTH ACT.

(11 & 12 Vict., Cap. 63.)

REPORT

England & Wales

TO THE

GENERAL BOARD OF HEALTH

ON A

PRELIMINARY INQUIRY

INTO THE SEWERAGE, DRAINAGE, AND SUPPLY OF WATER, AND THE SANITARY CONDITION OF THE INHABITANTS

OF THE TOWNSHIPS OF

ALNWICK AND CANONGATE,

IN THE COUNTY OF NORTHUMBERLAND.

By ROBERT RAWLINSON, Esq.,

SUPERINTENDING INSPECTOR.

LONDON:

PRINTED BY W. CLOWES & SONS, STAMFORD STREET,

FOR HER MAJESTY'S STATIONERY OFFICE.

1850.

NOTIFICATION.

THE General Board of Health hereby give notice, in terms of section 9 of the Public Health Act, that on or before the 22nd of April next written statements may be forwarded to the Board with respect to any matter contained in or omitted from the accompanying Report on the Sewerage, Drainage, and Supply of Water, and the Sanitary Condition of the Inhabitants, of the Townships of ALNWICK and CANONGATE, in the County of Northumberland; or with respect to any amendment to be proposed therein.

By order of the Board,

HENRY AUSTIN, *Secretary.*

Gwydyr House, Whitehall,
9th March, 1850.

PUBLIC HEALTH ACT (11 & 12 Vict., cap. 63).

Report to the General Board of Health on a Preliminary Inquiry into the Sewerage, Drainage, and Supply of Water, and the Sanitary Condition of the Inhabitants, of the Townships of ALNWICK *and* CANONGATE, *in the County of Northumberland.* —By ROBERT RAWLINSON, Esq., Civil Engineer, Superintending Inspector.

London, January 29, 1850.

MY LORDS AND GENTLEMEN,

A PETITION having been received from more than one-tenth of the rated inhabitants of the townships of Alnwick and Canongate (containing at present a population of about 6000), praying "the General Board of Health to direct a Superintending Inspector to visit the said townships, and to make inquiry and examination with respect thereto, with a view to the application of the said Act (the Public Health Act), according to the provisions of the said Act in that behalf;" agreeably with instructions by your Honourable Board due notice was given as the Act directs, and on Wednesday the 24th day of October, 1849, I commenced an inquiry at the Town Hall in Alnwick, and did receive evidence, and "hear all persons desirous of being heard before me upon the subject of the inquiry;" I also personally examined the district in order to obtain full information on the several heads of the inquiry, "and other matters;" and beg most respectfully to submit this Report, "for the purpose of enabling the General Board to judge of the propriety of reporting to Her Majesty, or making a provisional order, with a view to the application of the said Act, or any part thereof, to the said townships of Alnwick and Canongate," or to the whole union of Alnwick.

On the 23rd of September, the month previous to my visit, cholera broke out; and, in one month, upwards of 140 deaths occurred, being twelve times the ordinary rate of mortality. The particulars are detailed in this Report.

The inquiry was attended by William Dickson, Esq., solicitor, chairman to the Board of Guardians, &c.; Anthony Lambert, Esq., solicitor; James Russell, Esq., solicitor; William Dickson, jun., Esq., solicitor; Thomas C. Wilson, Esq., vice-chairman of the Board of Guardians; the Rev. Charles Charlton, incumbent of St. Paul's, Alnwick; Francis Holland, Esq., bailiff of the manor

of Alnwick; Major Younghusband; Hugh Moises, Esq., magistrate; Joseph Forster, Esq.; George Wilson, Esq., M.D.; Charles Ransford, Esq., M.D.; George Wilson, Esq., surgeon; Luke Hindmarsh, Esq.,; Thomas Thorp, Esq., solicitor; S. C. Bell, Esq.; Captain George Hall, R.N.; the Rev. John Ker; the Rev. David Donaldson; Mr. Thomas Robertson; Mr. James Bowmaker; Mr. George Tate, postmaster; Mr. Thomas Rickaby; and others. I received much information and assistance from W. Dickson, Esq.; William John Carr, Esq., clerk to the Board of Guardians; John Davison, Esq., surgeon; Mr. G. Tate, F.G.S. (on the geology of the district); the Rev. Court Granville, incumbent of St. Mary's, Alnwick; and also from the gentlemen forming the local committee. I also consulted with Hugh Taylor, Esq., of Earsdon, commissioner to his Grace the Duke of Northumberland, as to the application of the Act to the whole union.

Existing Parochial Boundaries from within which the Petition was forwarded.—The parochial boundaries of the townships of Alnwick and Canongate are—on the north-east, the park-grounds of his Grace the Duke of Northumberland and the river Aln; on the south-east, the river Aln, and lands called respectively Rugley Moor Farm, Hobberlaw Farm, and St. Margaret's Farm; on the south-west, lands respectively called Alndyke Farm (a part, the other part being in the township of Alnwick), Cawledge Park Farm, Greensfield Farm, and Snipe-house Farm; and on the north-west, Edlingham Moor, Lemmington, and Abberwick grounds.

Alnwick (long. 1° 34′ W., lat. 53° 23′ N., 33 miles N. by W. from Newcastle, and 306 N. by W. from London, by railway about 342 miles from London) is the county town of Northumberland, an ancient borough, in which is a body corporate by prescription, consisting of 4 chamberlains, a common council of 24, and freemen. The corporate name is "The Chamberlains, Common Council, and Freemen of the Borough of Alnwick." They exercise no jurisdiction over the affairs of the town; they are possessed of some property in land and houses, out of the income of which they support a school for their own children; they maintain several of the public pants * and two public clocks.†

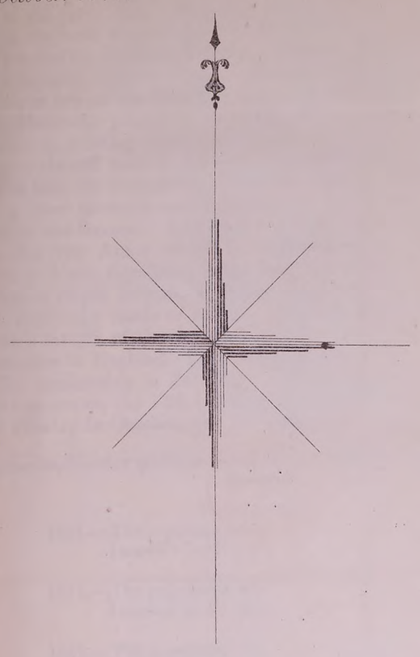
* The northern local name for a construction half pump half fountain. There is a large open stone trough into which the water runs or is pumped, or the inhabitants receive it direct in vessels to convey away.

† The freemen of Alnwick, on their admission to their rights on St. Mark's day, have to pass through a pool on the moor, the water of which is purposely made filthy and muddy; hidden stakes, pitfalls, and obstructions are also placed in the water; and through this foul pool, so prepared, laughed at, pelted, and hooted by his townsmen, each young freeman is required to pass before he can take up his freedom. After this cold bath he has to ride the bounds of the moor on horseback, over about twelve miles of most dangerous road, which is attempted at a racing pace for the honour of precedence given to the person who accomplishes the distance first; and, as some of the young men know little of horsemanship, serious accidents have taken place. Tradition assigns this custom to a capricious mandate of King John, who had been befouled in

ALNWICK *Inquiry.*
October. 1849.

Map of
ALNWICK UNION,
BEING A PART OF THE COUNTY OF
NORTHUMBERLAND.

Area, 93,025 Acres.
Population, 18,575.

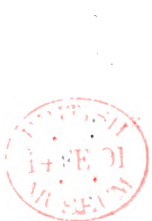


The line_____shows the boundary of the Union.

Scale of Statute Miles.

1 ¾ ½ ¼ 0 1 2 3 4

138 p. 103.
Standidge & Co. Lithe. Old Jewry.



Alnwick Castle, the principal seat of his Grace the Duke of Northumberland, stands close to the town. The scenery of the district is very beautiful. The castle and town stand on the south side of the river Aln. Harrison wrote,—"The Alne is a pretie riueret, the head whereof riseth in the hills west of Alnham towne, and is called by Ptolomie, Celnius. Between Ailmouth and Wooden it sweepeth into the ocean." Richard of Cirencester mentions Alauna as one of the Ottadine rivers; and Alnham, Hulne, Alnwick, Alnmouth, places on its banks, derive their names from it. There is no existing historical account of the foundation and rise of the castle and town of Alnwick: arguments may be adduced to show at least the probability, if not the absolute certainty, of their having been formerly establishments of the Romans, and afterwards of the Saxons. ALNWICK* is supposed to derive its name from the river ALN,† which is undoubtedly an abbreviation of Alwen or Alain, signifying, in the language of the ancient Britons, a white or bright stream, with the addition of the Anglo-Saxon wick, implying a castle or village. Alnwick Abbey, seated on the northern margin of the Aln, was the first house of the Premonstratensians in England: they settled at it in 1147.

The market-day is Saturday. The market is well supplied. The fairs are on the 12th of May, the last Monday in July, the first Tuesday in October, and the 24th of December.

Population, Number of Houses, and Rate of Increase in the Parish of Alnwick.

	POPULATION.
1801.—The population was	4719
Increase in 10 years	707
1811.—The population was	5426
Increase in 10 years	501
1821.—The population was	5927
Increase in 10 years	861
1831.—The population was	6788
Decrease in 10 years	162
1841.—The population was	6626
1850.—Supposed increase	600
Present population	7226

the filth of Ayden Forest on a hunting-day. That which was imposed as a penance is now performed as an honour.

The freemen of Alnwick will probably ere long reform this dirty and dangerous custom by substituting a more rational mode of taking up their freedom and preserving the boundaries of their property.

* Alenwike, Alnewike, *Leland's Itin., Inscrip. Town's Seal;* Alnewick, Alnewicke, *Randal's Manuscripts.*

† Alaunus, *Ptolemy;* Alne, *Camden;* Anne, *Stukely;* Ail, *vulg.*

1841.	Houses.		Persons.			Remarks.
	Inhabited.	Uninhabited.	Males.	Fem.	Total.	
In Alnwick and Canongate	814	40	2510	2950	5460	
Remainder of the parish	209	9	560	559	1119	
In the house of correction	..	..	..	..	12	
In the workhouse	..	..	..	..	35	
Total of town and parish	1023	49	3070	3509	6626	

List of Parishes and Townships, with their Population, Area in Acres, Annual Value, and Rate at One Penny in the Pound, according to the Assessment for the County Rate.

Alnwick Union.

Parishes and Townships.	Number of Inhabitants in 1841.	Number of Acres.	Annual Value.			Rate at One Penny in the £.		
			£.	s.	d.	£.	s.	d.
1 Alnwick	6626	15,884	24,734	10	0	103	1	2
2 Bassington	11	233	187	6	5	0	15	7
3 Edlingham	138	5,635	1,561	0	0	6	10	1
4 Abberwick	170	1,681	1,602	0	0	6	13	6
5 Bolton	128	2,046	1,632	0	0	6	16	0
6 Broome Park	63	452	560	0	0	2	6	8
7 Learchild	36	462	338	0	0	1	8	2
8 Lemmington	125	1,989	1,516	0	0	6	6	4
9 Eglingham	304	1,896	1,695	10	0	7	1	3
10 Beanley	176	1,888	1,361	0	0	5	13	5
11 Crawley	20	315	400	0	0	1	13	4
12 Ditchburn	60	1,320	502	0	0	2	1	10
13 Harehope	49	470	351	0	0	1	9	3
14 Hedgley	72	599	704	0	0	2	18	8
15 Shipley	124	2,126	1,176	10	0	4	18	0
16 Titlington	70	1,964	831	5	0	3	9	3
17 Embleton	525	1,940	4,525	7	9	18	17	1
18 Broxfield	24	290	345	0	0	1	8	9
19 Brunton	59	920	1,742	6	8	7	5	2
20 Craster	247	629	1,120	0	0	4	13	4
21 Dunstan	218	1,601	1,696	11	0	7	1	4
22 Fallodon	113	1,011	1,056	10	0	4	8	0
23 Newton by the Sea	282	1,169	1,947	0	0	8	2	3
24 Rennington	245	1,715	2,069	18	0	8	12	6
25 Rock	227	1,910	2,269	15	10	9	9	2
26 Stamford	90	1,628	3,465	10	0	14	8	9
27 Longhoughton	483	2,724	5,014	13	6	20	17	10
28 Littlehoughton	136	799	2,267	0	0	9	8	11
29 Boulmer and Seaton Houses	153	363	634	6	0	2	12	10
Carried forward	10,823	55,650	67,286	0	2	280	8	5

List of Parishes and Townships, with their Population, &c.—*continued.*

Parishes and Townships.	Number of Inhabitants in 1841.	Number of Acres.	Annual Value. £.	s.	d.	Rate at One Penny in the £. £.	s.	d.
Brought forward . .	10,973	55,659	67,306	0	2	280	8	5
30 Howick	242	1,565	2,481	0	0	10	6	9
31 Charlton (North) .	238	2,630	2,448	10	0	10	4	0
32 Charlton (South) .	188	1,854	1,515	10	10	6	6	3
33 Doxford	56	567	1,159	4	10	4	16	7
34 Glanton	592	1,351	3,038	6	0	12	13	2
35 Shawdon	94	1,094	1,033	13	0	4	6	1
36 Warkworth . . .	785	945	3,476	10	0	14	9	8
37 Acklington . . .	301	1,907	3,282	7	0	13	13	6
38 Acklington Park .	133	695	686	12	1	2	17	2
39 Amble	724	1,050	2,546	16	0	10	12	3
40 Birling	60	820	1,240	15	0	5	3	5
41 Brotherwick . . .	10	189	610	0	0	2	10	10
42 Buston (High) . .	100	684	1,255	12	0	5	4	7
43 Buston (Low) . .	115	856	2,189	0	0	9	2	5
44 Gloster Hill . . .	18	209	290	0	0	1	4	2
45 Hauxley	457	730	1,838	0	0	7	13	2
46 Morwick	79	740	1,368	0	0	5	14	0
47 Sturton Grange . .	108	1,073	1,602	0	0	6	13	6
48 Togstone	151	1,011	1,587	0	0	6	12	3
49 Walkmill	5	122	226	10	3	0	18	10
50 Shilbottle	549	2,918	2,351	8	0	9	15	11
51 Hazon and Hartlaw .	85	1,431	1,647	2	0	6	17	3
52 Newton-on-the-Moor.	290	889	1,468	9	11	6	2	4
53 Woodhouse . . .	23	563	422	10	0	1	15	2
54 Whittle	56	555	518	19	0	2	3	3
55 Felton	623	1,388	2,703	12	6	11	5	3
56 Acton and Old Felton	111	1,304	1,570	0	0	6	10	10
57 Elyhaugh. . . .	27	270	240	0	0	1	0	0
58 Greens and Glantlees	79	960	500	0	0	2	1	8
59 Swarland	194	1,933	1,629	0	0	6	15	9
60 Lesbury	404	3,596	8,116	15	9	33	16	5
61 Alnmouth . . .	480	216	1,340	3	4	5	11	8
62 Guyzance . . .	205	1,251	1,671	10	0	6	19	3
Total . . .	18,575	93,025	125,360	17	8	522	5	9

Note.—Of the 93,025 acres in the union about 11,700 are moor or waste land.

All the above townships appoint surveyors for highways, besides the following, which also appoint each their own surveyor.

63 Abbey Lands . .	Included in the parish of Alnwick, No. 1, but each place appoints a surveyor of highways.
64 Alnwick (south side)	
65 Canongate . . .	
66 Denwick	
67 Huln Parks . . .	
68 Shieldykes . . .	
69 Bilton	Included in the township of Lesbury, No. 60, but each place appoints a surveyor of highways.
70 Hawkhill	
71 Wooden	

Thus 71 surveyors of highways are annually appointed for the union.

Local Acts.—*Alnwick.*—There is a local Act (the 3rd Geo. IV., Sess. 1822) "for Lighting, Paving, Cleansing, Watching, and otherwise Improving the Town of Alnwick."

The limits of the Act are "that part of the town of Alnwick situate within the manor and borough of Alnwick, and that part of the said town situate within the manor and barony of Alnwick."

The commissioners under this Act are—

All acting justices of the peace resident within the limits of the Act;

The perpetual curate of Alnwick;

The bailiff of the town and borough;

The chamberlains of the town and borough for the time being;

The churchwardens and overseers of the poor for the time being resident within the limits of the Act;

All householders resident within the limits of the Act possessed of real or personal property, or both species together, of the value of 600*l.*

The powers of the commissioners are—

To levy rates not exceeding 1*s.* in the pound a-year, and to borrow money not exceeding 1000*l.*

To light the streets, lanes, and public passages and places with gas or oil, or to contract with any company for the purpose, and to supply private individuals with gas.

To make and maintain pavements.

To repair and cleanse lanes.

To appoint watchmen. (But there is no provision that such watchmen shall have the same indemnities and protection afforded by law to constables.)

Local Act.—On the local Act it may be observed that the limits are very indefinite. It is quite impossible at the present day to define the boundaries of the manor and borough, or of the manor and barony of Alnwick. To show how little of them is known, it may be stated that about two or three years ago several inhabitants of the town were summoned before the magistrates for not having kept clean the pavement in front of their houses. The first case taken was that of a gentleman whose house was in the very centre of the town. His solicitor took an objection that there was no proof given that the house in question was within the limits of the Act; and as no evidence to that effect could be given, the whole of the summonses were dismissed.

The ratepayers have no choice in the election of the commissioners (the possession of 600*l.* entitling the party to be a commissioner), nor any control whatever over their acts; and as they (the commissioners) audit their own accounts, it is perhaps fortunate the Legislature has given them such limited powers.

Therefore, to avoid conflicting authorities in the town, to save the expense of separate establishments, and to place in the hands

of the ratepayers the power of electing the persons who are to manage their affairs, such provisions should be inserted in the Provisional Order as will enable the local Board, in addition to the powers given to them by the Public Health Act, to exercise the powers of the local Act, and to keep the district properly watched, lighted, and otherwise improved.

For these purposes it is proposed—

1st. That the local Act be repealed.

2nd. That the debt of 1000*l.* incurred by the commissioners be transferred to the local Board, and charged on the "General District Rates."

3rd. That all monies in the custody or power of the commissioners, and all rates uncollected by them, be transferred to the local Board.

4th. That there be incorporated with the Provisional Order such of the clauses in the Police Clauses Act (10 and 11 Vict. c. 89), with respect to the appointment, powers, duties, and privileges of constables (ss. 6 to 20); obstructions and nuisances in the streets (ss. 21 to 29); fires (ss. 30 to 33); places of public resort (ss. 34 to 36); and such of the clauses in the Towns Improvement Clauses Act (10 and 11 Vict. c. 34), with respect to naming the streets and numbering the houses (ss. 64 and 65); improving the line of the streets, and removing obstructions (ss. 66 and 68 to 74), ruinous or dangerous buildings (ss. 75 to 78); precautions during the construction and repair of sewers, streets, and houses (ss. 79 to 83); prevention of smoke (s. 108); lighting the town (ss. 119 and 120); fire-plugs (s. 124); clocks (s. 143); providing public bathing-places, washhouses, and drying-grounds (ss. 136 to 140).

List of Rates at present levied in the Town of Alnwick.

Date.	Poor's Rate.	Highway Rate.	Lighting and Paving.	Remarks.
	s. d.	*s. d.*	*s. d.*	
1846	2 0	0 3	1 0	
1847	2 11	No Rate.	1 0	
1848	2 6	0 4	0 10	

The number of paupers relieved in the union for the half-year ending Michaelmas, 1849, was 1838, and the amount of relief expended upon them during that period was 2732*l.* 16*s.* 9*d.*

EXPENDITURE ON CHOLERA CASES in 1849.

	£.	s.	d.
Expenditure of the Board of Guardians in furnishing necessaries to parties attacked by cholera, in burials, and in furnishing new clothes in lieu of those which were burnt	225	1	8
Payments to medical officers	249	11	0
,, chemists	83	6	3
Total expenditure out of poor's-rates for Alnwick	557	18	11
Additional payments to county medical officers for their services under the order of your Honourable Board	110	10	0
Total money expenditure out of the poor's-rates consequent upon the cholera	668	8	11
Add for private subscriptions	896	4	9
Total	£1,564	13	8

This sum is exclusive of all private expenditure on their own account made by persons above the rank of paupers, and can only be taken as the ascertained money loss during the month of cholera: the real loss to the whole community has been much beyond this sum.

GEOLOGY.—The mountains of Scotland are known to be much older than the Alps, and the whole island has probably a much less elevation now than belonged to its early age. Many of the rivers on the east coast of England, such as the Aln, the Coquet, the Tyne, the Wear, and others, have no flat alluvial estuary, but flow betwixt steep and abrupt banks down into the ocean. They are like fragmental or upper branches of larger rivers. The east coast is a wasting shore generally, and the action of the sea, with a long-continued and slow subsidence of the land, may have gradually wasted and submerged a large area of country which existed previous to any written records of history, and far beyond the reach of tradition. The ruins of a submerged forest have recently been washed bare by the waves on the shore, near to Howick, and traces of this character exist on many other portions of the shores of England: betwixt the Mersey and the Dee, on the west, such remains are found. At Alemouth, properly *Alnemouth*, in the parish of Lesbury, the old burial-ground has been washed away by the sea; and with bones of men are found those of horses, supposed to have been slaughtered in border skirmishes.

The relative positions of the boulder formation, the carboniferous limestone, and the basaltic dikes or outbursts, are exemplified in a most interesting manner at Ratcheugh, about 3 miles from

Alnwick. The basalt may there be seen interstratified with the limestone, having broken through the lower sedimentary beds: in one part it is intercalated betwixt them; in another part it covers them. The metamorphic action of the basalt is very marked; the limestone beds in contact with it have been changed into crystalline marble, and the shale into porcellanous jasper. At Hawkhill, the estate of Earl Grey, a portion of the under-beds of the carboniferous limestone has recently been bared, for the purpose of obtaining the rock; the surface is found to be polished and scored with parallel grooves, running north and south, exactly resembling the polished and striated surfaces observed in Switzerland on the flats and bottoms of the valleys occupied by glaciers. Volcanic rocks of basalt, greenstone, trachyte, porphyry, &c., are found in all parts of the earth's crust. They have ruptured every formation; and, where in contact, they have changed the character of all kinds of rocks. Chalk has been converted into granular marble, and coal into coke. They may be seen in narrow dikes, leagues in length, and sometimes in huge shapeless masses. The dikes have penetrated the divided strata from unknown depths, evidently in a fluid or semi-fluid state, as thin horizontal sheets are found intercalated between the regular beds, or overlying them; and in the vicinity of the larger masses the rocks are broken, contorted, and thrown back into confusion. The county of Northumberland is traversed by several large dikes and numerous smaller ones. These trappan rocks are by geologists considered to have had their origin in active volcanoes.

