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TRANSACTIONS

OF THE

PERTHSHIRE SOCIETY OF NATURAL SCIENCE.

I.—EARLY PLANS OF PERTH.

By Thomas McLaren, f.s.a.(scot.).

At a time when so much is being said of post-war town and country planning, a study of our city and its stages of development in the past is of fundamental importance. A better understanding of the town as it is at present can be obtained by a detailed examination of its early records, particularly as they are portrayed in the old plans that are available.

When a proposal was made to have a record of all the plans of the town prepared, it was intended to reproduce to a common scale the earliest of them so that the phases of transformation from time to time could be easily traced and the progress from mediæval conditions down to the industrial age carefully noted. It was found, however, that this was impossible owing to war-time restrictions on the quantity and quality of paper and the shortage of skilled technicians in the execution of such work. This is regrettable, as such a method would convey the desired information in the most satisfactory way. The only alternative is to give as detailed as possible a description of each plan and endeavour to show by the topographical changes how present conditions are largely determined by the past.

In comparing these plans it will be noticed how little the old town changed during the period prior to the commencement of the industrial age. These early plans, therefore, reflect in an interesting way the size and general appearance of the town in mediæval times, when it was the ancient capital.

No attempt will be made in these pages to enlarge upon the history of the town or particular buildings. Only explanatory notices are given where these are necessary to connect fully certain sites and places.

The indebtedness of the author is expressed to Mr. James S. Richardson, Inspector of Ancient Monuments, for drawing attention to those Plans of Perth that are in the British Museum; and to Dr. Meikle, librarian, for his assistance in making available for inspection those Plans deposited in the National Library of Scotland.

18th Century Plans, 1715-1792.

Plan 1715-16.

"A Plan of Perth, with the retrenchmints made about it by the Pretender's engineers, 1715-16, by Louis Petit." This plan is in the National Library of Scotland, Edinburgh. It is 14 inches by 25½ inches in size, and the scale is approximately 26.4 inches to a mile.

This plan shews the entrenchments made by the Rebels, very similar to those indicated on the following plan. A few places are named, such as "The old Fort in ruin" (Cromwell's Citadel); "Bassin" (Balhousie); "Mordon" (Muirton); "Tay River"; and "ground commanding the other side" (Bridgend).

Plan 1715-16.

This plan of the town is in the King's Collection in the British Museum, and is named "An exact Plan of the Town and adjacent parts of Perth, as it was fortified and possess'd by the Rebells in Scotland, till they were driven thence by the victorious Arms of King George. Anno 1715/6."

This plan was prepared for military purposes during the Jacobite Rebellion. The surveyor's name is not given. In size it is 28¼ inches by 18⅞ inches, and is shaded in colour. The scale to which it is drawn corresponds to 14.4 inches to a mile.

The town is rectangular in shape, with its longer axis east and west. The water course which formed the *fosse* around the city walls is shewn as an open ditch bridged only opposite the ports or gateways. This stream still flows in the same line under what is now Canal Street, Canal Crescent, South Methven Street, and Mill Street. The "King's Lead," from the River Almond, discharges into the *fosse* below the City Mills.

The streets are not named, but within the bounds of the old town are shewn two main streets running east and west, corresponding with High Street and South Street of to-day. Running north and south are other streets in the line of Watergate, Speygate, Kirkgate, Skinnergate, Meal Vennel, Cutlog Vennel, etc. Houses occupied the frontages of these streets, but the spaces behind and between the thoroughfares appear to be open ground. St. John's Church is referred to as the "Great Church," and Gowrie House, at the east end of South Street, is designated as the "Duke of Athol's House and Garden." At the end of the southmost *fosse* (Canal Street) is "The Kay" (quay), where vessels were moored at that time.

Two small suburbs extended from the town northwards and westwards. The first-mentioned comprised Castlegable and Curfewrow, and the other, Newrow, Hospital Street; and High

Street continued westwards as far as the Mill Close leading to the City Mills.

