

and *Llanisbeen* Brook, and stored in reservoirs and filtered; rateable value, 32,115*l.* 13*s.*

#### CATCHMENT BASIN CXX.

Area, 67 square miles, 10 of which are Old Red, 15 are Carboniferous Limestone, 5 are Trias, and 37 Lias. This basin includes the larger portion of the Vale of Glamorgan. In it is Cowbridge.

#### POPULATION IN SEVERN GROUP OF RIVER BASINS.

In CENSUS of 1871.

COUNTIES.	Population.	Density, Acres to Persons.	Proportion of Population, probably living in this Group.	Population, about.
Gloucester .. .. .	534,320	1·5	$\frac{3}{4}$	400,740
Warwick .. .. .	633,902	0·8	$\frac{1}{3}$	233,902
Staffordshire .. .. .	857,333	0·8	$\frac{1}{10}$	85,733
Worcestershire .. .. .	338,848	1·3	All	338,848
Shropshire .. .. .	248,064	3·3	$\frac{10}{20}$	235,661
Montgomery .. .. .	67,789	7·1	$\frac{9}{10}$	61,011
Radnor .. .. .	25,428	10·0	All	25,428
Brecknock .. .. .	59,914	7·8	$\frac{10}{20}$	56,917
Hereford .. .. .	125,364	4·1	All	125,364
Monmouth .. .. .	195,391	1·8	All	132,003
Glamorgan .. .. .	396,010	1·3	$\frac{1}{3}$	131,003

In CENSUS of 1881.

Gloucester .. .. .	572,480	1·4	$\frac{3}{4}$	429,364
Warwick .. .. .	737,188	0·7	$\frac{1}{3}$	245,729
Staffordshire .. .. .	981,385	0·7	$\frac{1}{10}$	98,138
Worcestershire .. .. .	380,291	1·2	All	380,291
Shropshire .. .. .	247,993	3·4	$\frac{10}{20}$	235,594
Montgomery .. .. .	65,798	7·3	$\frac{9}{10}$	59,219
Radnor .. .. .	23,539	11·6	All	23,539
Brecknock .. .. .	57,735	7·9	$\frac{10}{20}$	54,809
Hereford .. .. .	121,042	4·4	All	121,042
Monmouth .. .. .	211,374	1·6	All	211,374
Glamorgan .. .. .	511,672	1·0	$\frac{1}{3}$	170,557

#### CHAPTER XXV.

#### SOUTH WALES STREAMS DRAINING INTO THE BRISTOL CHANNEL.

#### RIVER OGMORE (CXVIII.)

HAS a length of 16 miles; area, 114 square miles, of which 7 are Carboniferous Limestone, 90 Coal Measures and Millstone Grit, 7 Trias, and 10 Lias. Its tributary, the *Llynfi*, is 10 miles long.

BRIDGEND.—*Acres*, 629; population, 3600; supply partly from Gas and Water Company, and partly from rain-water tanks; rateable value, 8953*l.*; Bridgend Gas and Water Act, 1869, and Provisional Order, 1875.

MASTEG.—*Acres*, 6180; population, 7990; supply from springs led through earthenware pipes, 30,000 gallons; rateable value, 23,000*l.*

#### RIVER AFON (CXVI.)

Has a length of 12 miles; area, 87 square miles, of which 3 consist of Carboniferous Limestone, 75 of Coal Measures and Millstone Grit, chiefly the latter, 5 of Trias, and 4 of Lias. The stream rises near the synclinal axis in the Coalfield and flows up the dip, over higher and higher strata.

ABERAVON.—Population, 3396; supply from tanks on mountain-side; reservoir to hold 4,500,000 constructing; rateable value, 8320*l.* 14*s.*

#### RIVER NEATH (CXVI.)

The *NEATH* is 12 miles long; area, 118 square miles, of which 4 are Old Red Sandstone, 6 Carboniferous Limestone, and 108 Coal Measures and Millstone Grit, chiefly the latter.

This stream also rises in the Coalfield near the synclinal axis, and flows up the dip of the strata to Swansea Bay.

NEATH.—*Aeres*, 1427; population, 10,447; supply constant, 360,000 to 390,000 gallons a day, from 3 reservoirs 180 feet above the centre of the town, storing water from streams flowing off the Gnoll Estate, Neath, of 800 acres; rateable value, 31,298*l.*; works carried out under Neath Water Supply Acts, 1861, 1865, and Provisional Order, 1876; extra filter-beds are required. Rainfall in 1879, at 240 feet above the sea, 53·21 inches; in 1880, 48·53 inches; at Glyncoirwg, at 730 feet above the sea, 81·44 inches in 1879, 81·08 inches in 1880.

BRITON FERRY.—*Aeres*, 679; population, 5998; supply from Neath and a reservoir at Briton Ferry used for flushing sewers only; rateable value, 13,600*l.*

#### RIVER TAWE (CXV.).

The length of this river is 26 miles; area, 106 square miles, of which 8 consist of Carboniferous Limestone, and 98 of Coal Measures and Millstone Grit, chiefly the former. This stream, like the *NEATH*, rises in the Black Mountain, forming the watershed between the *USK* Basin and the South Wales Coalfield; like it, flows down the dip of the strata, and, crossing the axis, flows up the dip, to Swansea Bay.