The polished surfaces and striated markings are also common over vast areas of the earth's surface, as are also blocks of stone, termed "erratic," some of which are a few inches, others several yards in diameter. They are strewed by thousands over Great Britain, and by myriads over the sandy countries of the north of Germany, in the valleys of Sweden, Denmark, Finland, Russia, and North America. Many of them have one side flat, polished, and grooved in the same manner as the surface of the rocks forming the regular strata. Icebergs, holding these stones imbedded, and being driven by the ocean-currents and wind over shoals where their surfaces would be rubbed and ground against the strata, would produce the appearances seen; and glaciers are known to carry along with them fragments of rock of all sizes, which are rubbed and ground as the whole mass of ice descends. The geological phenomena observed near Alnwick are common to many countries on either side the intermediate equatorial and warmer regions—over vast areas of the globe. They speak of a cold climate; and, of change.

The town of Alnwick stands on the south bank of the Aln, at a considerable elevation above the bed of the river, on the boulder formation, or "northern drift," which in several parts of the county overlies the carboniferous formation. This northern

drift consists of many beds of sand, gravel, erratic boulders, and clay, irregularly interstratified with each other; it is of variable thickness.

The following section, taken when water was bored for on the north-west outskirts of the town, will show the general character and succession of the formation:—

	Ft.	In.
Gravel	7	0
Sharp sand	3	6
Gravel	3	6
Gravel and erratic boulders	4	0
Tough red clay in which boulders are generally embedded	5	0
Sharp sand with water	9	0

Below these were beds belonging to the carboniferous series, viz:—

Grey clay or shale	23	6
Slaty sandstone	13	0
Grey metal.	0	6
Sandstones and shale	17	0
Total depth	86	0

On the south-west part of the town the subsoil is very damp, being sand, saturated with water, resting on clay. Some of the buildings in this district, as for example the Scientific Institute, stand on piles driven into the sand. The river Aln, in portions of its upper channel, flows over sandstone beds; but opposite to the town, and for the most part of its course onward to the sea, it runs through portions of the northern drift, and passes over a sandy mud, and in some parts a gravelly channel.

The mountain-limestone formation extends over the parish and neighbourhood of Alnwick; it consists of limestones, calcareous shales, sandstones, coal, and carbonaceous shales, with ironstone nodules interstratified. The limestones and calc shales contain remains of corals, crinoids, mollusks, and fish, characteristic of the lower beds of the mountain limestone.

The following are names of a few of these fossils, viz.:—

Fenestella flabellata, Chætetes radians, Lithodendron sociale, Cyathophyllum basaltiforme, Cyathophyllum fungites, Cidaris vetusta, Nucula attenuata, Nucula gibbosa, Pinna flabelliformis, Sanguinolaria transversa, Sanguinolaria sulcata, Solemya primæva, Chonetes sarcinula, Orthis resupinata, Orthis arachnoidea, Spirifer glaber, Spirifer trigonalis, Reticularia lineata, Productus Flemingii, Productus giganteus, Euomphalus catillus, Bellerophon Urii, Orthoceras giganteum, Nautilus ingens.

The sandstones and carbonaceous shales yield remains of plants identical with those found in the Newcastle coalfield, such as

Stigmaria ficoides, and some species of calamites, lepidodendron, and sigillaria.

The Northumberland mountain limestone is of the same age, and presents similar characteristics, as that which is found in Fifeshire. This formation also extends over a wide area in Russia. The limestones worked in this parish produce lime of the best quality, and excellent sandstones for building purposes are abundant and accessible. The coal obtained in the neighbourhood is not well adapted for domestic use.

The inclination of the mountain-limestone strata in the county is varied, the angle depending chiefly on their relation to the porphyry of the Cheviot, from which they generally dip, yet modified, especially in the eastern part of the county, by basaltic dikes and outbursts, in the neighbourhood of which the beds are broken and contorted. Basaltic rocks overlying portions of the strata are found to the south and south-west of Alnwick. The rocks in Alnwick parish generally dip south-east.

Proceeding from the sea-coast, in a line north-west, the strata rise towards Alnwick, and the relation of the beds in Alnwick parish to the contiguous formations may be distinctly seen. At Radcliff the coal-measures, which are a continuation of the Newcastle coalfield, will be passed over. At Warkworth the millstone-grit will be found rising from beneath the coalfield. At Newton-on-the-Moor and Shilbottle, where one of the best seams of coal in the country is worked, the uppermost beds of the mountain-limestone rise up from below the millstone-grit, and from beneath these again the Alnwick Moor limestones crop out. The chief beds of limestone in Alnwick parish appear in the elevated grounds at Hobberlaw and Alnwick Moor: but the hills to the north of Alnwick and the highest hills on the moor, which are more than 800 feet above the sea-level, are formed of masses of gritty sandstone. On the shore near Howick the limestone beds may be seen bent in curved lines, and the characteristic fossils of the formation may be obtained in abundance.

On the declivity of the highest hills in Alnwick Moor there are several springs of water, which, coming out of the sandstone rocks, are remarkably bright. Along the acclivity of the hill ranging from Clayport Bank to Rugley are several powerful springs, probably containing some portion of carbonate of lime, as the limestone beds are near to them. Several other springs in the neighbourhood of Alnwick are strongly impregnated with iron.

Meteorological Observations.—No regular and systematic observations have been registered in the town of Alnwick; I could not therefore obtain any registered account of the rain-fall. From gauges in other parts of the county it appears that about one-third more rain falls annually in Northumberland than in Middlesex. Cold easterly winds prevail during the months of March, April,

and frequently throughout the greater part of May. It is not uncommon to see the trees in the beginning of May as leafless as in December. When, however, the fine weather sets in, with mild westerly winds and moderate showers, the growth of vegetation is rapid. In a few days not a bare branch is to be seen of the previously leafless trees. When, however, the west wind increases to a hurricane, it is a sure indication that a deluge of rain is falling at the time in the western counties of England and Scotland.

The autumn of the year is the summer of Northumberland. From the middle of November to the latter end of March the winter is usually severe. The heaviest falls of snow are brought by winds that sweep over the most extensive tract of land.

It has been observed that where the county is dry and well cultivated, the air is most salubrious. Extensive deep draining will not only add to the value of the land, but most materially modify the climate, and tend to equalize and raise the general temperature of the atmosphere over the district.

At West Denton, in 1845, the least quantity of rain fell in January, 1·15 inches; February, 1·22 inches; September, 1·66 inches; and November, 1·60 inches. The heaviest fall was, in May, 4·33 inches, and in October, 5·85 inches. This year's amount was 37·88 inches. In 1846 the least fall of rain occurred in February, 1·01 inches; the greatest in October, 6·33 inches; the yearly average was 40·26 inches. In 1847 the least fall of rain was in March, 1·27 inches; the greatest in May, 6·22 inches: the year's average was 29·85 inches. In 1848 the least fall of rain was in January, 1·05 inches; the greatest in October, 6·31 inches: the year's average 40·36 inches. During an average of eight years, commencing in 1841, the mean heights of the barometer have been 29·708. For the same period of years the average heat was 48·83: the greatest heat is in August and September, when the average of the thermometer occasionally reaches 63·2.

Public Inquiry, *Wednesday, October* 24, 1849.—As there was no opposition made to the inquiry, I did not take a mass of verbal evidence, but communicated with those gentlemen possessed of local knowledge, and also personally inspected the district with reference to future works—by this course carrying out the instructions of your Honourable Board to study judicious economy as fully as possible. The evidence is given with such comments as I have deemed it to require; but the several heads of the inquiry are more fully treated in other parts of this Report.

Evidence Taken.—*Defective Drainage and excess of Disease described by the medical gentlemen and others.*—John Davison, Esq., surgeon, resides in Alnwick:—

"Have found the cholera cases most rifely developed in the high parts

of the town: the houses here are the most crowded and in the most filthy condition. In Fenkle-street there is a privy which when last emptied the man residing near took the cholera and died. The prevailing diseases in all the crowded districts are scarlet fever, typhus fever, small-pox, and diseases of this type and character.

"There is a room over a privy and ashpit. I inquired of the person inhabiting it as to her health, and she said she was never well. My own impression is, that much of the existing disease may be prevented by proper drains and sanitary works." [For additional evidence, see Appendix.]

George Wilson, sen., Esq., surgeon:—

"Having heard Mr. Davison's evidence, I fully concur in all that he has said. In my practice I have invariably found the most disease in the ill-drained, crowded, and ill-ventilated districts."

George Wilson, jun., Esq., M.D.:—

"Has heard the evidence of Mr. Davison, and also confirms it. The House of Correction yard I would wish to instance; particularly one family here was living with a dung-heap directly before the window. There are one or two lodging-houses in the yard, and six cases of cholera have occurred here."

Thomas Rickaby stated,—

"There is a drain on the north side of Clayport-street; water used to flow through this, but for many years it has, by some means, been cut off, and it must now be very foul. There has been much cholera in the neighbourhood."

Mr. James Bowmaker:—

"The present drains in the town are square in section; they have rough stone bottoms and rough stone covers, with dry side-walls. The largest sewer is about two feet square. This was made last year. They vary from this size to nine or ten inches wide, and a foot high. The drains from the backs of the houses are of the same character; some pass through the passages, others under the floors of the houses, and empty their contents out into the surface-channels. The drains passing under the houses have been complained of."

Mr. Thomas Robertson:—

"There is a drain runs through a house in the lower part of the town, Bow Burn, which I inhabited for some time. The nuisance from this drain was very bad. We had much sickness in the house, which the late Mr. T. Dodds, surgeon, said was in consequence of the filthy state of this drain. My brother now occupies the same house, and his family are frequently unwell—I have no doubt, from the same cause."

WATER-SUPPLY DEFICIENT.—Mr. George Tate, postmaster of Alnwick:—

"Recently there has been a very great scarcity of water throughout the town. There are seven public pants, or fountains: these are enclosed with stone, and are maintained by the freemen. There are four

more maintained by the Duke of Northumberland. Some of these have been fouled by vegetable matter and infiltration. Women carry water from the present fountains, and sell it at one halfpenny per four gallons, or a 'skeel,' as it is locally called."

Mr. Joseph Forster says,—

"That formerly there was communication with the river, so that persons could get water, but they cannot so readily obtain it now."

Mr. Luke Hindmarsh stated,—

"For some months the corporation have been very anxious to improve the supply of water; they tried by boring, but did not obtain the water sought. I think there is no chance now of getting water within the town. Thinks a good supply should be at once provided."

Mr. William Burn

"Speaks of the Messrs. Black, brewers, who have sunk wells in Howick-street, and bored deeper than the surrounding wells, and have laid several dry.

"Foul water is thought to percolate into the Clayport pant from drifts in the moor" [old coal-workings].

Mr. George Wilson, sen., surgeon:—

"In Bondgate-street Without there is a great deficiency of water, and such supply as there is has been contaminated by some neighbouring drains."

Cholera prevails where fever is common.—Large middens offensive.—The mode of emptying them objected to.—Mr. Philip Dennis, surgeon:—

"The cholera appeared in those places where fever is generally most common—typhus, scarlatina, &c. These diseases, if general, are shown in a more malignant form in these places. I allude to Clayport-street, and the immediate neighbourhood, Greenbat, &c., lying at the back; Union-court, &c., on the opposite side of Clayport-street. In 1819 fever was very prevalent in Canongate-street—malignant typhus—amongst the muggers or gipsies, &c. This place has been drained and generally improved, and we have not had so much fever there since. In 1832 we escaped malignant cholera, but typhus fever was more common than at any other period during which I have known the town. The following year, 1832–3, diarrhœa and dysentery were general to a great extent.

"I think one great evil is the objectionable mode of emptying the large middens. I have noticed that in the spring and early part of summer, when many middens are emptied, fever generally follows: I have remarked this year after year. The middens are most offensive at the time of removal. The large surface-drains in the streets are also very offensive in hot and damp weather."

Imperfect drains complained of.—The following letter was handed in as evidence:—

"Sir, "Alnwick, October 30, 1849.

"I regret not having been able to attend any of the meetings

held in the Town-hall for the purpose of promoting sanitary improvements in this town: pressing business engagements alone prevented me doing so.

"I beg permission to state to you a grievance or two to which I and my family are subjected.

"I carry on business at No. 45, Clayport-street, paying rates on a rental of between 40*l.* and 50*l.* per annum. There is a public thoroughfare (Old Chapel-lane) through our property, and an open surface-drain down the said lane, bringing the foul water, &c., from about twenty families past our house door and windows, generally leaving its filthy sediment close to us, the noxious vapours from which prove at all times unpleasant and unhealthy, particularly during summer. This evil is aggravated by the difficulty of obtaining a good supply of water wherewith to cleanse our premises from these impurities. The open drain in the street close to our shop-door is scarcely less offensive in the summer months.

"As an individual householder and ratepayer I should be most thankful for any improvement in the drainage and supply of water into the houses.

"*R. Rawlinson, Esq.*" (Signed) "W. GIBSON.

The necessity that good plans should be devised, and the work executed by an educated surveyor, described.—Mr. Robert Busby speaks of the necessity there is that some competent person should be appointed to conduct the sewage-works of the town, or more mischief will be done than good accomplished. "Under the powers of the present Act a surveyor, Mr. William Smith, was appointed at a nominal salary of 10*l.* a-year to superintend the streets and drains. An alteration was made some years ago in front of my property, and I remember my father asking the surveyor if he intended the water to run up hill, as it must have done to pass clear from the new gutter: this faulty construction exists to the present time as a nuisance.

"The subsoil of the moor to the west and south of the town is clay, as also of the high ground called the 'Dunterns.' The fall from a large area of this land is towards the town, which also partially rests on clay. The streets are in general the lowest part of the town, and the drainage is consequently towards and through the houses. This I think in a measure will account for much of the disease we have experienced. The land drainage, I conceive, should be cut off from passing upon the houses."

Houses of a superior class of construction are unhealthy where there are no proper drains.—The Rev. Court Granville drew attention to Pottergate-row:—

"The front houses are new and clean looking; the street is macadamized, but there are no drains, and all the slops and refuse are thrown out upon the street. Those cottages are never free from fever, whilst some at the back, more confined, but which are not subjected to the nuisances of the front houses, are more free from disease."

Villages suffer from neglect in common with the towns.—Good local government, proper sewers, and a pure water-supply required.

—The state and condition of the out-villages is more fully described in another portion of the Report, but the following remarks were given in evidence.

Amble township, in the union of Alnwick, is situated on the south side of the river Coquet, and near the sea. In 1841 the population was 724, but it has nearly doubled since that time. Several coal-mines have been sunk in the immediate neighbourhood, and a harbour is in course of formation for the shipment of coals, and the trade of the district generally. Many new houses have been recently erected, but no provision has been made for the drainage of the place; there is no proper form of pavement, no system of cleansing, and consequently the place is very dirty. During the summer diarrhœa has prevailed.

There is no form of local government: the water-supply is from wells, but some of these are fouled by land and surface drainage.

Arthur Hedley, M.D., Pathfoot House, Felton:—

"The township of Felton is situated partly on the north and partly on the south side of the river Coquet.

"There is no form of local government; there is no system of sewage; some sewers and drains were formerly put down, but these have become blocked up."

Mr. Hedley thinks the application of the Public Health Act would be highly beneficial to the whole community.

"Many nuisances exist which we have no power permanently to remedy."

CONDITION OF THE TOWN — *described with respect to the numerous Nuisances which exist.*—The principal streets of Alnwick are wide and open; such are Clayport-street, Fenkle-street, Horse-market, Bondgate, Bondgate Without, and Bailiffgate; Canongate, Pottergate, and Narrowgate are, as the name of the latter denotes, narrow streets. The town, however, as seen from any of its streets, affords no indication of its true state and condition; the courts, passages, alleys, and confined yards must be inspected, and the natural drainage must be understood, before the cause of excessive disease and this recent outbreak of cholera can be explained. The natural position of Alnwick is in a measure peculiar; the entire surface-drainage of a large area of land falls towards and through a portion of it, the streets being in the valleys. This is the case with Clayport-street, Horse-market, and Bondgate-street. It was on the south side of these streets that cholera was most rife. There is a considerable depth of back property crowded with privies and middens, the drainage from which, with the water and surface filth of the land above, must wash down upon the houses, and find its way through long passages, and in some instances under the floors of rooms. The yards rise above the front houses, and frequently large middens stand

close to the windows, their base being several feet above the floors, the evaporation and drainage from which middens must too frequently pass into the houses. Privies with cesspools are common throughout the town; they are placed under sleeping-rooms, betwixt houses in all sorts of corners and confined spaces, in contact with the walls of dwelling-houses, and, as previously stated, in some instances above the level of their floors. The middens are large; they are frequently confined in walled spaces, calculated to hold the refuse accumulation of twelve months, and I was informed this is the customary time these festering nuisances are allowed to stand, during the whole of which period fermentation, evaporation, and percolation are going on, so that all the foul gas the refuse of a whole town is capable of producing is retained in that position where it can act with the greatest destructive force upon the health of the people. There must be thousands of cubic feet of deadly gas given off daily in Alnwick; and the wonder is, not that cholera should have been so fatal, but that its attacks should be at intervals comparatively wide apart. The no-privy system, where the whole surface is covered with filth, though more demoralizing, is not so dangerous to health as the large middens attached to the privies of Alnwick, crowded and confined as they are by the surrounding houses. In places without privies the filth is spread over the surface, evaporation is gradual and regular, there is not mass to produce fermentation, and the scavenger does occasionally cleanse the yards and back streets, or the people clear a road for themselves, or the filthy material is trodden out of the way several times over within the year; whilst in Alnwick the accumulation of this refuse is provided for, and it is retained, as described, to ferment in a concentrated form. The cholera did not break out first, or rage with the greatest virulence, in that which had been the worst-conditioned district, namely, the Tunnel lodging-houses, because the medical officer, Mr. Davison, had drawn attention to this place in time; and it had been cleared from its accumulated filth, was limewashed and fumigated, some days previous to the outbreak of the disease. It may fairly be inferred from this circumstance, that, had the whole of Alnwick been treated as this one place was (because it was the most foul, confined, crowded, and destitute), the cholera might have been averted, 135 lives saved or prolonged, and a direct money expenditure of near 2000*l.* in four weeks have been unnecessary, and many widows and orphans kept off the parish.

The evidence of Mr. Davison, as herein detailed and as furnished by his own Report to the guardians, drawn up in 1847, and which I have appended, is deserving of marked consideration. In pointing out the cause of disease he is lucid, distinct, and earnest. The warnings given in 1847 were prophetic; in 1849 cholera fastened upon the filthy districts, and claimed its prepared victims.

The cost of this single visitation in sickness and death would more than effectually sewer and drain the whole town, as shown under:—

Estimated Cost of Death from Cholera from 23rd September to 23rd October, 1849.

65 deaths: calculating half the number as adults, loss of life to each person, say six years, and value of labour averaged each at 7*s.* 6*d.* a-week	7,605	0	0
Expended in sickness and relief	1,100	0	0
Total loss	£8,705	0	0

The expenditure of the sum, large as it is, does not close the account with the ratepayers, large and generous as the subscription has been. The widows and orphans must be maintained, and all experience proves that a family once degraded into pauperism rarely ever rises above it. This degradation is as much to be deplored as the actual death of the parent. There is no remedy but in good sanitary regulations, and constant attention afterwards.

The Plan of Court lying between Fenkle-street and Union-court exhibits the manner in which privies and large middens are at present crowded amongst dwelling-houses. The cholera cases and deaths are also shown. The pink lines indicate the way in which the tubular drains may be laid. Thirty-two houses would be effectively drained by 319 lineal yards of 4 and 6 inch pipes, which, at 1*s.* 6*d.* a-yard complete, will be a first cost of 23*l.* 18*s.* 6*d.*, a sum equivalent to 15*s.* for each house nearly. The present privies may be converted into water-closets, and the large middens should be entirely removed. The ashes and other solid refuse would then be taken away at short intervals. The whole surface of the court, when properly paved, may with economy and advantage be washed down with the jet, and the surface, atmosphere, and houses will by these means be rendered clean, pure, and healthy.

The Plan of Premises in Dispensary-lane, Clayport-street.—This plan shows the objectionable practice of constructing privies and placing middens within dwelling-houses, without either sewers or drains. The pink lines show how the tile pipe-drains may be laid down so as to remove the refuse from the existing privies if cheap pan water-closets are provided. The cesspools and middens should be entirely abolished to prevent the dangerous nuisance arising from them. To complete the drainage shown would cost about 2*l.* 9*s.* Common rubble sewers and drains, which would not remove the refuse, would cost more than double

this amount. The cross section of Clayport-street shows the slope of the ground on either side towards the street, as also the relative position of the privies and living rooms. The lane leading to Monkhouse's-square has a continuous rise for a considerable distance back, and large middens, privies, and pigsties are crowded on each side. There were six fatal cases of cholera in these two houses.

A plan of Moore's-yard, or the Tunnel, is furnished, and the following Report, drawn up by Mr. John Davison, surgeon, and laid before the Board of Guardians on the 18th of September, will in some measure illustrate the condition of the place and of the wretched inhabitants. Bad however as this is generally, it escaped cholera, as it is presumed, because the whole place had been thoroughly cleansed and limewashed a few weeks previous to the outbreak.

Lines of drainage are indicated on this plan also, but there is much more than drainage required. The ratepayers would, in fact, save money if such property were taken down and proper dwellings provided for the poor. Light and fresh air are necessary to health, and this place in its present state and crowded condition cannot be either properly lighted or ventilated:—

"The following table is intended to convey some idea of the condition of Moore's-yard and the Pant Hall premises, which are the two most filthy places in Alnwick. In the former, although notice was given a week ago, the ashpits have only been partially emptied, and the disgusting privy mentioned in a former Report is still in existence. The insides of the houses are as bad as the yard, and are in my opinion dangerous to health and require immediate attention. The state of the Bow Burn, which flows through the yard, I believe to be very dirty. After it has been cleansed, I would suggest that proper grates with traps, instead of the irregular holes, into which all kinds of filth are thrown, would be of great advantage. I have mentioned to the owner what I consider requisite to be done, but I find that he has neither the means nor the energy to accomplish it.

"In the Pant Hall yard is a pigsty, which, although kept in a very clean condition, is in a bad situation, being placed under the window of a dwelling-house. There are also a large ashpit and privy used by the lodgers which require attention. The room occupied by Monaghan is very similar to those in Moore's-yard, and requires limewashing, as well as one opposite on the same floor, underneath that occupied by Peter Marshall, where an ass is said to be kept at night.

"The owner of the Pant Hall premises not being at home, I could not give the necessary notice.

"In other parts of the town where I have found filth to exist, or anything likely to be injurious to the health of the inhabitants, the owners or occupiers, on being spoken to, have generally set about removing the nuisance.

"List of Tenements in Moore's-yard, or the Tunnel, the Pant Hall and Premises.

MOORE'S-YARD.

Number of Rooms.	Name of Occupier, &c.	Number of Persons at the time of Visit.	Number said to reside at Night.	Remarks.
	House at the head of the yard:—			
2	Ann Thompson . .	6	15	Walls and floor dirty.
1	Phill Roony . . .	5	10	Recovering from fever; beds on the floor; room dirty.
1	Mary Jobson . . .	4	12	Walls require limewashing.
	Second house in the yard:—			
1	Catherine Kelly . .	7	15	Dirty in the extreme.
1	Patrick Conolly . .	7	20	Beds on the floor; dirty.
1	James Cossar . . .	..	1	Door locked, but said to be filthy.
1	William Conolly . .	..	2	Requires general cleansing.
	Third house in the yard:—			
1	Michael Morony . .	3	20	Very dirty.
1	Michael Mavin . .	7	10	Ditto.
	Front house:—			
1	Margaret Philips . .	3	5	Close and ill-ventilated.
1	Ann Young . . .	1	4	Ditto.
1	Michael Lavy . . .	4	15	Dirty in the extreme.
1	Peter Baron . . .	9	19	Requires cleansing.
1	John M'Fall . . .	6	8	Ditto.
1	John Campbell . .	3	4	Ditto.
1	William Robinson .	4	4	Clean.
1	Catherine Forster . .	..	4	Clean.
1 and Shop.	William Moore . .	..	..	Dirty in the extreme. This man owns this property.
	Total number of persons . .	69	169	

PANT HALL AND PREMISES.