Greyfriars' Cemetery is marked as the "Church Yard." Immediately south of it, on the South Inch, is "the old Fort, built by Cromwell," with bastions at the corners and surrounded by a ditch. The river is referred to as being the "River Tay, running by Dundee 100 fathoms broad." "The House of Lord Duplin" is indicated at Balhousie, where there are a few houses and the Castle. It is designated "Bassin," possibly a corruption of "Boosie."

From the Port at the west end of South Street a road is shewn extending along Hospital Street, Kinnoull Causeway, and westwards, called the "Road to Dunferling and Queensferry." Leading off this road, in line of Leonard Street, Priory Place, and High Craigie, is the "Road to Edinburgh by Kinghorne." Branching off the last-mentioned road is another leading westwards past Pitheavlis.

From the Port at the west end of High Street a road leads westwards past Dovecotland and Burghmuir marked "Road to Stirling." From the High Street outwith the Port the old road to Dunkeld is shewn passing northwards across the Lade at the City Mills. Leaving the town at the Nort Port the Dunkeld Road extended through the North Inch to the Muirton (Morton on plan). The river crossing at that time was by ferries, and the roads shewn on the east side of the river extended from the "Horsewater" at Commercial Street (the landstile of the bridge destroyed in 1621) northwards to Coupar-Angus, with the road to Dundee forking off at the Back Wynd.

The Island (now the Golf Course) and the Stanner's Island (below Perth Bridge) are shewn, and the rising ground around the town is shaded off.

The old city walls are not clearly indicated. They were possibly ruinous at this time, as defences appear to have been erected in the open spaces around the town. The south and west sides of Cromwell's Fort were utilized and a canal was cut from Craigie Burn through the Inch to fill the ditch with water. Additional lines formed by the Rebels extended from the Fort westwards and southwards of the old town; also along the high ground on the west side about the line of what is now Caledonian Road, and on the north side of the town down to the Balhousie Lade on the west side of the North Inch, with redans, or V-shaped ramparts projecting outwards at intervals. Within these fortifications "two small redans were erected by the townsmen," extending from the lade at the end of Cutlog Vennel through the open ground north-west of Curfew Row.

A construction on the shoulder of Kinnoull Hill, near Bellwood,

was probably a battery which could be used against enemy craft approaching the town by the river.

This plan, along with the one prepared by Lieut. Eyres, 1745-46, was reproduced in an issue of the "Perthshire Constitutional," on 1st December, 1924, along with an article by the late William Barclay, on "Jacobite Days in Perth." Photograph copies were made of these plans in London and sent on to the Museum here.

Plan 1715-16 *circa*.

"Plan of Perth and adjacent places, with a projection of a Cittadel, by Brigdr. Petit." This plan is in the National Library of Scotland. It is undated, but the plan first described was drawn by Louis Petit. It has evidently been executed by the same engineer and about the same time.

It shews the town and the various roads leading into it, but places and streets are not named. It extends up to Balhousie on the north, Bridgend on the east, St. Leonard's on the south, and Burghmuir on the west. Cromwell's Citadel on the South Inch is shewn. It is one of five erected by Cromwell in 1650 A.D. to overawe Scotland.

A proposed fortification of considerable dimensions is shewn on ground where the Barracks now stand. It differed from Cromwell's Citadel in respect that it was pentagonal in form, whereas Cromwell's was four-sided. Occupying high ground, it guarded or dominated the town proper. The *fosse* or ditch could be supplied by water from the King's Lead, or Town Lade. This citadel was designed on the lines of similar sixteenth century military structures in Turin, and Furnes in Flanders, having bastions at each of the five corners of the curtain wall, outside of which were elaborate field works in the form of redans. The end of the Rebellion rendered such a structure unnecessary.

The plan is 14 inches by 20 inches in size, and the scale 10.56 inches to the mile.

Plan 1745.

"A Plan of an ancient piece of fortification near Perth, lately repaired by the Rebels, drawn and surveyed by Jas. Leigh Jones, Feb. the 9th, 1745."