SWANSEA.—Population, 63,739; intermittent supply from intercepting reservoirs on Rivers *Lliw* and *Blaenant Ddu*, yielding 1,500,000 gallons daily; rateable value, 191,000*l.*; works carried out under Swansea Waterworks Acts, 1860 and 1873.

OYSTERMOUTH.—*Aeres*, 2615; population 3485; supply from springs and wells; company forming; rateable value, 10,697*l.* 11*s.*

#### O.S. CATCHMENT BASIN CXIV.

Peninsula of Gower streams; area, 66 square miles, of which 14 are Old Red Sandstone, 29 Carboniferous Lime-

stone, and 23 Coal Measures and Millstone Grit, chiefly the former.

#### RIVER LLWCHWR (CXIII.).

The length of this river is 16 miles; area, 156 square miles, of which 2 are Carboniferous Limestone, and the remainder Coal Measures and a small tract of Millstone Grit. The source of the main stream is at foot of the Mountain Limestone escarpment above Llan-de-bie, where considerable underground streams were met with in excavating the quarries, which emerge in springs on the slope below. Near Bettws the *LLWCHWR* receives the River *Amman*, 9 miles in length, and flows past Llanedy and Llangennyh to the sea at Castell Llwchwr. West of the river another tributary, the *Dafen*, 6 miles long, falls directly into the tidal estuary at Llanelly.

LLANELLY.—*Aeres*, 2000; population, 19,655; supply from reservoirs storing the *Trebeddod* stream and the River *Lliedi*; rateable value, 50,397*l.*; works carried out under Public Health Act, 1848; Local Government Act, 1858; and the Llanelly (Local Board) Waterworks Act, 1865.

#### RIVER GWENDRAETH FAWR (CXII.).

This river is 15 miles long; area 73 square miles, of which 30 square miles are Old Red Sandstone, 10 Carboniferous Limestone, and 33 Coal Measures with a small tract of Millstone Grit. The northern watershed runs along the crest of the Old Red hills lying north of the Coalfield, and is carried by them to the sea between estuaries of this river and the *TOWY*. In this basin are Llandyfaelog, Llangynden, Llanddarog, and Kidwelly, where it is joined by the *Gwaendraeth Fach*, also 15 miles in length.

#### RIVER TOWY (CX.).

The length of this river is 58 miles; area, 514 square miles, of which 42 miles consist of Old Red Sandstone, more or less permeable, and the remainder of Silurian rocks. The

stream rises in the mountains forming the boundaries of Cardiganshire, Radnorshire, and Brecknockshire, flows over Lower Llandovery and Bala Beds, receives on its west bank the *Camddwr* falling in above Capel Ystrad, the *Cothi*, 9 miles in length above Llandovery, whence it follows the strike of the Lower Llandovery and Llandilo beds past Llangadoc, Llandilo, and Llanarthney, when another River *Cothi* falls in on the west bank; it rises within three-quarters of a mile of the other, flowing past Llan-y-Cowys, Llansawyl, Abergorlech, Brechfa, entirely over Lower Silurian rocks. From the infall of this stream to Carmarthen, the *TOWY* continues to follow the strike of the rocks, but the unconformity between the Upper and Lower Silurian causes the latter to be entirely concealed by the Old Red Sandstone which rests at its outcrop on the Lower Silurian.

From Carmarthen the river trends south-west, and flows down the dip of the Lower Silurian and Old Red, in which it has cut a broad estuary continuous with the estuary of the *TAFF* at Laugharne. The eastern watershed commences on the sea-coast between Kidwelly and the estuary at the top of the Old Red, and passes across that formation until it reaches its base east of Carmarthen, which it follows to the point south of Llandilo, where the Old Red has its narrowest outcrop, one mile and a quarter; then it again passes to the top of the Old Red near the source of the *USK*; then trends northwards, passing over the Old Red, Ludlow, Wenlock, Tarannon, and Lower Llandovery rocks. The western watershed also traverses Old Red Sandstone at its commencement on the sea-coast between the *TAFF* and the *TOWY*, but only for 3 miles; the whole of its course to the point where it meets the eastern watershed is over Lower Silurian rocks. The slope from the western watershed is a distance of 12 miles, while the eastern slope is only on an average 5 or 6 miles, and often less than 2; which sufficiently explains the chief tributaries being all on the west bank.

LLANDILO.—*Aeres*, 300; population, 1533; supply con-

stant from reservoir storing springs; rateable value, 4615*l.*; under 11 & 12 Vict. c. 63. Rainfall in 1879, at Dynevor Castle, 236 feet above the sea, 47·03 inches; in 1880, 52·31 inches.

LLANDOVERY.—Population, 2035; supply from wells; rateable value, 1861*l.* Rainfall in 1879, at 217 feet above the sea, 47·95 inches; in 1880, 50·09 inches.