2	Charles Wilson . . .	4	16	Lodginghouse; clean.
1	Martin Monaghan . .	3	4	Dirty; generally sickness here.
	Empty room . . .	..	Ass said to be kept at night.	Very dirty.
1	Peter Marshall . . .	6	6	Dirty.
1	Peter Farley . . .	3	7	Ditto.
	Total number of persons . .	16	33	

(Signed) "JOHN DAVISON."

VISITING COMMITTEE.—During the outbreak of cholera a local committee was formed and the town was divided into sections, which the gentlemen of the committee visited twice a-day. This truly Christian conduct and fortitude cannot be too highly commended. The dead were removed from the crowded tenements as speedily as possible, the sick relieved, medical skill provided, and the terrified relations of the afflicted were comforted, and, where necessary, pecuniary relief was afforded. Mr. Bolton and Mr. Gibb visited the district composed of the Old Workhouse, Roxborough-place, and Greenbat; Mr. John Richardson and Mr. Stamp, the district from Bondgate Tower to the Correction-house-yard; Mr. William Burn and Mr. Thomas Duncan, from the Correction-house-yard to the High-pant; Mr. James Archbold and Mr. William Hindmarsh, north side of Clayport and Union-court; Mr. John Thompson, Mr. Thos. Archbold, and Mr. John Bowey, Pottergate-row and Dispensary-street; Mr. W. Aynsley, Mr. Amory, and Mr. Milne, Pottergate-street; Mr. M. Smith and Mr. Hogg, Bailiffgate and Walkergate; Mr. Hall and Mr. W. Ross, Canongate. Mr. James Bowmaker acted as chairman to the visiting committee, and Mr. James Allen as secretary.

NOTES ON PERSONAL INSPECTION.—On Thursday, the 25th of October, and following day, in company with the Rev. Mr. Donaldson, the Rev. John Ker, the Rev. Charles Charlton, Wm. Dickson, Esq., Mr. Holland, Mr. Thorp, and Mr. W. J. Carr, I visited the several districts with the gentlemen who had taken them under their charge, and thus personally examined the whole town. Having inspected other towns where drainage did not exist, and where nuisances of the worst character existed, I felt most anxious to account, if possible, for the terrible visitation of sickness and death which had but just passed over. The houses on the south side of Clayport-street, Market-place, Bondgate, and Bondgate Without, extending up to Greenbat, are crowded upon each other; the narrow passages are generally approached from the main streets by confined, steep, and covered passages; and the whole of the land for a considerable distance to the south slopes towards the houses and main streets. There is all but a total absence of drainage, and almost every corner, not actually covered with buildings, is walled round to confine and retain the refuse of twelve months. The natural drainage of the whole area passes the liquid filth over the surface, or underground by infiltration, towards, under, and through the houses—poisoning the atmosphere above and the soil beneath. This is the condition of the north side of Clayport-street also; and the accompanying map of the town, prepared by Mr. John Davison to show the position of each case of cholera, indicates in a remarkable manner how true this disease is to the conditions considered to be necessary to its ravages. On the north side of Bondgate, and the other portions of the town, the

houses in general are not so crowded, and in most instances the land falls from them. Some of the houses in Greenbat, where cholera occurred, have a superior appearance; they are built of hewn stone, and are not unduly crowded, but they have cellars underneath which are "always damp," *because they stand upon an undrained site.* In Hotspur-street there is an open gully, said to be foul from the drainage of a block of privies in the old workhouse-yard. In White Hart-yard there is an open drain which runs close against the back of some dwelling-houses, and it was much complained of by the inhabitants. There are also slaughter-houses and open middens in this yard. Monkhouse-square: Five persons died of cholera here. The rooms are damp; the yard at the back is confined, and pigs are kept on the premises; there are foul privies close to the houses; the middens are under the floors of bedrooms. Pottergate-row is a row of clean-looking cottages; but the yards are confined, the privies dirty, and there is no drainage. The Rev. Court Granville stated that he had never known fever absent.

These remarks might be extended, more or less strengthened or modified. Drains and regular cleansing will remove the filth which is now allowed to accumulate, but the evil resulting from overcrowding will still remain.

The cross section of Clayport-street, and the houses on each side, illustrate the relative condition of streets, houses, and the slope of the land. The plan also shows a most objectionable system of crowding privies and middens within the houses; many such examples of faulty and dangerous arrangements exist throughout the town.

Table exhibiting the state of the weather from the 1st of the month, and for the two following months, given to show that there was no great variation in the general temperature, or apparent cause in the state of the atmosphere for the sudden outbreak on the 23rd. The list of deaths was furnished by Mr. Davison; the meteorological observations were furnished by Captain the Hon. Frederick William Grey, R.N.:—

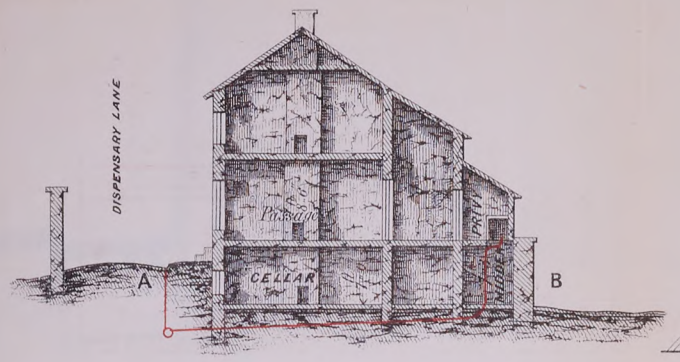

ALNWICK
PLAN OF THE
TOWN AND BOROUGH
— OF —
ALNWICK.
1827.
From Eglingham
Suspension Bridge
The Duchess School
Dairy
Canongate Common Quarry
Forsters Close
Canongate Burn
Walker Gate
Lion Bridge
NORTH DEMESNE
RIVER ALN
Rotten Row
Gas Works
Church
Church Yard
Pond
BARNEY SIDE
Bailiff Gate
CASTLE
Great Court
Stable Court
Potter Gate
Barndale Ridges
Saint Thomas's Lands
Howling Lane
Fenkle Street
Market Place
Horse Market
Well
Land falls towards the River
LINE OF DRAINAGE PARTIALLY OPEN & PARTIALLY CLOSED
PARTIALLY OPEN & PARTIALLY CLOSED
Castle Gardens
Pond
Goose Knows
Clay Port Street
Clive Terrace
Road from Rothbury
Green Bat
Bond Gate
Bondgate Within
Bondgate Without
Bondgate Hall
PRESENT LINE OF DRAINAGE
Fishers Lane
Aller Burn
Column
Spring Garden
Road to Morpeth & Newcastle
Coal Staith
Land falls towards Clay Port Street
Hope House Lane
Land falls towards Horse Market
Croft House
Note_ The black spots (●) denote a fatal case of Cholera on the site marked, during October, 1849.
Standidge & Co. Litho. Old Jewry

ALNWICK.

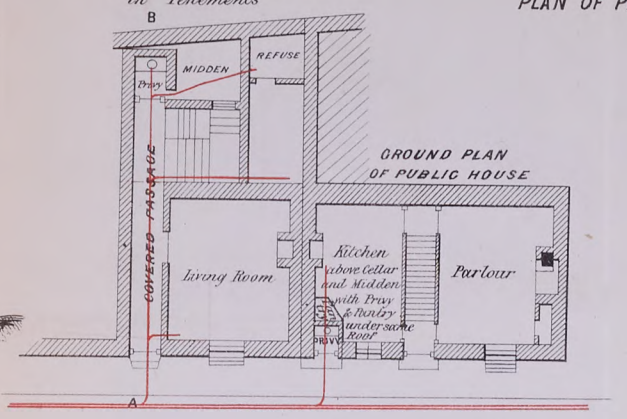
ALNWICK.

PLAN OF PREMISES IN DISPENSARY LANE, CLAYPORT STREET.

SECTION FROM A TO B ON PLAN.



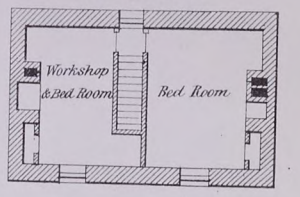
DWELLING HOUSE in Tenements

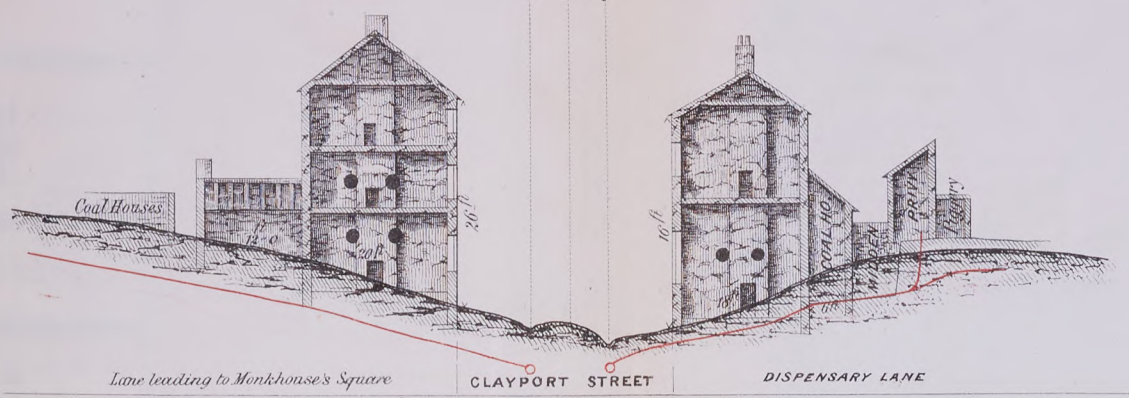


GROUND PLAN OF PUBLIC HOUSE

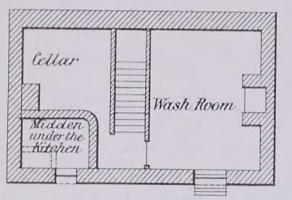
DISPENSARY LANE

FIRST FLOOR OF PUBLIC HOUSE





Section of Road in Alnwick



CELLAR PLAN OF PUBLIC HOUSE

Scale. 20 Feet to an Inch.

20 5 0 10 20 30 40 50

Note. Cholera Cases which proved Fatal marked thus ●

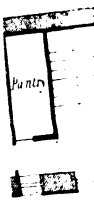
Thos. Fenwick, Surveyor, 43, Sidney St. North Shields.

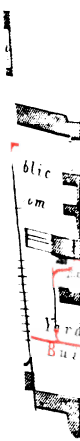
Horizontal Scale 66 feet to an Inch
Vertical Scale 20 Feet to an Inch

N.B. The red lines indicate proposed line of Tile drains.

144. P. 103

Standidge & Co. Lith. 36 Old Jewry

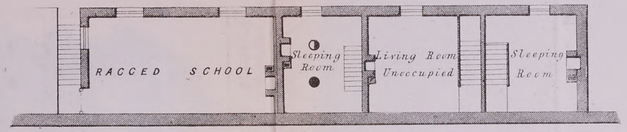




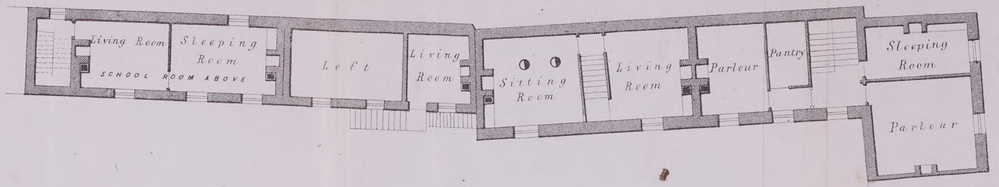
ALNWICK.

PLAN OF A COURT OR YARD, LYING BETWEEN FENKLE STREET & UNION COURT, NEARLY IN THE CENTRE OF ALNWICK.

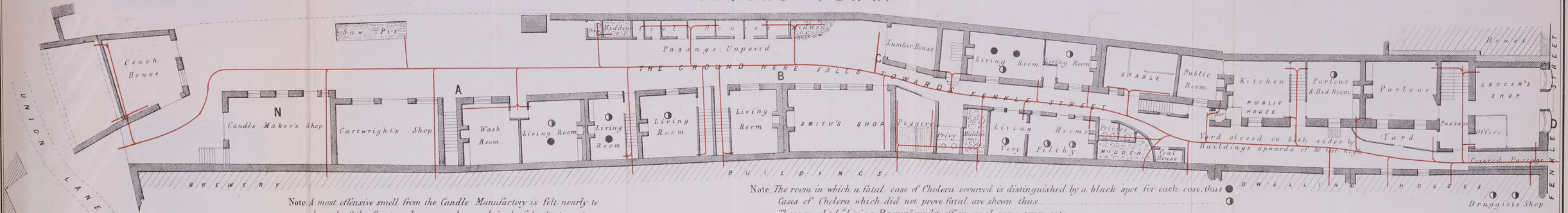
SECOND FLOOR PLAN FROM A TO B.



SECOND FLOOR PLAN FROM C TO D.



GROUND PLAN.



Note. A most offensive smell from the Candle Manufactory is felt nearly to the end of the Court, and was much complained of by the tenants.

Note. The room in which a fatal case of Cholera occurred is distinguished by a black spot for each case, thus ●
Cases of Cholera which did not prove fatal are shewn thus ○
Those marked "Living Rooms" are let off in single room tenements.
The Red lines indicate the manner in which Tile Drains may be laid, but the branches shewn may be modified to suit the actual position of the present water closets & sinks, as also to suit those proposed to be introduced.

SCALE
20 15 10 5 0 20 40 60 80 Feet

The.s Fenwick, Surveyer,
43 Sydney St. North Shields.

Vol. I. p. 165
Standidge & Co. Lithr. Old Jewry.

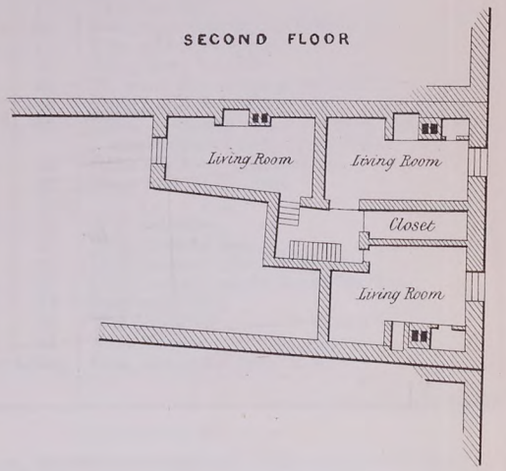
ALNWICK.

PLAN OF PROPERTY IN POTTERGATE,

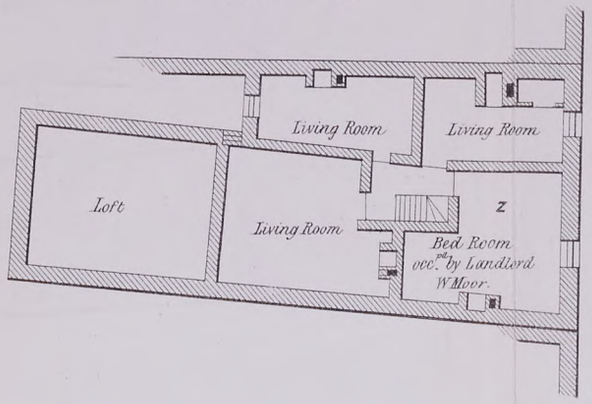
Known as 'the Tunnel', belonging to William Moor, who resides on the premises marked Z.

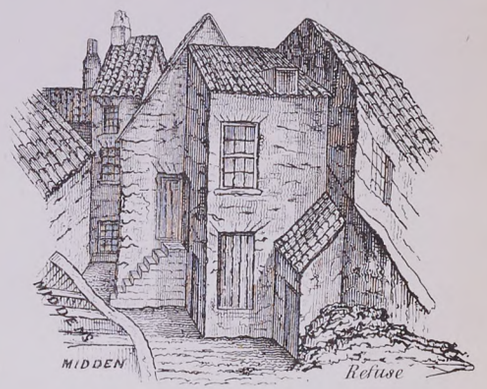
Scale 20 Feet to one Inch

SECOND FLOOR



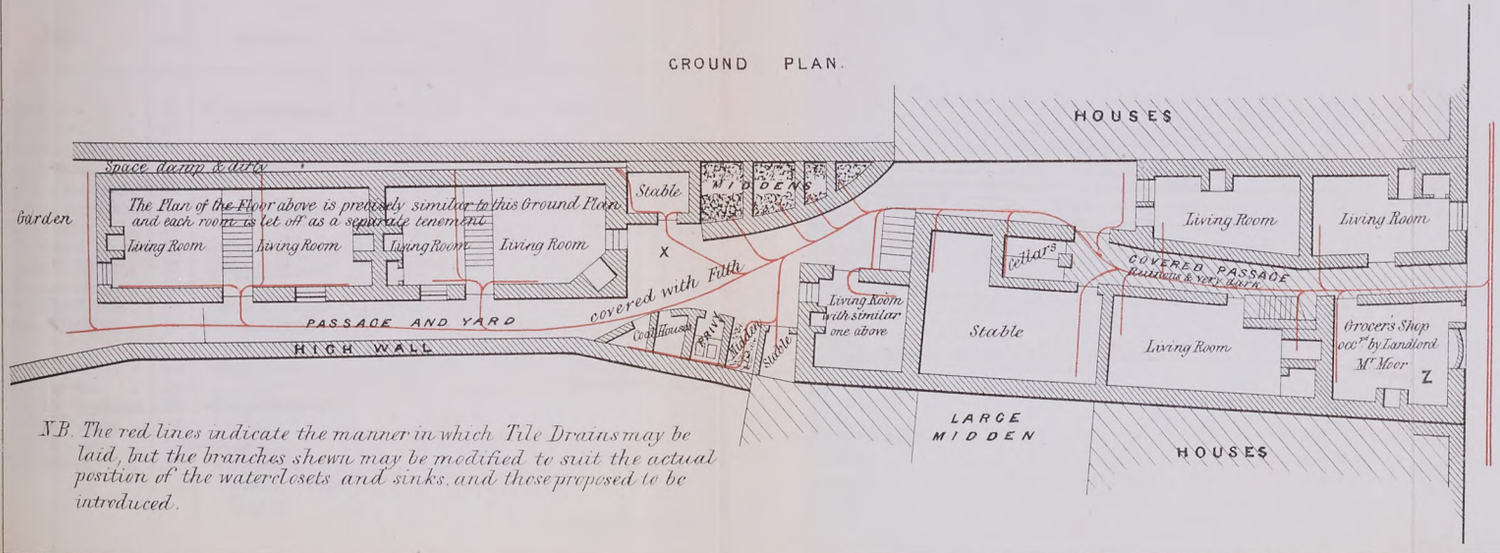
FIRST FLOOR





Back view of Moor's Property in Pottergate, as seen from X.

GROUND PLAN.



N.B. The red lines indicate the manner in which Tile Drains may be laid, but the branches shewn may be modified to suit the actual position of the waterclosets and sinks, and those proposed to be introduced.

Front view of William Moor's House in Pottergate

4to. P. 103
Standidge & Co Printers Old Jewry.

METEOROLOGICAL OBSERVATIONS for two Months during the prevalence of Cholera. From a register kept at Howick Grange, 5 miles east of Alnwick. The instruments are placed 118 feet above the sea.

Date.	Barometer.	Ther. 8 A.M.	Lowest previous Night.	Wind.
Sept.	°	°	°	
1	29·79	57	54	Dull, foggy, and damp.
2	29·55	60	55	Dull, S.E., rain; afternoon mild and damp.
3	29·81	58	52	Hazy, S.E.
4	30·09	56	54	Calm, wet, foggy.
5	30·17	59	54	Very fine day.
6	30·14	56	50	Dull foggy morning; afternoon cold.
7	30·17	54	47	Fine, cold N.E. wind.
8	30·14	47	42	Heavy dew; fine day.
9	29·64	57	43	W. wind, fine; evening threatening.
10	29·31	52	46	Calm; dull and rainy.
11	29·01	53	50	Calm, unceasing rain; afternoon fine, heavy clouds clearing away; light S.E.
12	28·94	49	42	Calm and fine; light S. wind.
13	29·35	53	47	Fine; fresh N.W. wind.
14	29·73	54	50	,, ,,
15	29·93	58	52	Fine and calm.
16	29·95	55	51	Rain; evening fine.
17	30·24	47	43	Cold morning; fine; N.W. wind.
18	30·27	50	45	Cold northerly wind; bright fine day.
19	30·33	50	43	Fine bright day.
20	30·41	52	50	Wet fog all day; light N.E. to S.E.
21	30·41	55	48	Fresh E. wind; fine but raw.
22	Not marked, but falling slightly.			Cold, damp, and raw; E. wind.

DEATHS from Cholera, the sites of which are indicated on the Map.