This plan shews Cromwell's Citadel on the South Inch, and places adjoining—Greyfriars' Burial Ground, Spey Tower or Port, the south end of Speygate, Gowrie House, a portion of the City Wall in line with what is now Canal Street, the old Dock at the end of that street, and the vacant ground between the fortified town and the South Inch. None of the places are, however, named on the plan. The Citadel is shewn with only three bastions complete. The one on the north-east corner is not there.

This plan is preserved in the National Library of Scotland, Edinburgh. The size is $6\frac{3}{4}$ inches by $9\frac{1}{4}$ inches, and the scale, approximately, 19.6 inches to a mile.

Plan 1745-46.

The title of this plan is "Eye Draft of Perth," by Lieut. Eyres, 1745/46. It is also a military plan, and the original is in the King's Collection, British Museum. It is roughly drawn to a scale of 14.2 inches to the mile, imperial measure. The plan is $13\frac{1}{2}$ inches by $8\frac{1}{2}$ inches, and was prepared for defensive purposes during the '45 Rebellion. It shews the town bounded by the water courses which formed the *fosse* or moat around the city walls. High Street and South Street are the only streets named, but Watergate, Speygate, Skinnergate, Castlegable, Curfew Row, and Newrow are shewn. The Tolbooth and Town House stand at the foot of High Street, where a ferry to the Angus Road crosses the river, and to the north of the Tolbooth, at the river side, was an orchard. Opposite this, in the centre of the river, is an island. Gowrie House, at the end of South Street next the river, is marked "H.R.H. Quarters," and to the north of it is the "Corn Market." The "Monks' Tower," at the south-east corner of the gardens of Gowrie House, is shewn, and adjoining is the "Wharf," at the junction of the *fosse* with the river.

The King's Lead passes through the City Mills and supplies with water the ditches around the town. The city wall is roughly indicated on the west and north sides of the town and towers or bastions are shewn at the north-west corner of the fortifications and at two other points on the north wall. The "Dunkeld Road," leaving the town at the North Port, passes through the North Inch. The Crieff Road is a continuation of the High Street westwards. To the north of the Corn Mills is a quarry, and from it there ran northwards "Boosie Hall Road." Along the west side of the North Inch there flowed the (Balhousie) Mill Lead, and on it, near the North Port, was a Snuff Mill.

The "Stirling Road" leads from the town by the line of Hospital Street and Kinnoull Causeway, and the "Edinburgh Road thro' Fife" passed by the line of Leonard Street. Greyfriars is marked as a "Burying ground," and to the south of it is Oliver's Mount (Cromwell's Fort). Separating the South Inch from the lands to west and south is a water course marked "drain," the southern portion being Craigie Burn.

"Rebel Works," referred to as "unfinished," were entrenchments across the North Inch, to the west of the Newrow, at the junction of the Stirling and Edinburgh Roads, and on the south and west sides of Cromwell's Citadel.

Plan 1765.

This plan is the most complete survey that had been made of the town up to this date. The title is "A Plan of the Town of Perth, with adjacent environs, surveyed and drawn by Henry Buist in 1765."