CARMARTHEN.—Population in 1881, 10,512; supply intermittent of 200,000 gallons from two catchwater reservoirs, holding 11,000,000 gallons, being 50 days' supply; rateable value, 33,622*l.*; Public Health Acts, 1841 and 1875. Rainfall in 1879, at the Joint County Asylum, 189 feet above the mean sea-level, 49·78 inches; in 1880, 43·60 inches.

#### RIVER TAFF (CIX.).

The length of this river is 12 miles; area, 183 square miles, of which about 10 are Old Red Sandstone, on the coast margin, and the rest Lower Silurian rocks of very impermeable kinds. At Lampeter, near the western watershed, a considerable exposure of Llandilo Limestone occurs. The central Welsh watershed forms the northern limit of this basin; near its western limit rises the *TAFF*, then the *Afon Gynin*, 8 miles in length, the *Dewy Fawr* which unites with the last after flowing 12 miles, and falls into the *TAFF* at St. Clare, then the *Cywyn*, 11 miles in length, with a feeder from the east rising near Carmarthen.

#### O.S. CATCHMENT BASIN CVIII.

Area, 61 square miles. The headlands lying between Carmarthen and St. Bride's Bays are traversed by a series of sharp anticlinal and synclinal folds, running in an east-south-east direction. To the north is a coalfield, overlapping the Lower Carboniferous rocks westwards, and resting directly on the Lower Silurian at Haverford West, flanked by Upper Silurian and Intrusive Porphyry between St. Bride's and Milford, and Millstone Grit, Carboniferous Limestone, and



Old Red at Tenby, between which and St. Gowan's Head are two anticlinals, that of Cheriton bringing the Ludlow rocks to the surface. The peninsula between St. Gowan's Head and St. Bride's is deeply indented by Milford Haven, which is a long fiord running nearly with the strike of the Old Red for 12 miles, and then turns northwards extending into the centre of the Coalfield, where it receives the waters of the *CLEDDAU*, draining a Cambrian and Lower Silurian area, and rising within 2 miles of the St. David's Head coast-line. Silurian, 3 square miles; Old Red Sandstone, 27; Carboniferous Limestone, 13; Carboniferous rocks, chiefly Coal Measures, 18 square miles.

TENBY.—Population, 4783; supply varies from 80,000 to 200,000 gallons, winter average 150,000 gallons; a well called Ladywell is stored in a service reservoir, partly fed by a gathering-ground, also a storage reservoir filled from adit driven in hill, and its natural drainage; rateable value, 18,256*l.*; Public Health Act.

#### O.S. CATCHMENT BASIN CVII.

Area, 114 square miles. This area is drained by Milford Haven, which is the tidal portion of the *CLEDDAU*, 212 square miles in extent, or with Milford Haven, 326 square miles. Its structure has already been described: 161 square miles consist of pre-Cambrian, Cambrian, and Silurian rocks of impermeable character, all lying north of the Coalfield, with the exception of the narrow belts of Upper Silurian brought up by anticlinals in the Old Red, which occupy 78 square miles, which is overlaid by the Carboniferous Limestone extending over 25 square miles, which is partly overlapped by the Coal Measures, 62 miles in extent, resting on the Lower Silurian east of St. Bride's Bay.

PEMBROKE.—*Aeres*, 4376; population, 14,197; an Act for supplying this town was passed, 9 Geo. 4, and received royal assent 15th July, 1828; under it a reservoir was constructed, supplying 35,000 gallons a day. Pembroke Dock is supplied

by distinct reservoirs belonging to the Government, and public springs yield 6000 gallons; rateable value, 30,573*l.*

MILFORD.—*Aeres*, 667; population, 3813; constant supply of 15,000 to 30,000 gallons, raised by force-pumps from springs to reservoir; rateable value, 7054*l.*; works under 20 & 21 Vict.; the Milford Improvement Act, 1857.

#### ST. BRIDE'S BAY STREAMS (BASIN CV).

Area, 65 square miles, of which Lower Silurian, and older rocks occupy 52 square miles, Old Red Sandstone, 3; and Coal Measures, 10; the latter rest on the Lower Silurian on the north side of the Bay; and on the south side are in contact with Intrusive Felspathic Porphyry, on the southern side of which is the Old Red Sandstone, the Coal Measures having overlapped the Carboniferous Limestone.

#### POPULATION OF SOUTH WALES STREAMS DRAINING INTO BRISTOL CHANNEL. IN CENSUS OF 1871.

COUNTIES.	Population.	Density, Acres to Persons.	Proportion of Population probably living in this Group.	Population, about
Glamorgan .. .. .	396,010	1.3	$\frac{3}{10}$	265,007
Brecknock .. .. .	59,914	7.7	$\frac{1}{20}$	2,995
Carmarthen .. .. .	116,944	5.1	$\frac{9}{10}$	105,250
Pembroke .. .. .	91,936	4.3	$\frac{9}{10}$	82,743
In CENSUS of 1881.				
Glamorgan .. .. .	511,672	1.0	$\frac{3}{10}$	341,115
Brecknock .. .. .	57,735	7.9	$\frac{1}{20}$	2,886
Carmarthen .. .. .	124,861	4.8	$\frac{9}{10}$	111,375
Pembroke .. .. .	91,808	4.2	$\frac{9}{10}$	82,628