Date.	Name.	Age.	Residence.	Barom.	Ther. 8 A.M.	Ther. Lowest previous Evening	Remarks.	No. of Deaths each Day.
Sept.								
23	Ann Egdell . .	38	Clayport-street	29·97	55	50	Cold E. wind.	12
	John Smith . .	41	,,					
	Thomas Wilkinson	30	,,					
	Ann Allison . .	76	Green Batt					
	Dorothy Jamison .	60	,,					
	Michael Sanderson	54	Clayport-street					
	Mary Jowcey . .	28	,,					
	Ann Brown . .	63	Crown Inn-yard					
	Elizabeth Jobson .	27	Clayport-street				• •	
	*Margaret Moffit .	53	,,					
	Mary Henderson .	18	Howick-street					
	Thos. M'Millan .	21	Hunter's-yard				• •	
24	Robert Tate . .	63	Green Batt .	29·91	55	53	Calm and cloudy.	6
	Jane Jackson . .	54	,,				Fine but close.	
	Dorothy Brankston	52	Clayport-street					
	Isabella Pickard .	5	,,					
	John Walker . .	72	Union-court					
	Neil M'Nab . .	32	Workhouse, removed from Rugley.					
							Carried forward.	18

Deaths from Cholera—*continued.*

Date.	Name.	Age.	Residence.	Barom.	Ther. 8 A.M.	Ther. Lowest previous Evening	Remarks.	No. of Deaths each Day.
Sept.							Brought forward	18
25	Harvey Cross	2	Clayport-street	29·84	56	48	Fine, but with E. wind.	2
	Ann Fawdon	48	,,					
26	Isab. Flannaghan	43	,,	29·89	52	48	Fine, but cold and raw; E. wind.	12
	Frances Laing	78	,,					
	Edward Davis	75	,,					
	Isabella Burn	28	,,					
	Ann Appleby	46	,,					
	Margaret Marshall	54	Market-place					
	*Jane Duncan	34	Clayport-street					
	John Douglas	29	,,					
	Thomas Carr	60	,,					
	George Hume	62	,,					
	George Forster	18	,,					
	—— Morrison	..	,,					
27	John Hunter	45	Chapel-lane	29·90	56	52	Fine, damp; S.E. wind.	5
	Sarah Dickman	55	Union-court					
	Ann Hudson	24	Teasdale's-yard					
	Jane Berkely	46	Crown Inn-yard					
	Alice Wardhaugh	63	Ogle-terrace					
28	Ralph Emerson	53	Clayport-street	29·81	56	53	Hazy, and rain.	13
	James Lockey	39	,,					
	Margaret Millar	30	,,					
	John Balmer	31	Howick-street					
	Ann Lough	43	Clayport-street					
	*Eliz. Mennim	43	,,					
	Thomas Jeffrey	15	,,					
	*George Taylor	21	,,					
	Isabella Dixon	31	Market-place					
	James Paxton	20	Clayport-street					
	Mary Mills	58	,,					
	Catherine Cross	26	,,					
	Jane Thompson	60	Percy-street					
29	*Rebecca Dobbs	56	Clayport-street	29·58	54	49	Calm and cloudy; very wet.	17
	Robert Grey	13	Denwick					
	Robert Gardener	73	Lisburn-street					
	Grace Taylor	39	Clayport-street					
	Robert Duncan	6	Monkhouse's-sq.					
	Robert Black	3	,,					
	James M'Millan	44	Clayport-street					
	Sarah Black	29	Monkhouse's-sq.					
	William Howey	11	Clayport-street					
	Dinah Tate	14	Correction-house-yard					
	Charlotte Tate	4	,,					
	John Cavenah	..	King's Arms-yd.					
	Sarah Smith	67	St. Michael's-pl.					
	Henry Tinson	29	Ogle-terrace					
	Mary Hedley	58	Green Batt					
	Mary Maule	61	Walkergate					
	George Reid	36	Fenkle-street					
30	*Jane Douglas	57	Greenbat	29·18	47	47	Strong N.E. wind.; cold rain; clear at night.	13
	*Margery Keen	28	Clayport-street					
	James Hindmarsh	81	Peak's-street					
							Carried forward	80

Deaths from Cholera—*continued.*

Date.	Name.	Age.	Residence.	Barom.	Ther. 8 A.M.	Ther. Lowest previous Evening	Remarks.	No. of Deaths each Day.
Sept.							Brought forward	80
	Ann Hindmarsh .	75	Peak's-street					
	*William Ramsay .	4	,,					
	*Ann Robarts . .	60	,,					
	Catherine Metcalfe	31	Union-court					
	Alice Hume . .	26	Clayport-street					
	*Thos. Robarts . .	60	,,					
	Robert Stanfield .	60	Pottergate-place					
	Sarah Black . .	1½	Monkhouse's-sq.					
	Ann Fawdon, jr. .	18	Clayport-street					
	Adam Dixon . .	75	Correction-h.-yd.					
Oct.								
1	John Douglas Arnott	3m.	Chapel-lane	29·39	45	42	Cold N.E. wind; fair.	8
	Sarah Burnett .	4	Clayport-street					
	Henry Ferguson .	40	Clayport-street					
	Wm. Dick . . .	54	Greenbat					
	Julia Dixon . .	55	Market-passage					
	Jane Snowdon .	27	Clayport street					
	Ann Nesbitt . .	25	Peak's-street					
	*James Skelly . .	40	Pottergate-street					
2	Isabella Bell . .	44	Peak's-street	29·57	37	35	Calm and bright; afternoon W. wind.	4
	Joseph Jamison .	75	Greenbat					
	Elizabeth Wood .	73	Bondgate-street					
	Ann Hudson . .	60	Teasdale's-yard					
3	George Lindsay .	68	Teasdale's-yard	29·45	39	35	Calm and cloudy; afternoon rain.	6
	Mary Pickard .	71	Clayport-street					
	George Davison .	22	Pottergate-street					
	Henry Hedley . .	61	Greenbat					
	Jane Taylor . .	6m.	Clayport-street					
	Letitia M'Laughlin	59	Bondgate-street					
4	Ann Middlemas .	44	Teasdale's-yard	29·12	44	39	Cold easterly wind; fine afternoon, N.E. wind.	3
	Susan Anderson .	55	White-Hart-yard					
	George Anderson.	65	Clayport-street					
5	Appelina Cooper .	25	Market-passage	29·39	36	33	Bright and frosty; N.W. wind; afternoon, heavy showers.	8
	Ann Bamburgh .	58	Greenbat					
	*Mary Ramsay .	34	Clayport-street					
	George Pike . .	27	,,					
	John Dickman .	52	Union-court					
	Mary Thew . .	71	Clayport-street					
	James Williams .	50	,,					
	Eleanor Forster .	8	,,					
6	Jane Brankston .	73	Clayport-street	29·57	35	32	Bright and fine.	6
	Elizabeth Grey .	83	,,					
	Catherine Lockey	35	,,					
	*Dorothy Grey .	48	,,					
	John Wardle . .	8 d.	Elliott's-yard					
	Elizabeth Smails .	77	Dispensary-street					
7	Ann Newton . .	27	Correction-h.-yd.	29·57	47	33	Fresh N.E. wind; a gale.	4
	John Snowdon .	38	Dispensary-street					
	Jas. Keen . . .	25	Clayport-street					
	John Lindsay . .	14	Teasdale's-yard					
8	Jane Davison . .	54	Pottergate-street	29·69	46	42	Northerly wind; fine.	1
							Carried forward .	120

Deaths from Cholera—*continued.*

Date.	Name.	Age.	Residence.	Barom.	Ther. 8 A.M.	Ther. Lowest previous Evening	Remarks.	No. of Deaths each Day.
Oct.							Brought forward.	120
9	Mary Ann Featherstone	47	Clayport-street	..	..	..	No observations recorded.	3
	George Slight .	55	Dispensary-street					
	Patrick Macone .	7	Lodging-house					
10	Isabel Anderson .	27	Clayport-street	..	..	..	,, ,,	1
11	Thomasine Grey .	70	Union-court .	..	..	..	,, ,,	2
	Ellen Ferguson .	3 m.	Clayport-street					
12	AnnRickabyPearson	22	Correction-h.-yd.	29·70	41	38	Fresh breeze; wind N. easterly, with hail.	1
13	Robert Wardle .	3	Elliott's-yard .	29·87	41	36	Moderate wind N.E.; heavy squalls of rain.	2
	John Stocker . .	..	Moffit's-yard					
14	. .	..	. .	30·13	45	40	Very fine; light N.E. wind.	
15	Robert Wallace .	48	Pottergate-street	30·20	38	35	Calm and bright.	2
	Rebecca Quin . .	1	Victoria-place					
16	Mary Wilson . .	39	Market-place .	30·03	44	36	Beautiful; wind S.	2
	Mary Carr. . .	40	Dispensary-street					
17	. .	..	. .	29·62	43	33	Dull and hazy; wind S.W., in the evening blowing strong.	
18	Elizabeth Burnett	39	Crown Inn-yard	29·68	55	47	Very fine; wind fresh from S.W.	1
19	. .	..	. .	29·83	51	48	Hazy, but day fine.	
20	. .	..	. .	29·54	48	48	Wind west, fresh, fine.	
21	. .	..	. .	29·52	52	44	S. wind, day fine.	
22	. .	..	. .	29·84	42	40	Southerly wind; the morning fine; rain in evening.	
23	John Newton . .	1	Greenbat . . .	29·72	47	38	Fine morning; heavy rain during the night.	2
	Thomas Thompson	52	Clayport-street					
24	. .	..	. .	29·73	49	46	Light wind from the E.; some rain in evening.	
25	. .	..	. .	29.68	51	47	S.wind, alternately fine and showery.	
26	. .	..	. .	29·46	47	45	S. wind, weather beautiful.	
27	. .	..	. .	29·66	46	40	Some rain.	
28	. .	..	. .	Not registered, but barometer rising rapidly.			Wind S.; day fine.	
29	. .	..	. .	30·45	40	35	Wind S. W., fresh; day very fine.	
30	. .	..	. .	29·98	45	41	,, ,,	
							Total . .	136

NOTE.—There were about fourteen deaths in Clayport-street, which are not marked on the plan of Alnwick in consequence of my not being able to find out the residences. They are marked with an asterisk in the list. Eight or ten other deaths occurred which are not entered in this list.

HEIGHT of the Barometer and Temperature of the Air, observed at Alnwick by W. J. Carr, during the corresponding periods of 1847 and 1848, in which Cholera occurred in Alnwick in 1849:—

Date.	1847.		1848.		1849.		REMARKS.
	Barom.	Therm.	Barom.	Therm.	Barom.	Therm.	
Sept. 23	..	..	29·664	62·5	29·97	55·0	The temperature appears to have been lower in 1849 than either of the preceding years; but there may be a difference owing to the relative positions of the instruments, as that kept by Capt. Grey for 1849 is placed several miles nearer to the east coast, and within one mile of the sea.
24	..	..	29·360	62·5	29·91	55·0	
25	..	..	29·516	60·	29·84	56·0	
26	..	..	29·646	59·5	29·89	52·0	
27	..	..	29·750	60·	29·90	56·0	
28	..	..	29·874	59·5	29·81	56·0	
29	..	..	29·738	58·5	29·58	54·0	
30	..	..	..	..	29·18	47·0	
Oct. 1	..	..	29·396	60·5	29·39	45·0	
2	30·100	56·	29·520	58·5	29·57	37·0	
3	30·070	54·5	29·508	60·5	29·45	39·0	
4	29·964	55·	29·416	61·	29·12	44·0	
5	29·688	54·	29.746	62·5	29·39	36·0	
6	29·614	54·	29·746	64·5	29·57	35·0	
7	29·350	55·	29·932	62·5	29·57	47·0	
8	29·438	52·	29·736	63·5	29·69	46·0	
9	29·712	51·	29·660	60·	..	..	No observations recorded.
10	29·580	56·	29·440	57·5	..	..	
11	29·700	58·5	29·820	55·	..	..	
12	29·768	58·	29·886	56·	29·70	41·0	
13	29·940	56·	..	..	29·87	41·0	
14	29·852	53·5	30·204	54·5	30·13	45·0	
15	29·812	54·	29·992	55·	30·20	38·0	
16	29·920	56·5	29·800	54·	30·03	44·0	
17	29·714	55·	29·868	51·	29·62	43·0	
18	29·438	57·	29·672	46·	29·68	55·0	
19	29·144	57·5	29·748	45·5	29·83	51·0	
20	29·370	53·	29·932	47·	29·54	48·0	
21	29·490	51·	29·796	51·	29·52	52·0	
22	29·576	55·	29·560	52·5	29·84	42·0	
23	29·276	55·	..	..	29·72	47·0	

NOTE.—The electric condition of the atmosphere was not ascertained at Alnwick; but in Manchester it was most accurately noted, and no marked or particular variations were noticed: there certainly was not that variation which could account for the presence of cholera. Some days electricity was in excess over the average, on others below, but no corresponding results were noticed in the disease, though narrowly watched for.

Progress of Cholera in Alnwick, and the natural Causes which may lead to it in other Towns considered.—Early on the morning of the 23rd of September the first case of cholera appeared in Alnwick, on the south side of Clayport-street; and, before the clock marked off the next twenty-four hours, 12 human beings had passed into eternity. The youthful of eighteen years of age, with the ripened maturity of seventy-six, had become blackened corpses. The inhabitants were panic-stricken, and whispered to each other with pale fear on their cheeks. The thermometer ranged from 50° to 55°; a cold east wind prevailed. On the following day 6 more deaths occurred, the thermometer ranging

from 55° to 53°, the weather calm and cloudy, but dry and close. On the 25th there occurred 2 cases only. On the 26th the east wind again blew "cold and raw," and there occurred 12 deaths; on the 27th, 6 deaths; on the 28th, 13 deaths, the weather hazy, with rain. On the 29th the day was "calm, cloudy, and very wet," and 17 deaths occurred, to be increased by 13 additional on the 30th. On the 1st of October there were 8 deaths; 4 on the 2nd; 6 on the 3rd; 3 deaths on the 4th, with a "cold easterly wind;" 8 deaths occurred on the 5th, with a bright and frosty morning, a north-west wind, and heavy showers in the afternoon. From this date the number of deaths daily diminished, until by the 23rd the disease had apparently, for this time, run its course. The previously crowded churchyard was dotted over with new mounds, and in one month the average mortality of a year had taken place.

Many theories have been propounded to account for cholera, but in its ravages it is true to no one cause, excepting that, in localities, its preference is for filth, and, in persons, for the dwellers amongst filth, the diseased, the dissipated, and the immoral. The temperature of the atmosphere does not always appear to encourage or control this disease—the direction of the wind will not always modify its attacks. It is regardless of stratification or the proximity of rivers, if the favouring causes are found in other places; and elevation does not appear materially to abate its virulence. Wolverhampton and Bilston have sites about 500 feet above the sea; they are not near any river, and Wolverhampton stands upon the same geological formation as Birmingham, and at about the same elevation. The village of Wreckenton had not a population of more than 1000; it also stands on the new red sandstone at an elevation of 500 feet, and the proportion of deaths from cholera in a few weeks was one out of seven of the entire population. Electricity is not the sole cause of cholera; and most certainly it cannot be laid entirely to the charge of bad water. Each and all of these conditions and things may aggravate the disease, but no one cause alone can, in all cases, be made to bear the whole blame. In examining the course of rivers, the fact must be borne in mind that in such localities population is generally the most dense; and seaports contain a debased, ill-fed, ill-housed, filthy, and crowded population. Particular geological strata are also crowded with populations assembled for purposes of trade: such is the case on the great coal-measures, and the formations immediately connected with them. Many of the great manufacturing towns in England stand upon the new red sandstone; but this fact did not produce cholera in Birmingham, though it was most fatal in Wolverhampton—towns similar in trade, elevation, and stratification.

Many towns and places—nay, whole countries—escape the most general epidemic, not because they stand on a stratification less liable to disease, or by reason of any peculiar advantages,

natural or artificial, but simply because they did not lie in the track of that particular epidemic. On the grandest scale, the single operations of nature are local; but, comprehending the whole of time, the most minute differences are general. Earthquakes are general; a particular earthquake is local. Storms are general; a particular storm is local. Epidemics are general; but a particular epidemic is local. Earthquakes, storms, and epidemics may each act upon the greatest scale; the primary and secondary effects may encircle the globe, but the force will be defined and comparatively local. There is also a disposition in nature to repeat the same operations in the same track; or, rather, all the excesses of nature are for a time self-generating. Epidemics may not be prevented; but all experience has shown that their fatal virulence may be controlled.

It will be a mistake to impute the prevalence of cholera in one place more than another to natural causes solely, as this may lead to fatal neglect in towns and districts where hitherto it has happily not prevailed. It is true that cholera follows in the track of fever, and in this its second visitation it has generally passed over the site of its former ravages in 1832 and 1833, but not in all cases. Some towns have suffered less in 1849 than previously, others more, and the disease has prevailed where it did not make its appearance in 1832. But wherever cholera has prevailed, there proper inspection has pointed out some state and condition of neglect favourable to its generation, as shown by the able Reports of the Registrar-General and the indefatigable labours and researches of Dr. Sutherland and Mr. Grainger; and although it has not attacked all such places, no dweller amongst filth and imperfect sanitary arrangements is safe. Frequently the disease has just oscillated on the verge of malignancy, where the slightest addition, or less watchful care by your Honourable Board or attention of the local authorities, might have caused it to terminate fatally. The instructions and precautionary measures so actively sent forth and recommended by your Honourable Board have in many instances been attended with the best effects, and in some places, where neglected, the dreaded results have fallen heavily upon the district.

There is one feature in the outfall drainage of towns which has not been prominently noticed as affecting the general health of the inhabitants, but it in a remarkable degree illustrates the influence of a vitiated atmosphere if brought back upon the town by the prevailing wind. In Birmingham, which is cited as a town having escaped the ravages of cholera, the whole natural drainage is to the eastward: the prevailing winds are south and west. In Wolverhampton the natural drainage is to the south and west, in Liverpool west and north; in London the drainage or flow of the river is eastward, but the two divisions of the metropolis are exposed, through the oscillating of the tide in the Thames, which

receives the sewage of the metropolis, to every wind. In Alnwick the drainage is to the north and east, and when the cholera broke out the wind was from this point. In Liverpool the line of docks retain comparatively stagnant water, the basins receive most of the drainage of the town, and the mud-banks in them are more or less exposed to the atmosphere every tide. The prevailing winds at Liverpool are west, or intermediate betwixt west and south, so that any evaporation from the docks and tainted basins is dragged back over the town. In Wolverhampton the prevailing atmospheric currents are also charged with any escape there may be from the refuse of the place; but in Birmingham the prevailing winds carry such influences away. The sanitary condition of Birmingham is, however, very imperfect, and fever is common, as detailed in the able Reports of Messrs. Joseph Hodgson and James Russell, surgeons. The natural fall of the site is no doubt favourable, but perfect drainage is no less required. The slope of the ground in Wolverhampton and Liverpool is quite as favourable as in Birmingham for perfect drainage; the only difference is the direction of the outlet. Proper sewerage and drainage are required within every town, but the disposal of the refuse at the outfall must also be looked to if health is to be preserved. Streams, rivers, or canals cannot be turned into common sewers with impunity, neither can the drainage be allowed to stagnate in open ditches, or to flow indiscriminately over large areas of wet, undrained land, but to the serious injury of health.

To drain the town of Alnwick perfectly, and turn all the refuse into the river Aln, would merely remove the source of disease and diffuse the present evil.

The refuse must not only be removed from the vicinity of human habitations, but it must also be applied to its proper use, namely, to manure the land, when, if all the necessary conditions are attended to, the benefits will be of the greatest value to agriculture.

In Alnwick that portion of the town which is farthest from the river, and comparatively the most elevated, produced the principal number of cholera cases. The inhabitants used the same or similar water as their more fortunate neighbours on the opposite side of the street; the whole of the inhabitants were exposed to the same action of terrestrial electricity, and the same general and common atmosphere enveloped them. Change of wind did not vary the seat of the disease after it had commenced. In Clayport-street it broke out, and on the south and north, where the surface-drainage passes towards, under, and through the houses, the greatest mortality took place. No local quarantine was established, and yet the disease did not cross a narrow street. The members of the sanitary committee visited the infected houses without fear, and they and their families escaped the effects of contagion.

The physical and visible causes to be found in Clayport-street were, large middens, foul privies, and cesspools, crowded amongst

houses built originally much too close; privies and cesspools within dwelling-houses and under the floors of sleeping-rooms; the land having naturally a wet surface and damp subsoil, and no artificial drainage; narrow streets, lanes, courts, and yards imperfectly paved, or without any form of pavement; the surface uneven and dirty, and no systematic cleansing; the middens left to accumulate, fester, rot, and give off poisonous gases throughout the whole year. The result to the inhabitants at all times and at all seasons is sickness, debility, and death above the ordinary average of well-regulated districts. When a concentrated combination of causes occurs, the result is fever in excess, or the more terrible cholera.

The following notice, published and extensively circulated in the district after the disease had subsided, will show the character and strength of feeling existing on the subject at the time :—

"*Alnwick Union.*

"Alnwick, October 27, 1849.

"At a Meeting of the Board of Guardians of the Alnwick Union, held in the Board-room, in Alnwick, on Saturday, the 27th day of October, 1849,

"It was resolved, That the Board of Guardians congratulate the inhabitants of the union on the disappearance of the cholera, with which it has lately been so grievously afflicted. That the Board cannot allow this opportunity to pass without recording their high sense of the duties voluntarily undertaken, and efficiently discharged, by the Visiting Committee of the town of Alnwick. This Board views with admiration the moral heroism with which the members of that Committee daily and hourly, without intermission, visited the abodes of sickness and of death, with a view to alleviate the sufferings and avert the dangers of the poor, the friendless, and the forgotten. Nor can the Board omit to notice the assiduity with which the ministers of religion sought to administer the consolation of that faith which alone avails to sustain the sufferer amidst the pains and languors of approaching dissolution. The Board would also congratulate the Committee upon the faithful and discriminating manner in which they have applied the relief-funds intrusted by public benevolence to their discretion. The Board rejoice that, amidst the perils so nobly encountered, no member of the Committee has fallen a victim in the discharge of their sacred duty.

"It was also resolved, That the following letter from W. H. T. Hawley, Esq., Poor Law Inspector, to their clerk, be inserted in the minutes of this Board :—

"'My dear Sir, "'York, October 17, 1849.

"'I beg to acknowledge the receipt of your kind letter of the 13th instant, enclosing a circular from the Visiting Committee, and in doing so I have to express the gratification I derived from hearing that the cholera was on the decline, and rapidly disappearing from Alnwick. To God's mercy, and the exertions made by yourself and the excellent persons forming the Committee, may be attributed this most desirable consummation; and I trust that in a few days you will be quite clear of

the disease. Its progress with you has exhibited the same characteristics which were developed in other towns attacked by it, and I think, from what I have observed elsewhere, that you have no reason to fear a fresh outbreak; should it however appear, judging by comparison, it will be only slight.

"'The circular does equal credit to the heads and hearts of those who prepared and published it.

(Signed) "'W. H. T. Hawley.

"'To W. J. Carr, Esq., Alnwick.'"

Existing Sewerage and Drainage of Alnwick.—Almost the whole amount of drainage is at present over the surface, and through the town, from the land above: the water and refuse in most instances follows the natural outlet; there are some portions of these watercourses walled and covered over, but in a rude and imperfect manner. Some few houses have drains laid from them, but it is generally to conduct the refuse out into an open gutter on the side of the street. These drains are rude in character, imperfect in construction and use, and add to the general filth of the town; they have also cost more than proper tile-drains may be laid down for. This will be treated of in the proposed new works.

To the west there is a drain from Painter's-hill named Canongate Burn, which enters the river near the suspension bridge. This drain is partially closed and partially open. There is a second drain from Clayport-street, which passes under some houses where cholera was most rife, crosses Pottergate, turns eastward down Bow-alley, joins a line of drainage from Horse-market and Bondgate, and finds its way into the river. Another line of drainage commences above Green Batt, passes under a house where two cases of cholera occurred, turns along Green Batt down through the intervening block of buildings into the market-place near St. Michael's Pant, through Horse-market, and joins the last drain as described. Another line of drainage commences in Hotspur-street, where several cases of cholera occurred, crosses Bondgate Without, and falls into the drain last described. At the outer end of Bondgate Without another line of drainage flows into the castle grounds through a pond, the overflow from which passes into the river. The town is thus intersected by five lines of drainage, and the whole of the refuse passes along these open ditches through the castle grounds into the river.

There is no form of arrangement to intercept the refuse for agricultural use; but, of whatever value it may be, it is allowed to run to waste.

Present Water-supply.—There is no general supply of water in the town. There are public "pants," and there are public and private pumps and wells; the water is hard, and rain-water-butts are in use to collect soft water for washing. There

are ten public "pants" throughout the town, and all the water used for domestic purposes is carried from these, or from the pumps and wells, to the houses. In some instances the water has to be carried a distance of several hundred yards. The supply at times, when water is most needed, was said to be very deficient; and the open pants are not so clean as they might be kept. Complaint was made on behalf of the inhabitants by *Mr. Forster* that the river had been enclosed, so as almost to exclude the inhabitants from obtaining water from that source. When a full supply shall have been provided for the inhabitants, this will rather be an advantage than otherwise.

NUMBER AND STATE OF BURIAL-GROUNDS.—The only burial-ground in the town is attached to the church, and it has been in use many centuries. It is quite full, and the following returns and documents will show that means have been taken to remedy this evil:—

Queries issued under the Stat. 12th and 13th Vict. cap. 3, sec. 9 & 11, in respect to intramural interments in the metropolis:—

1. What is the name of your church or chapel? and in what parish or district is it?	St. Mary's parish, Alnwick, in the county of Northumberland.
2. Have you any consecrated burial-grounds, and where situate?	Only one in the parish, and that attached to St. Mary's church.
3. What is the extent of each in square yards as near as you can tell?	2000 square yards.
4. About what quantity in each ground (stated in square yards) has been appropriated by faculty or by purchase?	I am not aware of any.
5. About what is the quantity of the above of which the owners are at present unknown? State the quantity in square yards.	
6. Are the burial-grounds, or all or any of them, open for use?	The only one is open for use.
7. If closed, when, and by what authority?	
8. What is the extent of the vaults, tombs, or brick graves under the church or chapel? how much of same is occupied? State generally what interments have taken place under your church or chapel, and still continue to take place. Is there room for many more interments in them?	No interments have been allowed within the church for many years, except in one vault under the tower.
9. Are there any other burial-	None.

grounds in your parish or district not connected with the Church of England; and if any, what, to what extent, and by whom held?

10. What is the population of your parish or district? — Between 6000 and 7000.

11. Please to state, if you know, the number of deaths annually? — About 150 upon the average.

12. What was the total number of interments within the burial-grounds, vaults, tombs, within your parish or district, connected with your church, in the years

1842	146
1843	117
1844	128
1845	139
1846	151
1847	212
1848	171
Total	1064

13. Please to state the relative proportion of the persons of the several classes interred, as far as you are able; specifying

1. The gentry and professional persons	42
2. Tradesmen and shopkeepers	304
3. Mechanics and labourers	579
4. Paupers	139
Total	1064

NOTE.—If the rank of the parties interred be unknown to you, please to state the proportions of those buried in vaults, in private graves, and in public graves. The answer to this may partly be derived from the rate of fees paid on occasion of each interment, and may be set forth in the annexed Schedule.

14. How and when was each burial-ground obtained? by immemorial occupation, by purchase, or by gift? — By immemorial occupation.

15. Do you know whether the burial-ground is subject to any permanent charge, either to the incumbent or to any one else? — None.

NOTE.—Such cases as where the vicar's

glebe has been taken for a burial-ground; or a fixed sum is paid to the incumbent in lieu of fees; or money borrowed for the purchase of the ground on security of the rates or fees.

16. Do the parishioners pay any fee to the churchwardens for interment in the burial-ground, or do the incumbent, clerk, or sexton only receive fees?

The incumbent, clerk, and sexton only receive fees.

17. To whom are the fees paid if yours be a district church or chapel?

18. How long is it probable that the present burial-ground will be sufficient for the purpose of burial?

It is already overcrowded.

19. Are the grounds surrounded by dwelling-houses or other buildings, and to what extent, or in what manner enclosed; and what is the relative level of the burial-ground compared with the adjacent streets?

Partly surrounded by dwelling-houses and other buildings. Enclosed by a stone wall. On a level with Bailiffgate-street, and considerably higher than Canongate and Walkergate streets.

20. On what days of the week, and at what hours, are funerals most frequent?

21. Enclose a copy of table of fees relating to interments, monuments, tablets, &c., both in respect of church and chapel, and of church and chapel burial-grounds.

Fees for each burial, 4*s.*; for each tablet in church, 5*l.*; common tombstone in churchyard, 5*s.*; for single brick grave, 1*l.* An extra charge of 1*l.* is made on those funerals which are brought from another parish. Through stone in churchyard, 1*l.*

22. Who receives orders for the interments in the burial-grounds, vaults, &c.? And who selects the sites for interments—the clerk or the sexton? And who keeps the register?

The sexton receives orders. The friends select the site. The parson keeps the register.

23. Have you any suggestions to offer in reference to burial-grounds? If so, please to state them.

PARISH of ALNWICK.

SCHEDULE of the total Number of Interments of each Class during each of the Years hereunder set forth.

	1842		1843		1844		1845		1846		1847		1848		Total of each Class.
	Number.		Number.		Number.		Number.		Number.		Number.		Number.		
	Adults.	Children.	Adults.	Children.	Adults.	Children.	Adults.	Children.	Adults.	Children.	Adults.	Children.	Adults.	Children.	
1. Gentry and Professional Persons	5	2	4	..	7	1	6	1	5	..	4	..	4	3	42
2. Tradesmen and Shopkeepers	18	12	30	6	26	12	30	11	34	19	32	19	35	20	304
3. Mechanics and Labourers .	57	26	35	26	48	21	53	27	51	29	57	67	56	26	579
4. Paupers	23	3	12	4	12	1	10	1	11	2	25	8	20	7	139
Total Annual Interments of all Classes . . .	103	43	81	36	93	35	99	40	101	50	118	94	115	56	1064

NOTE.—If you cannot state the number of each class, state the total; and if you cannot give the returns for all the years, give them for as many as you can, or for the last year.

The following specification has been published and circulated in the district:—

Alnwick Parish.—Proposed New Cemetery.—The inspector under the Board of Health having viewed the several sites for a new burial-ground, and having given the decided preference to that upon the Moor, the committee appointed at a general meeting of the inhabitants of the parish, held in the town-hall on the 3rd day of October, 1849, acting upon the instructions given to them at that meeting, have agreed to the following Report:—

I. That it is exceedingly desirable that interments in the old burial-ground of the parish of Alnwick should be discontinued; that a larger and more convenient place of interment should be substituted; and that it should be a parochial burial-ground; but with a reservation to all parties having interests in the ancient churchyard, of the several rights, privileges, and duties now belonging to them, so far as relates to the Established Church, in the portion of the new ground proposed to be consecrated and set off in respect of that church.

II. That five acres of land be purchased upon Alnwick Moor, to the north-east of the houses at Hobberlaw.

III. That one-half be set off as a burial-ground for the Established Church, and be consecrated by the bishop.

IV. That the other half be set off for the interment therein of the other denominations of Christians who may die in the parish.

V. That a chapel be erected in which the services of the Church may be performed.

VI. That another chapel be provided for the use of the other congregations.

VII. That a register be kept under the superintendence of the Registrar-General for England and Wales.

VIII. That accurate data be preserved in a map and in records when and where each interment takes place.

IX. That a residence be provided for such registrar to live on the premises.

X. That a stable and house or shed for carriages be provided.

XI. That a house for the reception of dead bodies be also provided.

XII. That other conveniences be made, such as are found requisite in well-regulated burial-grounds.

XIII. That the ground be walled round.

XIV. That it be laid out in walks, with such shrubberies and plantations as may be deemed expedient or ornamental.

XV. That the cost (except the annual charges of the establishment) be met by borrowing a sum of money and paying it off out of the rates in 30 years.

XVI. That the Establishment charges be paid out of the poor-rates, all the parishioners being equally benefited.

XVII. That a schedule of charges for interment, monuments, and special appropriations of ground be framed, to be received and carried to account towards payment of such annual expenses.

XVIII. That a parish conveyance be kept for the use of the inhabitants, combining the convenience of a hearse and carriage, to take the body and attendants to the cemetery.

In submitting the above plan, the committee beg to state that their object throughout has been not merely to provide for the removal of the evils of the present system, and for the preservation of existing rights, but also in reference to the health of the present and future inhabitants of the parish. It is also their object that every inhabitant, however poor, should have a *legal right*, on the death of a relative, to an undisturbed grave in the peaceful seclusion of a well-ordered burial-ground —the performance of the Church of England service in regard of the members thereof—the performance of the services of other denominations according to their respective usages in their portion of the ground —the respectable conveyance of the body to the place of burial—the removal of a body from the place of death when desired to a house of reception until the time of burial—and that these privileges should not be of an eleemosynary character, but obtainable by every one on application, and on payment of moderate fixed charges.

These are the principles which the committee are unanimous in their wish to carry out, and trust it may meet with the concurrence of the inhabitants of the parish.

Every inhabitant will however have the opportunity of stating any objections he may entertain, at a court which will be held by the inspector of the Board of Health, and of which one month's public notice will be hereafter given.

(Signed) COURT GRANVILLE, Chairman.

Committee Room,
October 26th, 1849.

GAS-WORKS.

Gas Company's Return.

Queries.	*Replies.*
When was the company established?	The company's lease of the ground for an oil-gas-works is dated 1825; converted into coal-gas-works in 1830.
Number of shares and amount paid for each?	Fifty shares; 60*l.* per share.
Number of retorts at gas-works?	Thirteen; 12 of which are 6 feet 6 inches long and 12 inches in diameter, and 1 is 6 feet 6 inches long by 18 inches wide, 12 inches high.
Quantity of gas made in the year?	Not having a station-meter, cannot give the exact quantity, but as nearly as can be computed 1,802,402 feet.
Number of street-lamps now supplied?	Forty-eight.
Number of other public lamps?	One oil-lamp.
Price charged per annum for each lamp?	Two pounds five shillings. They are lighted half an hour after sunset, and extinguished at 11 o'clock at night, except Saturday nights, when they are continued until 12 o'clock. Ten of the lights are kept until 3 o'clock in the morning.
Price of the gas at the commencement of the works per 1000 feet?	Twenty shillings.
The present price per 1000 feet?	Eight shillings.

Alnwick, Oct. 23, 1849. (Signed) JAMES BOWMAKER.

Remarks.—The price charged for gas is very various throughout the towns in England; there is no recognised rule or standard price, but each company obtains, apparently, that which the directors consider the best price; and, unfortunately for themselves and for the public, they in general consider a high charge the best. This, however, is not always the case: one company clears 10 per cent. on 4*s.* per 1000 feet; other companies are in difficulties with a charge of 7*s.* per 1000 feet.

The following table shows the prices of gas at this and some of the neighbouring towns:—

Towns.	Population	Per 1000 Feet.	Batwing till 8.	Public Lamps, with Times of Burning.
		s. *d.*	*s.*	
Alnwick	6,000	8 0	31	45*s.* each till 11 o'clock, 68*s.* till 3 A.M.; off seven nights at full moon and 14 weeks at Midsummer.
Amble	Small	9 2	25	60*s.*
Belford	800	12 0	All by meter.	10*s.* per 1000 feet; half the night from 10th Sept. to middle of April.
Brampton	300	8 0	*s.* 25	40*s.* each; off nine nights at full moon, and 16 weeks at Midsummer.
Morpeth	3,600	8 4	25	42*s.* each from sunset to sunrise; off seven nights at full moon and 14 weeks at Midsummer.
Hexham	5,500	6 8	30	42*s.* each; off seven days at full moon and 14 weeks at Midsummer.
North Shields . .	25,000	4 0	20	40*s.* per lamp from 1st Sept. to 1st May; off four nights during full moon.
Newcastle . . .	100,000	4 6	23	10*d.* per lamp per week, from sunset to sunrise; one-half in summer, from 21st April to 21st August; the whole from 21st August to 21st April; not off during full moon. Lamps for the year, 43*s.* 4*d.*

	s.	*d.*
In Dover, gas is charged per 1000 feet . .	7	6
„ Watford, gas is charged per 1000 feet . .	8	0
„ Birmingham, gas is charged at prices varying from 6*s.* 8*d.* to	3	9
„ Wolverhampton, gas is charged at prices varying from . . . . . 5*s.* to	4	6
„ Whitehaven, gas is charged per 1000 feet .	4	0
„ Alnwick, gas is charged per 1000 feet . .	8	0

In Alnwick the price of gas was, on the establishment of the works, 20*s.* per 1000 feet, now 8*s.*; in Wolverhampton 15*s.*, subsequently reduced to 12*s.* 6*d.*, 10*s.*, 8*s.* 4*d.*, 6*s.* 8*d.*, and now 5*s.*, and to large consumers 4*s.* 6*d.*

In Whitehaven the price of gas in 1830 was 12*s.* 6*d.* each 1000 feet, subsequently reduced to 10*s.* 8*d.*, 8*s.*, and now 4*s.*; and the chairman informed me that at this latter price they expected to divide 10 per cent.

Public lamps are paid for at the following rates in the several towns named:—

	£.	*s.*	*d.*	
Dover . .	3	3	0	per annum.
Birmingham .	3	10	0	„
Wolverhampton .	2	16	4½	„
Whitehaven town .	3	0	0	„
Whitehaven harbour	4	2	0	„
Rugby . .	2	10	0	„
Coventry . .	3	0	0	„
Watford . .	4	0	0	for 8 months each year only.
Alnwick . .	2	5	0	

That a town should be well lighted is of the first importance, whether considered in a social or moral point of view; but even as a matter of police it is cheaper to pay for the necessary lights than to leave the worst districts in darkness. Not only should the main streets be regularly lighted, but also the back streets, courts, and alleys. A lamp tends to the comfort and safety of the inhabitants, and also prevents much mischief and immorality. If three lights can be placed and maintained for the price now charged for two, and equal advantage be derived by the gas companies in a generally increased consumption throughout the town, all parties will be alike benefited. A price which is profitable in other towns will, with wise management, be found advantageous in Alnwick. Extravagant charges defeat their own purpose, as they diminish consumption, beget discontent, and sooner or later produce rivalry.

ROOM TENEMENTS AND COMMON LODGING-HOUSES.—One principal cause of disease, immorality, and pauperism, is found in ruinous blocks of houses, crowded room-tenements, and unregulated common lodging-houses. The evidence which has recently been collected on this head of the inquiries, and brought before your Honourable Board, is clear, distinct, and unhesitating.

William Woodman, Esq., Town Clerk of Morpeth, stated in his evidence on that town,—

"No part of the Public Health Act will be more useful to this borough than that which gives power to regulate common lodging-houses. . . . Fevers prevail, and the sick-ward of the workhouse is filled with typhus in its worst form from these places."

Many such instances might be quoted from official Reports; and I could add proof upon proof, from personal inspection, of the misery endured by the outcast poor who reside in cellars, fetid, damp, and dark at noonday; or who crowd together in room-tenements, ruinous and totally unprovided with any means of ventilation. Room-tenements of this character are common in all the northern towns I have officially visited. Such exist in Morpeth, Alnwick, Berwick-upon-Tweed, Carlisle, Penrith, Ormskirk, Newcastle-upon-Tyne, Gateshead, Sunderland, and Whitehaven. Systematic cleansing, a full water-supply, and proper drainage, will do much for the improvement of the worst property; but there are blocks of houses and tenements, as also cellars, which no such remedial measures ever can make healthy dwellings, because the construction prevents free ventilation, and the sun can never shine within the crowded area, or even the light of day break the continuous night in which many of the poor at present exist. "The Tunnel" in Alnwick is of this class of property. The evidence of the relieving and medical officers is important to the ratepayers on this head.

S. M. Pain, relieving officer, Dover, stated of such property in that town,—

"The largest proportion of out-relief distributed in these places is caused by fever, small-pox, and other similar complaints, such being very prevalent in these localities; caused, I have no doubt, to a very great extent, by the closeness of the buildings, and their filthy state, from want of proper drains and other sanitary regulations.

"From the experience of upwards of ten years' intimate connection with the poorer classes, I have not the slightest hesitation in affirming that there is a most decided direct connection betwixt confined districts, bad sanitary arrangements, poverty, and vice. In such districts the moral state of the inhabitants is most deplorable: as the youth from these places grow to manhood they become habitual paupers; brought up to no regular employment, grossly ignorant and reckless, their time is spent between the union workhouse and the gaol.

"In conclusion I can only say that, if the Government wish to prevent the increase of a most debased and vicious population, they will take measures, if not to sweep away these nests of vice and disease already built, at any rate to prevent similar places from being erected in future."

When it is so clearly proved that crowded houses, dirt, and foul districts have a direct connection with heavy rates, it is not too much to presume that an improved condition, producing the opposite of all that now contaminates and degrades the populace, would remove much of the wretchedness and misery which exist, and also reduce the rates. Filthy crowded dwellings generate and foster disease: labour is thereby prevented; poverty and misery are the consequence; and a direct money-charge upon the funds of the parish is the inevitable result. A saving of one-tenth the amount annually expended in out-door relief would pay much of the sewer-rate for the whole district inhabited by the poor.

The late terrible outbreak of cholera in Alnwick is one more proof added to all which has gone before of the great expense incurred where sanitary works have been neglected.

Streets and Roads, Alnwick.—A portion of the town is paved with square sets, locally termed "dotting pavement." Narrowgate-street and part of Bond-street are thus paved. This cost about 5*s.* a square yard; the whole amount expended was upwards of 1100*l.*; the work was done under the powers of the Improvement Act about 25 years ago; it has answered very well. The stones were brought from Ratcheugh, about three miles east from the town; they are blue whinstone from one of the great geological dykes of the district, which has overlapped the mountain limestone, having ruptured the strata in its molten state, and run over the beds locally and technically termed "the three-band limestone."

A great portion of the town is paved with pebbles obtained from the sea-beach betwixt Alnmouth and Howick. This costs

about 1*s.* a square yard laid; it is very rough and unequal: the channels are in general formed of pebble-stone.

The principal cartways of the town are macadamized, formed of whinstone, as are also most of the roads throughout the union: some to the north-west are formed of small gravel from the river Breemish.

Footwalks in Alnwick.—Some of the footwalks are formed with freestone, which is laid down at about 5*s.* a square yard: the kerb is of the same stone, and costs about 6*s.* each square yard.

Roads throughout the Union.—The great main turnpike-road north and south is good, and well kept in repair; it may, however, be much improved. The road east and west is in very indifferent order; and all the other roads, with the exception of three or four townships—Howick, Craster, Preston, Falloden, and Doxford—are very bad, notwithstanding the number of surveyors there are to look after them, appointed annually under the Highway Act (5 & 6 Will. IV. cap. 50). There is said to be great neglect on the part of some of these local surveyors. Rates are levied from 2*d.* to 6*d.* in the pound, but it is at times rather difficult to trace an equivalent expenditure on the roads. The surveyors frequently employ their own carts and horses. The farmers have the option of working out their amount of rate on the roads, if claimed within fourteen days.

The macadamized roads are generally about 7 yards wide, and the cost of forming them is about 10*d.* each superficial yard.

Cost of town flagging pavement and road-making.

	s.	*d.*		
Caithness flags 2 inches thick	6	0	sq. yd.	complete.
Arbroath do. 2½ do. do.	6	6	,,	,,
Sparlaw do. 4 do. do.	3	8	,,	,,
Kerb-stone, to be measured with flagging	4	3	,,	,,
Paving with square sets "dotting" . .	5	0	,,	,,
Paving with round pebbles	1	0	,,	,,
Macadamized road, about	1	0	,,	,,

Election of Surveyors and mode of Road repairing.—The surveyors are frequently appointed without their consent, and in fact against their will. Some are appointed because the party having power to nominate has a grudge against the man he names. The situation is one of considerable trouble to a person not accustomed to such duties; and as the work to be done, and attendance necessary, are not paid for, the office in consequence is felt to be irksome. Some single farms are coextensive with the township, when, in such case, the farmer or one of his own servants is surveyor, and he may think it his interest to expend as little as possible upon the roads. He levies a rate upon the farm he occupies, and pays himself. The way in which such a surveyor sometimes attempts to repair the road is by removing

the stones from his land and laying them down in a rough and unbroken state; and frequently weeds are carted off and filled into the ruts. The "whicken," a weed most abundant, may often be found doing duty in place of properly broken stone.

OBSERVATIONS ON TILES, TILE-MAKING, AND THEIR USE FOR LAND AND TOWN DRAINS.—Earthenware tiles have recently been brought into extensive use for land drainage, for street and house drains, and even for the main outlet sewers of towns. Through the indefatigable labours of Edwin Chadwick, Esq., and others, this subject has been thoroughly investigated, theoretically and practically; and the result of both experiment and practice is, that pipes of comparatively small diameter serve better the purposes of drainage than the hitherto large and much more expensive brick and stone sewers and drains. The power of water to remove solids and semisolids is in proportion to the volume, head, or vertical depth, and the gradient down which it is made to flow. Thus, all these things being the same, a pipe of 4 inches diameter will drain any ascertained area within its capacity better than a larger sewer; as the power of water to remove solids and semisolids sent in from house and yard drainage will be the greater the more nearly this pipe is graduated to the volume of water to be sent through it. There are other considerations with respect to house-drains which dictate a minimum diameter of pipe, rather than the volume of water to be passed from any one house: as, for instance, the drain from any one watercloset should, until the pipes are more evenly made, not be less than 4 inches internal diameter. But one such 4-inch pipe may have several 4-inch branches, and will remove or take off the drainage of several houses. Experiment and actual experience have proved that such a pipe will be preserved in work, open and clean from refuse sediment; whilst all past experience has proved that the more expensive house-drains of 2 feet, 18 inches, and even those of 12 and 9 inches diameter, inevitably choke with sediment and refuse, and ultimately become blocked entirely up; because the volume of water is spread out over a wider area in drains of these larger dimensions, and the whole solid refuse is deposited in the drain, and much of the thin and stagnant sheet of water soaks away. Should there be the slightest imperfection in the traps or junctions of the drains, the foul and most unwholesome gas which is generated is gradually but constantly passed into the houses, alike destructive of health and comfort, and tending to produce premature death.

The discharges of water through pipes of small diameter, and laid at varying angles of fall, have been recently tested, and the result of the experiments has falsified the formulæ of such mathematicians as Prony, Dubuat, Eytelwein, Smeaton, and others. These authorities not only disagree relatively the one with the

other, but all are very wide of the truth when applied for the purposes of drainage. A pipe of 6 inches internal diameter, laid at an inclination of 1 in 60, and the head just filled, will discharge 75 cubic feet of water per minute; and in the length of 100 feet the sectional area of the pipe occupied is reduced to below one-half. The whole volume of water such a pipe will pass through it in 24 hours is equal to 675,000 gallons. This volume of water will pass through a single line of pipe without branch feeders; but by a proper junction of branch pipes a much larger volume will be delivered through the main pipe, as the velocity is increased with the volume up to a certain point.

House and town drains have but one principal purpose to serve, namely, the perfect and speedy removal of all liquid, solid, and semisolid refuse to some common outlet or reservoir, where it may be dealt with for agricultural purposes, without creating a nuisance or in any way endangering health. Land drains have also a most important purpose to serve; and that the drains may perform this operation perfectly, the main outfalls should be well chosen, their inclination, or gradients, the best the county will afford, the form and capacity of the drains such that they will not only pass off the water, but remove all sand and silt which may find its way into them, and the outfalls and branch drains should be so laid that no permanent lodgment of water can ever take place in any portion of their length. There is no reason why heat may not be applied to land in agriculture, on an extensive scale, to force and ripen green and succulent root-crops. The heat now wasted in lime-kilns, brick-kilns, and tile-kilns will probably be turned to some such use, but special arrangements may be made for this purpose which would be most economical for kitchen and other gardens. To thoroughly drain a county is to raise its temperature from 6 to 10 degrees, to increase the fertility of the land, and, in a climate notoriously fickle, to ensure an early harvest—it is, in fact, tantamount to removing the whole county so many degrees south.

Drain-tiles have of late been extensively made and used in the district by the Duke of Northumberland, by Earl Grey, and also by others of the local landed proprietors.

PRICES of Tiles at Tilesheds at Hawkhill.

—	Internal Diameter.	Inches Long.	Per Thousand.	Remarks.
	Inches.		£. s. d.	
Tile-pipe . .	5	15	2 10 0	
,, ,, . .	4	15	1 15 0	
,, ,, . .	3	15	1 7 0	
,, ,, . .	2½	15	1 2 0	

PRICES of Tiles at Tilesheds at Ayden Forest.

—	Internal Diameter.	Inches Long.	Per Thousand.	Remarks.
	Inches.		£. s. d.	
Tile-pipe . .	6	15	3 10 0	These are the prices charged to chance customers.
,, ,, . .	5	15	2 12 6	
,, ,, . .	4	15	2 0 0	
,, ,, . .	3½	15	1 12 6	
,, ,, . .	2½	15	1 6 0	
,, ,, . .	2	15	1 0 0	
,, ,, . .	1½	15	0 16 0	

NOTE.—These prices are exclusive of collars.

PRICE of same Tiles if not less than Two Millions were taken.

—	Internal Diameter.	Inches Long.	Per Thousand.	Remarks.
	Inches.		£. s. d.	
Tile-pipe . .	6	15	2 15 0	
,, ,, . .	5	15	2 0 0	
,, ,, . .	4	15	1 10 0	
,, ,, . .	3½	15	1 4 6	
,, ,, . .	2½	15	1 0 0	
,, ,, . .	2	15	0 16 0	
,, ,, . .	1½	15	0 12 6	

WEIGHT per Thousand of the same Tile-pipes in the Clay when Moulded, and when Burned.

Internal Diameter.	In the Clay.	When Burned.	Remarks.
Inches.	Tons. cwt. qrs.	Tons. cwt. qrs.	
6	7 10 0	5 13 0	
3½	3 7 2	2 12 0	
2½	1 17 0	1 12 1	
2	1 15 3	1 4 2	
1½	1 6 0	1 0 1	

THE Price at which Bricks can be made by a Proprietor with the Ainslie Tile-machine and the Ainslie Kiln.

Size.	Tons of Clay used.	Expense of working Machine per Ton.	Cost of labour of working per Ton of Clay.	Quantity of Coal per Ton of Clay.	Cost in the Kiln.*	Total Cost.
	Tons cwts. qrs. lbs.	*s.* *d.*	*s.* *d.*	Cwts.	£. *s.* *d.*	£. *s.* *d.*
6 inches external diameter, and 1 inch thick, per 1000 feet . .	8 18 0 16	2 6	1 0	1	2 4 2	2 8 2
8 inches external diameter, and 1 inch thick, per 1000 feet . .	12 9 2 18	2 6	1 0	1	3 8 7	3 15 1
5 inches external diameter, and 1 inch thick, per 1000 feet . .	7 5 2 0	2 6	1 0	1	1 18 10	2 2 9
Common size hollow brick, with headers and stretchers, per 1000 . . .	3 7 2 0	2 6	1 0	1	0 16 10	0 18 6

THE Price at which Tubular Drain-pipes can be made per 1000 feet by a Proprietor with the Tile-machine.

Size.	Tons of Clay used.	Expense of working Machine per Ton.	Cost of labour of working per Ton of Clay.	Quantity of Coal per Ton of Clay.	Cost in the Kiln.*	Total Cost.	
						Without Sockets.	With Sockets.
Inches.	Tons cwts. qrs. lbs.	*s.* *d.*	*s.* *d.*	Cwt.	£. *s.* *d.*	£. *s.* *d.*	£. *s.* *d.*
16	21 1 2 0	2 6	1 6	1	6 6 5	7 7 5	9 16 6
12	15 14 1 0	2 6	1 6	1	4 14 3	5 9 0	6 5 4
9	11 14 3 12	2 6	1 6	1	3 10 1	4 1 10	5 9 1
6	8 0 1 16	2 6	1 6	1	2 8 0	2 16 0	3 14 8
5	6 15 0 0	2 6	1 6	1	1 13 9	2 0 6	2 13 10
4	4 16 2 2	2 6	1 6	1	1 4 0	1 8 9	1 18 4
3	2 17 3 12	2 6	1 6	1	0 14 0	0 16 9	
2	1 19 0 20	2 6	1 6	1	0 10 0	0 12 0	
1	0 19 0 32	2 6	1 6	1	0 4 9	0 6 9	

* The cost in the kiln includes drying by artificial heat and manipulation. The larger tile requires more than a proportionate share of labour and care as compared with the weight of clay used.

Tiles for town drainage will require extra care and additional labour in making them. The clay should be washed, and the half-dried tile may with great advantage be compressed on a mandril, so as to ensure a smooth surface and truth of form: more economy than is usually practised may also be adopted in the sheds and kilns for drying and burning.

Hollow Bricks.—The same machinery employed to make drain-tiles may be used for making hollow bricks, as proposed by Edwin Chadwick, Esq. These may be used in cottage-building with many peculiar and superior advantages.

1st. They are cheaper than solid bricks, less absorbent of wet, and, by containing a body of air, less liable to damp if used in floors, house-walls, partitions, ceilings, or roofs. They may be used in conservatories and garden-walls with great economy of heat.

2nd. They may be glazed, as in pottery-ware, for internal walls, to supersede the use of plaster, or they may have colours burnt upon the surface, so as to be capable of producing cheap chromatic ornament.

3rd. As being superior to stone and common brick constructions,—

"In preventing the passage of humidity, and being drier.

"In preventing the passage of heat in summer, and the loss of heat in winter.

"In being a security against fire if used in chamber floors and roofs.

"In having less unnecessary material, and being lighter for carriage to distances.

"In being better dried, harder burned, and stronger.

"In being more cleanly.

"In being cheaper."

Comparative Cost of Hollow Tiles and Solid Bricks.—Hollow tiles, 9 inches square and 2 feet each in length, will do fifteen times the quantity of work of common bricks, with about one-fifth the weight, and consequently the cost of carriage would be reduced nearly in this proportion.

	£.	*s.*	*d.*	£.	*s.*	*d.*
15,000 common bricks, at per 1000	1	4	0	18	0	0
1,000 hollow tiles, 9 inches square and 2 feet long each, say. . .	7	10	0	7	10	0
In favour of tile				10	10	0

Hollow bricks can be used in many forms of improved construction; they may form an internal lining to rubble stone walls, in place of timber battens, so liable to rot and decay; combined with iron, wrought or cast, they may form ceilings and floors, perfectly fireproof, and afford the best means for ventilation.

COTTAGES AND ALLOTMENTS.—The naturally beautiful situation of Alnwick is much heightened in appearance by some cottage and allotment gardens on the outskirts cultivated by the inhabitants, and also by the neat appearance of several improved cottages in the suburbs erected for the labourers on the Duke of Northumberland's property. Near Howick Earl Grey has also reconstructed many of the labourers' cottages on his estates, and others are in progress. Perhaps there is not a more wretched or miserable sight in the world than the external and internal appearance of the labourer's cottage in some of the agricultural districts of England, where they have originally been ill-built, and for long periods have been allowed, through utter neglect, to fall into ruinous decay. And there certainly is no pleasanter sight in a landscape than a neat cottage in a well-cultivated garden, such as those near Alnwick and Howick. The majestic castle of the princely landlord can have no more graceful or appropriate addition to its stately grandeur; the lofty battlements and time-honoured walls receive new dignity by the humble companionship of the lowly dwelling, decent, warm, and comfortable within, and externally adding beauty to the landscape and fragrance to the air, from its rose and honeysuckle covered porch.

The following return relative to the number and mode of letting the allotments was handed to me during the inquiry:—

"In the years 1847 and 1848 his Grace the Duke of Northumberland caused three fields to be laid out into allotments for the benefit of the working men in the town of Alnwick.

"The fields are conveniently situated on the east, the west, and north-west of the town; there are 231 of these allotments, of $\frac{1}{10}$ of an acre each. The conditions on which they are held are that the allottee shall be a person of good character, that 6*s.* 3*d.* annual rent shall be paid, and that the cultivation shall be by the spade.

"The management of the whole has been intrusted to Messrs. T. Robertson, John Bradley, and Thos. Dixon.

"In these allotments kitchen vegetables have been chiefly grown; in most of them a small portion has been laid out with flowers; they have had a marked beneficial effect, not only increasing the comforts of the allottees, but also improving their habits. It has been calculated that after paying for rent and seeds each allotment has yielded an annual profit of about 3*l.*, and in some cases the profit has been much greater. Many of the allotments have been cultivated in a superior manner and yielded large crops.

"An association for the mutual protection of the property has been formed by the allottees.

(Signed) "THOMAS ROBERTSON.

"To Robert Rawlinson, Esq."

Reasons for recommending the application of the Act to the whole Union.

RECAPITULATION.—The townships of Alnwick and Canongate, containing a population of about 6000, having petitioned your Honourable Board to cause inquiry to be made, to the intent that the Public Health Act should be applied to these townships, as previously stated, I entered upon the inquiry on the 24th day of October, 1849. After an examination of the district I conceived the idea of recommending the application of the Act to the union, and at once consulted with several gentlemen intimately acquainted with the district, who in a measure confirmed the view taken. The agent of the Duke of Northumberland, Hugh Taylor, Esq., waited upon me relative to the subject, and stated "that his Grace was favourable to improvement, but that it was necessary to a final decision of approval or otherwise, as to the extended application of the Act, to wait the publication of this Report." The Right Hon. the Earl Grey was also consulted on the subject, and, so far as the proposal was explained, his Lordship approved of the view taken.

The town of Alnwick is situated near the centre of the union, on the south bank of the river Aln. The union is about 17 miles in length north and south, by 13 miles in breadth east and west. The German Ocean forms the boundary to the east by a line of coast about 16 miles in length. The entire area of the union is 93,025 acres, the annual value of which is 125,360*l.* 17*s.* 8*d.* The whole population is at present about 20,000. The union contains 62 parishes and townships, and 71 surveyors of highways are appointed annually. The town of Alnwick is not so healthy as from its favourable position it ought to be, the average of deaths for the last 7 years having been 26·5 in the thousand: in healthy districts there are not more than 11 deaths annually in the thousand. The recent terrible outbreak of cholera indicates the extreme danger to the inhabitants from the present state of the town, and the great loss suffered by the ratepayers generally, when endemic, epidemic, or contagious diseases prevail; the actual direct money loss to the town and union in October and November, from cholera alone, having been near 2000*l.*, the prospective loss from premature death and pauperism being much greater.

The several villages throughout the union are not so healthy as it is reasonable to expect they may be made; fever is common in many of them, as detailed in Appendix A. Cholera occurred in Amble and Hauxley; in Boulmer, out of 25 houses, nine deaths took place from cholera.

Alnmouth is a small seaport at the mouth of the Aln; a direct line of railway communication is contemplated, which will most probably add considerably to the population. Amble has

increased within the last few years, in consequence of the expenditure of a large sum of money (under a private Act of Parliament) in the construction of a breakwater to improve the harbour. A railway has just been completed to bring down coal from the northern extremity of the Newcastle coalfield, and a large addition to the town may be anticipated. Boulmer is a fishing village on the coast, very dirty at present, and, though small and most favourably situated, several cases of cholera have recently occurred there.

Want of proper drainage, street and road formation, privy accommodation, and regular cleansing, is felt in all. Several of the villages are rapidly increasing in population; and unless powers for sanitary works and arrangements are obtained, filth and misery will most probably accumulate, the rate of sickness and death increase, and the burden of poor's-rate taxation press heavier upon the ratepayers.

Advantages to be derived by the extended application of the Act.

1st. One properly constituted local Board may with the greatest economy and efficiency manage the work of the union by engaging men of education and practical experience to plan, superintend, and complete the several works as portions of one comprehensive arrangement.

2nd. The separate towns and townships could not, with economy, have each a distinct local Board and separate staff of paid officers; and such villages and towns as would be shut out from partaking of the benefits conferred by the Act must either be brought in subsequently or remain in undrained filth and neglect, suffering a continuance of the attendant disease, death, and actual money loss.

3rd. No village will have to pay rates for the improvement of any other place: the money raised will be wholly expended in such district as shall contribute the rate levied.

4th. The inhabitants of any one section will have no private interest in the work to be performed in any other, neither will there be reason for improper, factious, or unnecessary interference on behalf of the residents in one district with those in the other districts. The local Board will be comprised of representatives from each district, whose duty it will be to see to the particular interest of the ratepayers, as also to that of the whole union.

5th. The several clauses of the Public Health Act have been framed with care to meet such cases; and the manner of raising the money required and levying the rates necessary are most advantageous and equitable, as the following brief analysis of the rating clauses will show:—

The rates leviable under the Public Health Act are, first, public rates, and, second, private rates.

The general district rate may be levied over the whole or part of a

district (ss. 87, 89). Arable, meadow, pasture, and wood land, market-gardens and nursery-grounds, land covered with water, canals, and towing-paths, and land used as a railway, to be assessed upon one-fourth only (s. 88). The general district rate will consist of the expenses of preliminary inquiry, salaries, &c., of local officers and servants, and certain casual expenses; and all such expenses of executing the Act as are not defrayed by means of any other rate, or out of the district fund account (see s. 87). The district fund account will consist of the proceeds arising from the sale of sewage, &c., penalties recoverable by the local Board, and certain other miscellaneous sums received by them.

Special District Rates (s. 86).—Special district rates will be for making, enlarging, altering, or covering sewers (s. 89). This rate will be levied upon either the whole or part of a district, according to circumstances. But those persons only will be liable whose property has been benefited by the expenses in respect of which the rate is made (s. 86).

Water-rate (s. 93).—This rate will be levied for water supplied for the purposes of domestic use, cleanliness, and house drainage (s. 93). Property to be assessed—the premises supplied (s. 93).

The rates for public and private improvements may be spread over any period not exceeding 30 years, but must be so distributed as to pay off the expenses in respect of which the rate is made, together with interest not exceeding 5*l.* per cent., within that period (s. 90).

6th. Estimates will have to be furnished to the ratepayers for all new work undertaken, and before the money can be raised the General Board must be satisfied that such work is well devised, economical, and for the present and permanent advantage of the ratepayers. This is to secure the ratepayer against local incompetency and extravagance, and to furnish at the least cost the best practical information the existing state of scientific knowledge can afford.

The advantages to the landowner and farmer will not be less than those furnished to the inhabitants of the towns, villages, and hamlets.

1st. Perfect land drainage must in a great measure depend upon a good outfall for the surface-water, and this will be provided for at the least cost after a correct survey has been arranged and the district examined by a competent surveyor. Intermediate property may require to be cut through; roads will have to be traversed or crossed; and as the local Board will be competent to undertake this, the interest of all parties may be consulted, and such works may be so laid out and executed as to serve for the draining of several parishes, townships, villages, and estates, as the case may be, any one of which would be unduly oppressed if obliged to forego the necessary improvement or have alone to carry it out.

2nd. Good roads are necessary for the whole community, and to no class will they be more beneficial than to the farmer. They will enable him to bring manure on his land, and to perform all his operations, where wheeled vehicles are used, at the least cost; and,

as a railway has recently been opened through the district, collieries and other works established, the traffic on the roads may reasonably be expected to increase. The annual election of 71 surveyors of highways must in itself be irksome to the farmer, and most disagreeable to those elected. Road-making requires practical experience and knowledge, or the material may be used improperly, and the repairs may be undertaken at unsuitable times. By systematic attention full one-third of the materials wasted on bad roads may be saved, and a better road maintained.

3rd. Neglected and bad roads are more expensive than good ones, as they destroy horse-power or traction (not unfrequently to the extent of 50 per cent.); they wear and break the vehicles moved over them, and these re-act in an aggravated degree upon the road, as each violent rise and fall of a wheel strikes with the force of a rammer, and this blow is given on the weakest part, as the hollows retain water and mud, which rots the road under.

A thorough drainage of roads is of the first importance to their use and wear, and not unfrequently the road-drains may be made the main outlets for the land-drains; useless ditches may be filled in, and greater width for traffic be obtained.

4th. By placing all the roads under one responsible management the ratepayer will have a tangible tribunal of appeal in case any particular district is neglected; and each ratepayer will also have, in the annual election of members for the local Board, a certain control over the expenditure. The annual accounts will be published, and the amount of work done placed against the cost, thereby affording the best means of comparison.

One great advantage to the landowner and farmer will consist in their being enabled to avail themselves of such educated knowledge as the local Board will provide for extensive works of land-drainage, as also for the improvement of the villages and farms. If fever and disease are ascertained to prevail unduly in any locality, throwing claimants on the parish for relief, it will be the duty of the Board to ascertain the reason; and if want of drainage causes liquid filth to stagnate, and in the opinion of the medical officer this tends to produce the disease, means must be taken to remedy such a state of things; and that which no single proprietor could do may be done cheaply, easily, and with singular advantage, by the local Board. House and street drains will not be laid down to run independently into the nearest open ditch, regardless of any ultimate outfall or profitable use of the manure; but a well-devised scheme of drainage will have first to be considered; the branch and house drains may with economy in most cases be taken up to the backs of the houses; the best available fall will be given to the drains, tiles of a proper size and form be used, and the whole drainage conducted to the nearest available outfall, where the refuse may be stored and rendered profitable for agricultural use.

The Public Health Act has especially provided that oppressive charges shall not be made for a water-supply; it must also be "pure" and "proper" for all domestic purposes. Water-works of an expensive class cannot independently be carried out in villages and small towns, but springs and streams may be brought from distances in cheap earthenware conduit-pipes so as to supply with advantage even single farms and small villages. Works of this class may have immediate attention after the residents shall have requested the same from the local Board.

Regular and systematic cleansing is as necessary to health and comfort as works of drainage, and this will be best and most cheaply performed under the direction of one establishment. The native labour of the district may in most cases be employed.

The following short Report on the use of water as a washing and purifying agent in confined courts, yards, passages, and streets, will indicate what may be done with water under pressure in Alnwick:—

A REPORT to the SURVEY COMMITTEE of the Metropolitan Sewers on Street Cleansing by Jets of Water.

IN obedience to the direction of the Survey Committee, I beg to submit a further statement on street cleansing operations, as follows:—

The importance of water as an agent in the improvement and preservation of health being in proportion to the unhealthiness or depressed condition of districts, its application to close courts and densely populated localities, in which a low sanitary condition must obtain, is of primary importance.

For the purpose of ascertaining the effect produced by operations with water upon the atmosphere, two courts were selected—Church-passage, New Compton-street, open at both ends, with a carriage-way in the centre and foot-way on each side, and Lloyd's-court, Crown-street, St. Giles's, a close court, with, at one entrance, a covered passage about 40 feet in length. Both courts were in a very filthy condition; in Church-passage there were dead cats and fish, with offal, straw, and refuse scattered over the surface; at one end an entrance to a private yard was used as a urinal; in every part there were most offensive smells.

Lloyd's-court was in a somewhat similar condition, the covered entrance being used as a general urinal, presenting a disgusting appearance; the whole atmosphere of the court was loaded with highly offensive effluvia; in the covered entrance this was more particularly discernible.

In the cleansing operations the labour and water used, time occupied, and work done are, respectively, in Church-street,—

Number of men employed	3
Time during which cleansing court	5 minutes.
Quantity of water used	90 gallons.
Quantity of work done, in superficial yards	91

In Lloyd's-court,—

Number of men employed	3
Time during which cleansing court	10 minutes.
Quantity of water used	193 gallons.
Quantity of work done, in superficial yards	206

The expense of these operations, including water, would be, for

Church-passage	1½*d.*
Lloyd's-court	3½

The jets used were ⅝ and ¼ of an inch in diameter; the water was at first directed upward so as to present a large surface for the absorption of atmospheric impurities.

The property of water, as an absorbent, was rendered strikingly apparent—a purity and freshness remarkably contrasted to the former close and foul condition immediately prevailing throughout. A test of this was the change, at different periods, in the relative condition of the atmosphere of the courts and of the contiguous streets. In their ordinary condition, as might have been expected, the atmosphere was purer in the streets than in the courts: it was to be inferred that the cleansing would have more nearly assimilated these conditions. This was not only the case, but it was found to have effected a complete change; the atmosphere of the courts at the close of the operations being far fresher and purer than the atmosphere of the streets. The effect produced was, in every respect, satisfactory and complete.

October 18, 1848.

The application of water for cleansing purposes would be much cheaper in Alnwick than in London, as the water and labour would be provided at a less cost.

The Removal of Nuisances Act does not give the power necessary to carry out permanent improvements. It is temporary in its requirements, and not unfrequently has been found irksome and oppressive because it required the removal of a particular nuisance from the place where it was found, though probably the whole had not been generated there.

This Act, as a preliminary measure, has served a most useful purpose; but the Public Health Act will be found much more efficient and cheap.

Remedial Measures and Works proposed.—*Sewerage and Drainage.*—Back drainage should as much as possible be adopted, as affording the cheapest and easiest means of taking away all liquid refuse. Each house, yard, and alley should have its appropriate drain properly trapped; the pipes should be laid at such a depth as will perfectly drain the deepest cellar, and, by introducing a common tile-drain into the same excavation, it will lay dry the foundations of the houses. The house and yard drains should be so laid and constructed as to be impervious to water; they should form a continuous system of water-tight drain-tubes. Proper and sufficient means of ventilation may be afforded by inserting the down-spouts from the houses, and leaving all such untrapped.

The whole sewerage and drainage of the town and district may be accomplished at a cost very much below the usual price paid for the commonest and most imperfect stone or brick sewers. Tile-sewers and tile-pipe drains, the tiles for which may be made

in the immediate neighbourhood, will serve for the entire drainage of Alnwick and the villages and hamlets in the union.

The whole drainage of the town of Alnwick falls at present into the river Aln; to prevent this, an intercepting sewer must be laid parallel with the river, to convey the liquid down in the direction of the stream and, if requisite, out of the castle grounds, to such point as may hereafter be decided upon, where the outfall may be constructed, from which to apply the refuse to agricultural use. Into this main or intercepting sewer the secondary mains will fall, and these again will receive the various branches and minor yard and house drains, forming a complete network of mains and branches. One leading feature must be preserved throughout, which is, that every surface inlet-drain must have its upper opening less than the drain with which it is connected. This arrangement will prevent the secondary branches and main drains from being stopped up, as no solid matter can be inserted from the surface capable of blocking the drains below. Grates will, however, be used over all surface-drains; but if they (the drains) are constructed as described, even the spirit of mischief itself cannot injure the main drainage. If a stoppage does take place, it must be in the individual pipe rising to the surface, and this will tell its own tale, and the amount of repair required will be confined to such single pipe.

The villages and hamlets may be drained in the same manner, and with singular economy.

HOUSE-DRAINS AND WATER-CLOSETS. — As in a complete system of water-supply every house should have a water-tap, so each house and yard should have a drain to take off the refuse. A branch to the sink may be provided with a bent syphon water-trap: into this branch, in many instances, the water from the roof will pass direct, and there should be a separate branch for the surface-drainage and watercloset.

The utility of pipe-sewers of small diameter is fully shown in the accompanying Reports, as also their great economy over the more expensive description of sewer hitherto used:—

REPORT to the Metropolitan Sewers Committee on TUBULAR HOUSE-DRAINS.

October 21, 1848.

ON the 22nd of May, 1848, the owner of an estate, comprising 87 houses, obtained leave of the Court of Sewers to drain the said houses in accordance with a plan laid down for him by the surveyor to the court. The system of house-drainage there carried out is by tubular drains or sewers laid along the *back* of the houses. The work was done by the applicant's builder. As the plan affords a practical illustration of superior economy and efficiency, not only over the system of brick sewers and drains hitherto adopted, but also over pipe-sewers and drains, if laid along the *front* of and *through* the houses, I beg respectfully to report to the court the par-

ticulars of the work, and the expense contrasted with what would have been the cost by either of the plans just mentioned, with the view of showing the vast improvements and saving of expense that really can be effected by the adoption of the plan of *back* drainage as a system.

The houses had been built and inhabited for a number of years, but were in a most filthy condition from the want of drains, as the basement-floors, areas, back yards, and gardens were overflowing with soil-drainage, by reason of the adjacent ground being saturated with it from the numerous cesspools, which were quite full and had therefore become useless. During the progress of the work, two, and in some cases three, cesspools were found in and about each house, varying from 4 to 8 feet in diameter, 10 feet in depth, and containing, on an average, 12 cubic yards of soil; two of them measured 20 feet in length, 16 feet in width, and 10 feet in depth, and contained together 236 cubic yards of soil. 181 cesspools were found altogether, the evaporating surface of which was equal to 10,000 feet, and the quantity of soil contained within them amounted to 2384 cubic yards or single cartloads. This quantity of soil, instead of being bucketed out and carted away in the usual manner, which would have cost at least 1000*l.*, has been washed away, without smell or annoyance, through the main lines of the sewers; a very large quantity of water having been soon afterwards discharged through the same sewers from the canal close by. The whole of the cesspools, excepting one of the large ones, have been filled up with rubbish; and that one, which is situated at the head of the main drain, has been paved, well cemented inside, and made into a water-tank for the purpose of periodically letting off, with a rush, a large body of water through the drains, which, by so doing, can be thoroughly scoured out.

The 87 houses are drained by main drains or sewers of glazed stoneware pipes, carried, as before observed, along the *back* of the houses, the outlet being 12 inches in diameter. Four-inch branch drains, of the same material, lead into the main drains or sewers from all the water-closet pans, area, yard, and kitchen sinks, and rain-water pipes. The main and the branch pipes together measure nearly a mile in length, and the whole of the work, namely, the emptying and filling up of the cesspools, the materials and labour of the drains, sinks, traps, water-closet pans, and the making good of everything disturbed, has been executed at a cost of about 500*l.*, or 5*l.* 15*s.* per house.

If the same property had been drained under the recent system, large brick sewers would have been laid down in *front* of the houses, with 15-inch brick drains (the size required by the late Surrey and Kent Commission) laid into them from the houses, and the cost of the sewers and drains together would have amounted to 2550*l.*, or 29*l.* 6*s.* per house; so that, by the plan of draining with tubes laid along the *back* of the houses, a saving has been effected over the recent system of 2050*l.*, or 23*l.* 11*s.* per house; and if, instead of large brick sewers and drains, 15-inch pipe-sewers had been put down in *front* of the houses, with separate 4-inch pipe-drains laid into them from each house, the expense in this case would have been 1150*l.*, or 13*l.* 6*s.* 8*d.* per house, being an excess of 650*l.*, or 7*l.* 11*s.* 8*d.* per house, over the plan of *back* drainage as executed.

The pipe-drains put down have kept clear of deposit, are as clear

now as when they were laid, and not the least unpleasant smell escapes from them, as the liquid refuse and soil flow away as fast as produced, by reason of the small drains concentrating the currents, and so causing them to run with greater velocity and to act with greater force; and, on the whole, the property has been very much improved, both as regards healthiness and value, by the execution of these drainage works.

The sewers and drains proposed for use in Alnwick would cost much less than the price at which the material and labour are charged in this Report. The tiles will not cost so much, and be equally effective.

Detailed estimates have been made out for soil-pan apparatus and drains in other places, and the works have been executed, including soil-pan watercloset, for a first cost of 2*l.* 10*s.* to each house; or at 7 per cent. an annual charge of 3*s.* 9*d.*, or less than 1*d.* a-week: this is irrespective of any advantage arising from the use of the refuse as manure.

DIMENSIONS and Price of Egg-shaped Tile Sewers and Drains as laid down in Manchester, by Mr. J. Francis, C.E.

Table of Sewers and Drains.

Description.	Dimensions, inside Measure.	Price per Lineal Yard.	Remarks.
	In. In.	*s.* *d.*	
Main sewers . .	25 by 18	12 0	The tiles are set with butt-joints at depths varying from 8 to 12 feet in open cuttings, others have been set in tunnelled headings.
,, ,, . .	20 15	10 6	
,, ,, . .	16 12	7 9	
,, ,, . .	12 9	6 0	
Branch drains .	8 6	4 0	Tiles laid more than 4 feet deep.
,, ,, .	6 4	3 6	
,, ,, .	12 9	3 3	Not 4 feet deep.
,, ,, .	8 6	2 9	
,, ,, .	6 4	2 3	
,, ,, .	4 2½	2 1	

NOTE.—The prices include the cost of tile, excavating, and laying complete, as also nightwatching during the time the excavation is open, carting away the superfluous material, &c. The only addition, or extra, to the prices is an allowance for "blank eyes;" that is, shafts which are sunk to the depth at which the sewer is to be laid for the purpose of tunnelling, and only for those not to be used as man-holes or junctions of cross-drains. These extra eyes or shafts cost from 2*s.* 6*d.* to 3*s.* per lineal yard, and may add about 6*d.* per lineal yard to the cost of the main drains.

In a letter dated Manchester, November 29, 1849, Mr. Francis states,—

"Our Council have not yet begun the work of removing cesspools and substituting waterclosets, but they have made many drains for the overflow from them, the fluid being discharged from the cesspools through a close-barred 9-inch "grid" (grate), the bars only ½ of an inch apart. It is now three years since we first began to use tile-tubes; and besides the egg-shaped tiles, round tiles 9-inch and 6-inch internal diameter, of Staffordshire blue glazed ware, have been used, and up to this time we have not had one instance of failure from any cause, either from the giving way of a tube or from its becoming blocked up. The common bent, or syphon, trap is in most cases used."

Most of the tiles used in Manchester have been brought from distant kilns, Staffordshire for instance. The manufacture is new, and the price charged is excessive, as compared with prices for which common field drain-tiles are made, namely, 5*l.* 10*s.* for 1000 lineal feet of tiles, 6 inches internal diameter, or rather more than 1¼*d.* each lineal foot. Tiles of this size for town-drains are charged at present 9*d.* and 6*d.* each foot. All that is required to make the common land-drain tile fit for town purposes is more care in the preparation of the clay, more labour in preparing them for the kiln, and more perfect burning. Improved machines will make the tiles of a better quality at little extra cost, and improved drying sheds and kilns will dry and burn them at a considerable saving on the present cost. The best 6-inch tiles may be made in large quantities for 2*d.* each lineal foot, or at a price one-third or one-fourth less than present charges. Other sizes will also be reduced in price in the same proportion.

One great source of economy is anticipated from large demand, and the employment of skilled labour properly directed. The egg-shaped tiles may be made for sizes above 18 inches diameter; but all under should be circular. They will be more cheaply moulded, and more readily laid. Much of the work may be done for the local boards by contract.

Under my direction a street has recently been drained at Bury, in Lancashire, with egg-shaped tiles, 12 inches by 9 inches, at a cost, laid complete, of 3*s.* 6*d.* each lineal yard; and house-drains, 6 inches and 4 inches internal diameter, have been laid down complete, including traps, at an average of 1*s.* 6*d.* each lineal yard. These prices include the tiles, excavation, laying, and making the ground good. The average first cost upon each house drained was 12*s.* 6*d.*, or, if paid for at a rent-charge, the sum would be about 9*d.* a-year.

Room-Tenements and common Lodging-houses. — In dealing with the evils attendant upon these places as they at present exist, mere rules and regulations will be of little avail unless active measures are adopted to provide better accommodation for the poor whom the law will turn out from all rooms and dwellings not in accordance with the requirements of the Act; and it will be a subject for the serious consideration of the local Board as to whether they should not provide model cottages and model lodging-houses in the first instance, not on mere charitable considerations, but as a source of reasonable income, and to set an example in the neighbourhood, by showing that the poorest dwelling may be provided with all the means of comfort and health, and at the same time yield a profitable income as an investment, and directly and indirectly relieve the poor's-rates. Constructions such as the model houses for families and the model lodging-houses in London may be adapted to the situation and requirements of the

people. After these, baths and washhouses may be constructed, and museums and libraries be established for public use.*

SLAUGHTER-HOUSES.—The removal of slaughter-houses from crowded localities is most desirable, and in all well-regulated towns this will be accomplished. By sec. 62, the "local Board may provide slaughter-houses, and make bye-laws with respect to all slaughter-houses." Sec. 61 enacts that "slaughter-houses be registered." All slaughter-houses will require to be perfectly drained, and to be provided with a full supply of water on the premises.

1st. In each slaughter-house there should be means of thorough ventilation provided at the ceiling or highest part of the roof. A slit-like opening round the whole room, or louvers, afford the best means of free and perfect ventilation, as by such arrangement the outlet will be diffuse. Windows in side walls or square openings in the ceiling or roof do not act so freely or efficiently as a narrow opening continued round the room, and placed as high as practicable.

2nd. The floors should be paved with material impervious to wet, or with such as would be easily washed; there should be no open joints or rough inequalities on the surface. Asphalte will make a floor impervious to wet; and fire-bricks on edge, set in cement, or hydraulic mortar, will probably make the best floor which can be laid down, as the surface may be washed perfectly clean, and the bricks will not wear slippery beneath the feet of the cattle.

3rd. The lower portion of the room may, with much advantage, be lined with fire-bricks set in cement, or good mortar, and jointed with the best cement. This surface should not be plastered, but finished so as to allow of its being washed with the floor. The walls should be frequently washed, and all the upper portions of the slaughter-house be limewashed occasionally. In the construction of slaughter-houses, every portion of their structure which is liable to come into contact with the meat should be of such material as will easily wash.

4th. All refuse should be removed from the premises at short intervals. In no instance should any portion of the manure, offal, blood, or refuse of any kind, remain longer than two days; but their removal at shorter intervals will benefit alike the butcher and the public.

5th. Cesspools or covered middens should not in any instance be allowed, where liquid and solid refuse, though covered from sight, would be not less injurious in its action.

* A cheap work on the dwellings of the labouring classes has recently been published by Henry Roberts, F.S.A., which contains much valuable information on this most important subject.

Properly ventilated, cleansed, and regulated slaughter-houses will be of the utmost advantage and value to the butcher, as the slightest taint of corruption generates corruption, and gaseous emanations from decaying animal and vegetable refuse are most injurious to life, and rapidly taint fresh meat.

PROPOSED WATER SUPPLY FOR ALNWICK. — *Water-Works* may be established for the benefit of the town by the construction of a reservoir to impound the spring-water at present flowing to waste from Ayden Forest. At a point above the tile-works an embankment may be thrown across the valley so as to form a reservoir which shall impound the springs issuing above such embankment, and also the rainfall of the district, or as much as may be made available for the purpose. The site is naturally most favourable for the construction of a reservoir, and the quantity of available water which may be impounded is far more than the population of Alnwick will require. The elevation of the reservoir will also be sufficient to force the water from the mains over any house in the town. An average annual rainfall of 20 inches may safely be calculated upon, and from an area of 300 acres this will yield 136,125,000 gallons, at about 94 gallons to the square yard: 6000 persons, at 20 gallons per head a-day, = 120,000 gallons, or nearly 44,000,000 gallons annually; so that, if 300 acres be made available, there would be a surplus of upwards of 92,000,000 gallons annually. Should it hereafter be deemed advisable to construct the reservoir larger than the actual supply of the town will require, the surplus water may be used as power for the advantage of the inhabitants, or for irrigation.

Water under high pressure may be used for many mechanical purposes with great advantage; and by such mode of applying any surplus the rate may be reduced to the inhabitants generally.

WATER SUPPLY TO THE VILLAGES AND HAMLETS.—I am not at present prepared with specific plans of water-supply for these several places, as it would have been impossible during the preliminary inquiry to have devoted the time which it would have necessarily occupied to make myself acquainted with each district. As previously stated, small places cannot be supplied if the necessary works are to be costly and the management expensive; but even single houses may have their own water-works with economy and advantage, as at Howick, where Lord Grey has erected a hydraulic ram. Under the advice and direction of an engineer, each village may have a cheap, simple, and effective water-supply. Pumps and wells are always expensive means of house-supply, and water so obtained is generally hard, and, consequently, in itself, most expensive, because wasteful of soap, tea, &c., and in washing it is destructive of clothes.

Professor Playfair has estimated the difference in cost of water

of 16° of hardness over one of 4° of hardness to be 4*s.* a-year to each person. In a family of five persons this would be 1*l.* a-year to each house, or five times the amount of a proper and abundant supply, as given in Preston, Carlisle, and other towns.

When the individual cost of a private supply of water is contrasted with the paying charges made by some public companies, the economy and advantage of the one over the other will be very apparent. To sink a well, erect a pump, and maintain the apparatus in working order, will cost as under, varying slightly, of course, with circumstances:—

	£.	*s.*	*d.*
Sinking well, say	7	0	0
Pump complete	3	0	0
First cost	£10	0	0
Interest on 10*l.* at 5*l.* per cent per annum	0	10	0
Cost of annual repairs to pump, say	0	5	0
Labour of pumping water, and wear and breakage of utensils, say	0	15	0
Per annum	£1	10	0

Thus 1*l.* 10*s.* sterling will be either directly or indirectly incurred for a water-supply, if obtained from pumps; in many instances the annual cost is much more than the sum named, as a deep well and pump will cost from 20*l.* to 50*l.* in some situations, and the annual expenses vary from the above-named cost to 5*l.* This mode of supply excludes every public advantage; and, if entirely relied upon, creates many nuisances.

From the actual working experience of several towns where the whole water-supply is raised by steam-power, it has been ascertained that a full supply, at constant high pressure, can be given to each cottage at prices varying from 1*d.* to 1½*d.* a-week, or at an annual charge not exceeding 6*s.*, and may be 4*s.*—a cost several times less than the cheapest form of pump, as shown by the estimate. But apart from the cost, one of the most important advantages conferred by a well-regulated general supply is the superior quality and purity of the water. Few private wells sunk into a subsoil covered with dwelling-houses yield wholesome water. When analysed by the chemist, it is found to be contaminated. The transparency of a water is no test of its purity, as many which are sparkling and transparent contain both solid and gaseous impurities.

ANALYSIS of the WATER of the Thorntree Well on Alnwick Moor, by Mr. JAMES RICHARDSON, of Newcastle, Chemist.

Constituent Parts in an Imperial Gallon.

	Grains.
Chloride sodium	2·19
Chloride potassium	trace.
Chloride calcium	·55
Sulphate lime	·70
Carbonate lime	·49
Carbonate magnesia	·88
Oxide iron	trace.
Alumina and silica	·16
Organic matter	1·16
Total fixed constituents	6·13
Carbonic acid	3·42
Specific gravity	1·00019

SPECIMENS OF WATER ANALYSED BY DR. LYON PLAYFAIR.

No. 1.—*Alnwick.—Clayport, St. Michael's] Pant.—Present Supply.*

Day when water taken	10th of November, 1849.
Time of day	7 o'clock A.M.
State of weather	Dull, but fair.
Temperature of air	52° Fahrenheit.
Temperature of water	47° Fahrenheit.

There had been occasional showers during the last few days, but not much rain had fallen.

Degrees of hardness 34.

No. 2.—*Alnwick, Ayden Forest.—Proposed Supply.*

Day when water taken	10th of November, 1849.
Time of day	8 o'clock A.M.
State of weather	Dull, but fair—windy.
Temperature of air	50° Fahrenheit.
Temperature of water	48° 5′ Fahrenheit.

There had been occasional showers during the last few days, but not much rain had fallen.

Degrees of hardness 6·7.

Abstract of Analysis.

Water No. 1	34·0
„ No. 2	6·7
In excess	27·3 of proposed supply.

One hundred gallons of water of 34° hardness will require 74 oz. of soap to wash with. One hundred gallons of water of 6°·7 hardness will require 15 oz., as under :—

	Hardness.	Oz. of curd soap to form a lather.
100 gallons of	34·0	74
100 „	6·7	15
Excess of hardness	27·3	59 waste of soap ;

or a waste of 3 lbs. 11 oz. of soap to each 100 gallons of the harder water now supplied by this pant, which at 5*d.* a lb. will be rather more than 1*s.* 6½*d.** The use of this softer water for washing alone will more than save the whole water-rent proposed to be charged, and such would be the result from the use of soft water throughout the union.

At the same time that the works for the water-supply of Alnwick are carried out, the deep drainage of the moor may be forwarded. And if this work could be accomplished under the powers of the local Board (with the consent of the parties interested in it) for the benefit of the town, the source of the water-supply would be improved, the land, at present in a great measure waste, be turned into value, and the whole community be benefited.

ESTIMATES, ALNWICK.

Water Supply for Alnwick.

	£.	*s.*	*d.*
Proposed expenditure	3500	0	0
Annual Income :—			
House supply	350	0	0
Large consumers	150	0	0
	500	0	0
Anuual working expenses :—			
Working expenses, management, &c.	150	0	0
Sewerage.			
Intercepting main and tanks complete	1200	0	0
Sub-mains and branches complete	1500	0	0
Gully-grates and traps	100	0	0
	2800	0	0
Contingencies	200	0	0
Total for sewerage	£3000	0	0

* The water from the proposed reservoir will most probably not be more than 2 or 3 degrees of hardness, and will in this proportion be less expensive in use.

Abstract of Expenditure and Income.

Expenditure.				Income.			
Water-works . .	£3500	0	0	Water-works . . .	£500	0	0
Sewerage, &c. . .	3000	0	0	Deduct working expenses	150	0	
Total . .	£6500	0	0	Net income .	350	0	0
				Deduct annual interest upon 6500*l.* at 5 per cent.	325	0	0
				Balance	£25	0	0
Annual instalment to provide a fund to maintain the works and pay off the debt in 30 years					150	0	0
Deduct balance					25	0	0
				To be provided by a public sewer-rate . . .	£125	0	0

NOTE.—The establishment charge would be spread over the whole union, and will not in the first instance exceed one penny in the pound, to be reduced as the works are brought into operation.

The property of the refuse obtained from the drainage will be vested in the local Board; and from the ascertained value of this as manure, it is reasonable to expect that not only will the whole of this sum be provided for out of the income made by the sale of the manure, but that there will be an annual surplus which may be used for the improvement of the towns, villages, and farms.

RECOMMENDATIONS.—*Boundaries for the purposes of the Act.*—For the reasons set forth in this Report, I beg respectfully to propose that the entire union of Alnwick be brought under the provisions of the Public Health Act, and included under the management of one local Board.

1st. That an educated and efficient establishment may be provided at the cheapest cost for the whole district.

2nd. That facility may be given for land-drainage; that the roads may be properly repaired; and that sanitary works may be carried out in such manner as shall tend to reduce the poor-rates.

3rd. That the refuse of the towns and villages may be, with benefit to all parties, rendered available to the uses of agriculture.

To accomplish these things the following constitution of the *local Board is recommended for the union:*—

For the purposes of the election the union may be divided into five sub-districts, to be respectively called by the name given in the accompanying table, each sub-district to comprise the townships and places enumerated, and to return the number of members set down.

The clerk to the Board of Guardians to be the first returning officer.

Qualifications of Members of Local Board.—That every person shall, at the time of his election as member of the said local Board, and so long as he shall continue in office by virtue of such election, be resident, as in the said Public Health Act, 1848, is required, and be seised and possessed of real or personal estate, or both, to the value or amount of not less than 800*l.*, or shall be so resident and rated to the relief of the poor of some parish, township, or place, of which some part is within the said district, upon an annual value of not less than 25*l.*

The election to take place on the Monday after the 25th day of March in each year.

One-third of the members elected by each sub-district to retire annually, and a new election to take place on the day named, as prescribed by the Act.

The same person may be a guardian of the poor and a member of the local Board at the same time, if separately elected by the ratepayers.

List of Sub-districts and Members to be elected by each District.

Name of Sub-District.	Townships and Places comprised in the Sub-District.	Number of Members to be elected.	Population.
Alnwick . .	Parish of Alnwick and township of Bassington.	12	6,637
Glanton . .	Townships of Glanton, Shawdon, Edlingham, Abberwick, Bolton, Broome Park, Learchild, Lemmington, Eglingham, Beanley, Crawley, Ditchburn, Harehope, Hedgeley, Shipley, Titlington.	3	2,220
Embleton .	The townships of Embleton, Broxfield, Brunton, Craster, Dunstan, Falloden, Doxford, Newton-by-the-Sea, Rennington, Rock, Stamford, Longhoughton, Littlehoughton, Boulmer, Howick, North Charlton, South Charlton.	3	3,526
Warkworth .	The townships of Warkworth, Acklington, Acklington Park, Amble, Birling, Brotherwick, High Buston, Low Buston, Glosterhill, Guyzance, Hauxley, Morwick, Sturton Grange, Togston, Walkmill, Lesbury, Alnmouth.	6	4,155
Felton . .	The townships of Felton, Acton and Old Felton, Elyhaugh, Greens and Glantlees, Swarland, Shilbottle, Hazon and Hartlaw, Newton-on-the-Moor, Woodhouse, Whittle.	3	2,037
	Total number of local Board .	27	18,575

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS.—As the result of my examination of the town and union of Alnwick, I beg respectfully to lay the following summary before your Honourable Board for consideration:—

1. That the town is not so healthy as it may be, on account of ill-paved, badly constructed, and undrained streets, imperfect privy accommodation, crowded courts and houses, and large exposed middens and cesspools; that many of the villages and hamlets in the union have, in proportion, similar evils; and that no adequate powers for effective local government at present exist.

2. That excess of disease has been distinctly traced to the undrained and crowded districts, to deficient ventilation, and to the absence of a full water-supply, and of sewers and drains generally.

3. That the condition of the inhabitants would be improved, their comforts increased, and the rates reduced—

i. By a perfect system of street, court, yard, and house drainage.

ii. By a constant and cheap supply of pure water under pressure, laid on to every house and yard, to the entire superseding of all local wells and pumps, which are proved to be expensive.

iii. By the substitution of waterclosets or soilpan apparatus for the more expensive and noxious privies and cesspools which exist, and by a regular and systematic removal of all solid refuse at short intervals.

iv. By properly paved courts and passages, and by a regular system of washing and cleansing all courts, passages, slaughterhouses, footpaths, and surface-channels in the towns and villages, and by maintaining good roads throughout the district.

4. That these improvements may be realized for the estimates given, and, if the works are managed with economy, they may be made not only self-supporting, but a source of income.

5. That the direct charges stated will be the means of a direct and indirect saving to the inhabitants generally, but to the labouring man especially, of many times the amount to be paid.

6. That the outlay will not be burthensome or oppressive to any class of the community, as the capital required may be raised by loan, and the interest upon it reduced to an annual or weekly rent-charge.

The Public Health Act is, therefore, not only necessary, but it will be of the greatest advantage to the ratepayers; and, with the exception of section 50, I beg respectfully to recommend that it may be applied at the earliest period to the entire Union.

I have the honour to be,
My Lords and Gentlemen,
Your obedient servant,

The General Board of Health, ROBERT RAWLINSON.
&c. &c. &c.

Appendix (A).

The information contained in this Appendix was furnished to me during the inquiry by Mr. William John Carr, clerk to the Board of Guardians, after I had intimated a wish to recommend the application of the Act to the union. The number of nuisances reported to the guardians will show that some form of permanent work is necessary in the villages, and all experience is favourable to a judicious consolidation of power and knowledge, especially where works of a similar character require to be repeated. And in house-drainage a man of practical experience will lay down more cheaply the necessary tile-drains and traps than could be accomplished by the uneducated labour of any single village.

Report on the Villages in the Union, with Remarks and Observations.

The application of the Public Health Act to the townships of Alnwick and Canongate (from whence the petition has been sent) will be of great benefit to those places; but if it is limited to them, its utility will be much narrowed, whereas its extension to the whole of the Alnwick union (of which these townships form part) will be productive of incalculable benefit.

Besides the town of Alnwick, the union contains several villages; some of which would be greatly benefited by a well-directed system of sewerage and a supply of water, and by the supervision of a local Board of Health. This will appear from the following account of the measures taken by the guardians of the union to enforce the sanitary provisions of the Nuisances Removal Act of 1848.

Immediately after the passing of that Act the guardians caused handbills to be distributed to every house in the union, acquainting the occupiers with its provisions, enjoining attention to them, and expressing the determination of the guardians to enforce them whenever the necessity arose. They also caused their medical and relieving officers to make inspections of the several houses and yards, in conjunction with police officers, and from time to time to report the result of their visits to the guardians. Much was done in cleansing and in the removal of pigsties voluntarily by the inhabitants, but much more was left undone. When it was found that no attention was paid to remonstrances of the officers of the union and police officers, prosecutions under the Nuisances Act were instituted, and under the orders of the magistrates the causes of complaint were removed. For a time these proceedings had a good effect, but they were quickly forgotten, and the places once made clean and wholesome soon again became as filthy as before. These proceedings were attended with an expense to the union of 78*l.* 8*s.* 6*d.*, and of 34*l.* 17*s.* to the parties proceeded against, making a total of 113*l.* 5*s.* 6*d.* To recur to legal proceedings as often as the necessity required would have entailed a very considerable expense, without the root of the evil being affected. The evil lies in the want of proper convenience for the removal of the offal of the houses, and cannot be remedied under the provisions of

the Nuisances Removal Act. The occupiers may be harassed by repeated prosecutions, the ratepayers put to considerable expense in doing so, still no permanent good is effected. If the landlord is willing, which in the generality of cases he is, to improve the condition of the houses, the first question he asks is, "What am I to do with the liquid bred upon my property? If I make house-drains, I must open them to the street."

The only way, therefore, of providing for the cleanliness, comfort, and consequent health of the inhabitants of the villages, is to give them as far as practicable the benefits of the provisions of the Public Health Act. This may be done by including them within the boundaries of towns within which the Act is or may be applied; that is, by making the district of a local board coextensive with the Poor Law union.

A short account of the principal villages in this union will show the necessity there exists of some further provision being made for facilitating in villages the removal of nuisances and prevention of disease.

Felton is situated on the old North Road, leading from London to Edinburgh. It consists of one street upon a hill sloping to the river Coquet, and is inhabited chiefly by tradesmen and artificers. It contains 99 inhabited houses, and a population of 623.

During the latter part of 1848, 19 houses were reported to the guardians to be in a state injurious to health from filth. The principal grounds of complaint were—the construction of improper privies, the accumulation of filth in the ashpits, and middens and pigsties.

In March, 1849, 33 cases of nuisances of a similar character were reported, and on the 11th of October, 1849, 12 cases were reported. One privy was said to be used by nine several families.

Diarrhœa has been very prevalent in the village and surrounding district.

Warkworth is also situated on the banks of the Coquet, about two miles from the sea. The inhabitants follow similar occupations to those in Felton. The inhabited houses amount to 100, and the population to 785.

During the early part of this year 17 houses were reported as containing nuisances injurious to health, and several prosecutions have taken place. The inhabitants, sensible of the value of a sewer, have lately had one constructed from a fund raised by subscription.

Several cases of diarrhœa have occurred here lately. It was reported there were in one property "piggeries and a privy in a filthy state, the privy close to the foot-road, and the liquid filth oozing out underneath it in a shameful state; this is the third time this property has been complained of." In another, "a very confined yard, no ashpit or privy. The whole of the filth thrown into a corner, only nine feet from the tenant's door—very injurious to health."

Amble.—This village is situated about a mile from Warkworth. In 1841 it contained 140 houses and a population of 724. But since then several new houses have been erected, and the population is much increased, perhaps doubled. Many of the inhabitants are labourers finding employment at the works of a harbour in the course of building there. 23 houses have been reported as containing nuisances, and other complaints are continually being made. Diarrhœa has been very prevalent, and three cases of cholera have been reported.

In a recent Report on Amble it is stated of one property—"The whole of the filth is thrown down at the back door, no drain to carry it away, very injurious to health." Of another—"The whole of the filth thrown in front of the houses, and no drain; in a very filthy state." Of another—"The filth thrown upon the road in front of the houses, there being no drain; in a filthy state, and very injurious to health." Of another—"An accumulation of filth from the killing-house; pigsty and stagnant water in the yard; also a large pot of offal boiled once a-week, and the effluvia arising therefrom very injurious to health, and seriously complained of by Mr. Wake, chemist."

Hauxley is a small village near to Amble, occupied chiefly by fishermen and pitmen. Population in 1841, 457. It contained 152 tenements. Several of them have lately been built for the use of the pitmen, but not one privy. Many complaints have been made, in consequence of the want of proper conveniences to the houses, and of a want of drainage.

The medical officer of the district reports—"That in Warkworth, Amble, and Hauxley, he has, since the 24th of August last, treated three cases of cholera which terminated fatally, and 138 cases of cholera and diarrhœa which have terminated favourably. There were several other cases, attended by other medical gentlemen, of which he has no account."

Alnmouth is situated on the coast, at the mouth of the river Aln. In 1841 it contained 96 houses, with a population of 480, chiefly fishermen. It has a high and airy situation, upon a promontory between the river and the sea, but the houses are in general very filthy; large accumulations of filth are kept in the back lanes. After all the cleansing which the officers could procure voluntarily, there were only six cases which required to be dealt with under the Act.

Lesbury is inhabited by farmers and their labourers. Several of the cottages have lately been rebuilt, and it does not appear from the reports of the officers that many cases of nuisances were found. Population in 1841, 404. It now contains 120 houses, with a population of about 600.

Shilbottle is inhabited almost exclusively by pitmen, and, previously to the sanitary measures adopted by the guardians, was in a very filthy state. The number of houses it contains is about 90, and the population 549. After all the pacific measures the officers could adopt, without effect, they reported 22 houses containing nuisances. These, however, were removed after the first steps of judicial proceedings were taken. The village has lately undergone another cleansing, in consequence of the appearance of cholera at Alnwick.

Boulmer is a small fishing village on the coast. It contains 25 houses, with a population of 153. In August last the cholera broke out there, and 8 or 9 deaths occurred; "which," the medical officer reported, "I attribute, in a great measure, to the unwholesome condition of the dwellings from a want of proper ventilation."

Longhoughton contains 103 houses, with a population of 483, exclusively agricultural. 19 cases of nuisances have been reported to the guardians, and in June last 5 cases.

Embleton is situated near the sea-coast. It contains 120 houses,

and has a population of 525. The village is irregularly built and dirty. On one occasion the medical officer had to attend a woman in child-birth in a lodging-house in the village; he reported, "The case was one of extreme difficulty and danger. For three hours I had to lie upon the mud floor, there being only one chair in the room, although in it there were four beds all upon the ground, and no fewer than 12 persons, women and children, living in it. The room had no window, and the door had to be kept constantly open to prevent suffocation from the smoke of the fire."

The medical officer also reports—"There is a great want of proper places for the reception of ashes and other refuse. 24 cottages have been built in the village within the last three years, and yet there is not a single privy or ashpit. The same remark applies to the village of

"*Newton-by-the-Sea.*—The filth and other refuse have accumulated in the square, till it is several feet above the level of the foundations of the houses, so that in wet weather the cottages in the south-west corner are rendered almost uninhabitable. Population in 1841, 282.

"At *Craster Sea-houses* the dwellings are all clean; there are upwards of 20 cottages, and yet there is not a single privy attached to them. There is a common ashpit in the centre of the square, certainly not the fittest place for it, so far as the health of the inhabitants is concerned."

Glanton contains 125 houses, and a population of 592. Its situation is high and airy, but frequent complaints are made of some nuisances from privies and middens. Some of the houses are supplied by means of pipes with water, and this is the only village in the union which has such a convenience.

The smaller villages of Newton-on-the-Moor, Acklington, Craster, Howick, Newton-by-the-Sea, Remington, Rock, North Charlton, Eglingham, Beanley, and Edlingham, do not require to be separately described. All would be much improved by having some of the provisions of the Public Health Act applied to them. In the agricultural villages almost all the cottage-rooms are divided into two portions by a bed enclosed in a box. The smaller portion is occupied during the winter by the cottager's cow, and the larger one by the family. The floors are chiefly of mud. The ground in front of the houses is generally occupied by a middenstead—privies are rare. Much has been done of late by the Duke of Northumberland, Earl Grey, and other landowners, to improve the cottage-houses of the farm-labourers employed on their several estates, but much more requires to be done. There are few of the cottages which might not, at a small expense, have good water brought into them, or brought for use to a convenient part of the village. All the villages would be improved by drainage, and the sewage-water might be profitably applied to the land.

To pay in one sum the expense attending permanent improvements might reasonably be objected to by the freeholders in those villages which are divided into several freeholds, and perhaps by the sole or chief owner of those villages which are entailed; but if the Public Health Act were applied to them, the expenses would be distributed over a series of years; and on being informed of this it is believed no freeholder would hesitate as to the propriety of the application of the Act to his village, nor object to the expense.

Appendix (B).

Report on the Town of Alnwick, by John Davison, Esq., Surgeon, *laid before the Board of Guardians, and by them forwarded to the General Board of Health.*

My Lords and Gentlemen,

In consequence of the long prevalence of contagious diseases in the town of Alnwick, I have been induced to make some observations on the sanitary condition of its inhabitants, with the intention of presenting to the proper authorities the cause of the appearance and continuation of such diseases, that means may be used not only to overcome what already exist, but also to prevent, if possible, the ingress of that more fearful malady, the cholera, which it appears from various reports is fast approaching us.

In the year 1832, when the cholera produced such dreadful ravages in Newcastle and Gateshead, a Board of Health was established in this town, under the direction and superintendence of the present Duke of Northumberland, and every exertion was made to check its approach by removing all nuisances, and by washing and purifying those parts which most required it, with the effect, perhaps, not of entirely preventing, but at any rate of mitigating, the disease; for although a few cases were observed, yet it was gratifying to find that the proportion of deaths was exceedingly small as compared with the mortality that ensued in other places, which, I think, might be attributed in a great measure to our being prepared to meet the disease.

When therefore we take into consideration that few towns in England are better situated for good and proper sewerage than this of Alnwick, and that the public authorities of other places, not only in this country but on the Continent, are doing their utmost to improve their sanitary regulations, I trust that the suggestions which follow may be taken into consideration; for surely, were such a disease to revisit us, we should regret, when perhaps it might be too late, that precautionary measures had not been taken to protect the inhabitants, and particularly those suffering from poverty and debility, and who on all occasions have been chosen as its victims, and at any time are unprovided with the means of shielding themselves from its destruction.

Some individuals are of opinion that it is not right to anticipate the approach of a disease: most persons, I hope, hold a different opinion; but, setting this question aside, I think every one must admit that cleanliness, particularly in the miserable dwellings of the poor, ought to be recommended; and when it is known that typhus fever has continued for some time past to spring up in the lower parts of this town, principally inhabited by the poorest classes, every exertion should be made to advise and assist them in removing the cause of their misery.

Where typhus fever has appeared I have invariably been able to discover the cause within a very short distance from the dwelling; and where the nuisance has been destroyed, or the removal of the sick to a more salubrious atmosphere been accomplished, the recovery has been

rapid and satisfactory; but where neither could be obtained, there sickness has either terminated in death, or been followed by a slow and protracted convalescence.

The principal cause of typhus fever I take to be the effluvia arising from animal and vegetable decomposition, which may always be observed regularly going on in abundance where disease is prevalent, and which is very much increased by a want of a proper supply of water, and by imperfect sewerage. Animal and vegetable matter of all descriptions is thrown out of the dwellings into the open channels, and there, owing to a want of descent and a deficiency of water, it is allowed to remain until the putrefactive process commences, when gases of the most noxious qualities are produced, to the great danger of all who, from poverty or a want of nourishment, are predisposed to disease.

What I shall more particularly note in the following observations will be—

1st. The imperfect sewerage of the town, and filthy condition of the channels running along the open streets, with the conduit-drains opening into them from private houses.

2nd. The unwholesome condition of the public alleys, courts, and yards.

3rd. The filthy state of the yards belonging to private property where the houses are let out in tenements.

4th. The miserable and dirty condition of the dwellings of the poor, including lodging and private houses.

I shall begin at the south part of the town with Bondgate-street Without, where, near the Coal-staith on the way to the workhouse, from the traffic of the coal-carts, the road is often very imperfect, and in consequence collections of filth may be observed. Near Victoria-place, owing, in a great measure, to liquids, &c., being thrown out from the houses, the gutter and street are very impure, as well as near the entrance to Graham's-yard; the flagging is often deficient. In other parts small sewers open from the houses into the street, and from this cause, during hot weather, danger is to be apprehended.

Bondgate-street Within.—Here many nuisances exist which at a very trifling expense, I think, might be removed. On the north side of Bondgate Tower a collection of putridity may always be found; but the parts most to be noticed are where the sewers open from private houses, principally along the side of the hill, to the street. These appear much too small for the purpose they were intended for; the consequence is that they become closed by collections of noxious matter, and the stench is occasionally intolerable.

Clayport-street.—Here the same may be observed; but by some of these sewers the contents of waterclosets also are said to be evacuated, which must add considerably to the evil. In other places the open channels are too much on the level, particularly those opposite Grey's-inn and the Union-court, and every liquid there thrown out remains, unless removed by sweeping or other means.

Fenkle-street.—Here also small conduits may be seen, which are said to pour the contents of waterclosets into the streets.

Narrowgate-street.—In consequence of a certificate from me in July, 1842, regarding the unwholesome condition of the savings-bank,

and the great sickness which frequently prevailed in the family there residing, a sewer was here formed which appears to have only removed the nuisance from one place to another, for, on passing near the Bow-alley; the covering near the cesspool, which was there made, is often imperfect, and the effluvia from it, as well as from the grating close by, are often scarcely bearable.

Pottergate-street, with the exception of the part near the entrance to the Pant Hall, where stagnant water is generally to be seen, may be left unnoticed; but, in

Bailiffgate-street, much is to be complained of at the entrance into the square, where the descent of the open channel is not sufficiently great to carry off the liquid filth which flows openly through the gate-way from the square into the street.

Hotspur-street.—In Hotspur-street nothing particular is to be observed, excepting that a large quantity of mud is generally to be found here, particularly in wet weather. At the entrance to the old work-house a grating may be noticed, from which in hot weather very dangerous gases frequently emanate.

Green Batt.—The Green Batt does not require particular notice; but near Monkhouse's-square a great quantity of mud, owing, I presume, to the narrowness of the passage, and a manure-heap near a stable, always in a filthy condition, might be removed.

Dispensary-street, like most of the other narrow streets, is often extremely muddy; and at the end of what has been called the Haggis Hall, a dungheap, or filthy midden, and a pool of putrid water close by, constantly pour out their poisonous contents to the injury of the inhabitants. Last year a poor woman named Oxley died of fever in the cottage immediately contiguous, and to these nuisances I attributed her death. These have long been complained of by the people of the neighbourhood, and if they could be removed certainly all would be much benefited.

Pottergate-place.—Here stagnant water may always be found, and is increased by the inhabitants throwing all their filth on the road, which in winter is scarcely passable. It is rare that this place is free from infectious disease.

The public alleys, courts, and yards are nearly all in a very unwholesome condition, and amongst the worst may be particularized those in or near Bondgate-street.

Roxburgh-place.—A sewer was made here a short time ago for the purpose of carrying off the water to the Green Batt; but this it does not appear to accomplish, for water yet may be found stationary in many places, which I think may in some degree be attributed to the irregularities of the surface and the want of gratings in one part.

Correction-house-yard.—Although much has been done here, yet further improvements might be made, such as enclosing the ashpits, &c., which are exposed.

King's Arms-yard.—Decided advantage would here be gained by the removal of slaughter-houses, dunghills, and pigsties.

Crown Inn-yard.—Here the same observations may be applied, for manure appears in one or more places to be carefully preserved, and is generally allowed to remain until a large quantity is accumulated.

Queen's Head Inn-yard.—The lower part is kept cleanly, but the

upper is the reverse. A filthy open privy, a noisome dunghill with pig-sties behind, all tend to propagate disease, and greatly require supervision.

White Hart Inn-yard.—Great filth of every description may always here be found, and it has long been noticed as much subjected to fever. An open sewer, containing all kinds of putridity, which is seldom or never cleansed, runs from the Green Batt so far down the yard, and, where it becomes covered, its place is supplied by a large midden, into which all the blood and offals from the slaughter-houses are thrown, and frequently for a considerable time to remain. Here, in my recollection, several cases of fever have existed, and many terminated fatally.

St. Michael's-place.—Into this place, at the lower part, the drain just mentioned, after passing below the houses of White Hart-yard, becomes again exposed, and empties its contents into the open street.

Old Chapel-lane.—The upper part of this lane might be kept much cleaner with very little trouble.

In the narrow pathway which leads from Ogle-terrace to the top of Clayport-street much improvement might be made by covering the ashpits and privies.

The *Union-court*, although exceedingly narrow, might be kept in a much cleaner condition. An ashpit has been enclosed which formerly was very disagreeable, but others remain open, and deposits of decomposing substances are always to be seen in the corners; these, I think, the inhabitants should be obliged regularly to remove as in the public streets.

It is in the yards belonging to private property, where the houses are let out in tenements, that the greatest nuisances are to be found. Since the old workhouse became thus inhabited, the yard is constantly covered with a quantity of putrid stagnant water; and I can only account for more of the people in that house not becoming affected, by their dwellings being a considerable height above the evil.

Elliott's-yard has long been noticed as a place where the inbabitants often suffer from disease. This may be caused by its narrowness and by the ashpit being opposite and within a very short distance of the doors of the houses. A sufficiency of room appears at the head of the yard for its removal. Pottergate-street contains two or three of such places, which are really worse than any I observed in Newcastle at the time the cholera existed in 1832.

Moore's-yard, or, as it is called by its wretched inhabitants, "the Tunnel," cannot be described. A long, dark passage, badly flagged, with the irregularities filled with putrid urine, leads into the yard, which is a perfect nursery for sickness. The yard is narrow, and contains pig-sties, open privies, and ashpits, with a filthy sewer, the Bow-burn, all in immediate position with the dwellings of the inhabitants, who appear not to have the slightest idea of cleanliness, and may almost be said to be worse than the lower animals, which in many cases seem desirous of hiding their ordure, whilst here it is deposited in all directions without any such inclination.

The miserable condition of the interior of the dwellings in this place, as well as the bed-clothes and other articles, may also here be noticed;

for I am satisfied the walls of the former have not been cleansed since 1832, and, for the latter, I do not imagine they have been purified since they were made. Many of the people employ themselves in collecting bones, rags, &c., which are generally kept in some part of the residence, adding considerably to the nuisance and to the danger of producing disease by the miasmata arising from such remains.

The *Pant Hall* also exhibits many of the characteristics of Moore's-yard. A large open dunghill, with an exposed privy and pigsty, are constantly pouring forth their noxious vapours immediately under the dwellings, and disease in its worst form is here generally to be found. A family named Monaghan, consisting of the grandmother, son-in-law, his wife, with three children, living in one small room, became paupers in consequence of fever with purpura, or what is commonly called "spotted putrid fever." One child died suddenly in consequence of its great debility; the others remained in conditions of the greatest prostration, notwithstanding as much food and wine as they could consume were granted them, until they were removed to the hospital of the workhouse, where they all in a short time showed a marked improvement, although the allowance of food was smaller in quantity than that with which they had been supplied in their former residence, clearly proving how requisite cleanliness and proper ventilation are for the recovery of the sick.

Fever has also been prevalent in a lodging-house in the *Bow-alley*, which may be caused by the dirty state in which it is kept and by the miasm arising from the sewer which passes through it; for I have always noticed that, whenever contagious disease is present in Alnwick, it is principally to be found in the residences near this stream, from where it leaves Clayport-street to where it passes down this alley. Most of the cases of fever which have been removed from the town to the hospital of the workhouse have been taken from the lodging-houses in the three last-mentioned places.

Canongate and *Walkergate* I shall not particularly notice, but may merely speak of what is called "the Hole," where the dwellings of the inhabitants are very dirty. At the foot of this place is a filthy stream. The interior of the lodging-houses also in Canongate are in a most disgusting condition.

For the purpose of overcoming these disagreeable imperfections, I am of opinion that the first thing to be attended to is the improvement of the present existing sewers.

Provision might be made at the head of Clayport-bank for supplying the dwellings of the town with water, which would add to the comfort as well as the convenience of the inhabitants; and public baths might be formed near the same place, the water from which might be collected in a large reservoir, and occasionally let free into the improved sewers, which would have the effect of carrying all the filth at once into the river.

The removal of the slaughter-houses to a distance from the town would also be an advantage; but these alterations cannot, perhaps, at present be accomplished without some difficulty; therefore our object at this time must be to purify those places which most demand immediate attention.

All filth should be removed from the present and particularly the

large sewers, where they can be entered; and some of the public alleys, courts, and yards, after the contents of ashpits, &c., have been carried away, might be cleansed by the fire-engine, and the walls whitewashed.

The owners of private yards might be advised to assist in the undertaking, particularly where the nuisances exist in their immediate neighbourhood; but where means are wanting to do what is required, I am of opinion that the parish would be amply repaid by doing this, as well as by limewashing the interior of many of the dwellings of the poor, by which sickness would be lessened and the poor's-rate proportionally diminished.

(Signed) JOHN DAVISON.

Alnwick, November 19th, 1847.

LONDON :
Printed by WILLIAM CLOWES and SONS, Stamford Street,
For Her Majesty's Stationery Office.