It was the property of the Literary and Antiquarian Society until the old Museum and its contents were handed over to the Town Council. The plan is 31 inches wide by 38½ inches high, not including the spaces occupied by voluminous reference notes on each side. It is drawn to a scale of 26.5 inches to the mile, imperial measure. The drawing is stretched on a frame, and was carefully prepared from an original one that unfortunately had been damaged by fire in the Museum many years ago. The lines and particulars were, however, carefully followed and traced off. I examined the original in the Museum and saw the details through the blackened surface. The original drawing was mounted on wood and was in two portions. A reduced copy of this plan appears in the book on "The Blackfriars of Perth," by Rev. R. Milne, D.D. Being much larger in scale than the previous plans referred to, the streets and the area built upon within the old town are shewn with considerable accuracy, and the boundaries of the various lands surrounding the town are clearly indicated. There is not much change in the size of the town compared with the '15 and '45 plans. The *fosse* or ditch around the city walls is spanned by bridges at the Spey Tower, Southgate Port, Turret Bridge Port, and Red Bridge or Castlegable Port. Other accesses were bridges over the ditch at (1) the "Diddledan" (or Deadlands) north of the Tolbooth on "a new walk" leading to the North Inch; (2) entrance (near Reform Place) to the south lands of King James' VI. Hospital; and (3) opposite south end of Curfew Row. The old city walls are not shewn, but the space they occupied and the walk behind them along what is now Canal Street, Canal Crescent, South Methven Street, and Mill Street, are indicated and designated the "Back Ways." The main streets within the town are named the Highgate or Northgate; Southgate Street; Kirkgate; Skinnergate Street; Watergate Street, with the Water Vennel and the north and south Boat Vennels leading off same down to the river; Speygate or Spey Street; Flesh Vennel; Cow Vennel; Meal Vennel; Cutlog Vennel; Guard Vennel; Salt Vennel (south end of St. John Street); St. Anne's Vennel; Kirk Lane; and the north and south Kirk Vennels leading from the Church to watergate.

The principal buildings consisted of St. John's Church, with the reverstry projecting on the north side of the choir; the Tolbooth and the Town Hall or Council House; Guild Hall; Academy, west of St. John's Church; Flesh and Meal Markets, on site of what is

now the City Hall; Grammar School and Customs House, in St. Anne's Lane; Gowrie House, designated the "Royal Artillery Barracks," and in the gardens next the river the "Monks' Tower"; Fleshers' Hall, on the south side of South Street at the north end of the Flesh Vennel; Wrights' Hall and Shoemakers' Hall in the Watergate; the Hammerman and Tartan Halls were both to the south side of High Street; Anti-Burgher Meeting House, on site of North Church; and the Burgher Meeting House, opposite the Wilson Church in Scott Street.

The quay at foot of High Street was known as the "North Shore," and the dock at the end of Canal Street the "South Shore." The Diddledan Battery is shewn on a breakwater below the mouth of the main Lade. It might be mentioned that "Diddledan" is a corruption of "Deadlands," the orchard there having been used in early times as a burial ground.

Considerable areas were not built on behind the buildings in the principal streets.

Outside the walls there was a suburb on the north side of the town comprising the Curfew Wynd, Blackfriars' Wynd, and Castlegavel Street. In Curfew Wynd was Lord John Murray's Lodging and Tullibelton's Lodging. The Fair Maid's House is not named. On the main Lade at what is now the Horse Cross is the Nether Malt Mill, and below the Red Bridge was a lint mill and and an oil mill. On the Balhousie Lade or burn at the end of Curfew Row was a sawmill.

West of the old town was another suburb composed of houses erected along the continuation of High Street, Newrow Street, Hospital Street, and Mill Wynd, the latter leading to the Upper Malt Mill, the Nether and Upper and Lower Flour Mills, Corn Mill, Waulk Mill, and the Bakers' Granary. The Glassite Meeting House is on the north side of High Street (now St. Paul's Church Hall), and King James' VI. Hospital as it now stands existed then. On the Lade was the Newrow Washing Mill, on the site of Harley's "Rodine" Works.

There is no bridge across the river. A ford is indicated from the access road to the river side, from the old Dunkeld Road at North Inch across the river to the Horsewater at Bridgend, opposite the Stanner's Island, and there was also a ferry in the line of the bridge destroyed in 1621, near the foot of High Street. At the north end of what is now Norie-Miller Park there was a promontory called "Gibraltar Battery." Kinnoull Parish Church stood in the burial ground south of the above-mentioned park. A portion of this building is still standing. "Clocksery Miln" is the old distillery at Isla Road.

On the south side of the old town is Greyfriars' burial ground, and on the north-east corner of the South Inch is Oliver's Mount, or Cromwell's Citadel, on which stables belonging to the town

were erected. Passing through the Citadel, but not extending through the Spey Gardens up to the town, is shewn the road to Queensferry running southwards through the South Inch. The South Port issued into Hospital Street and Cow Causeway (Kinnoull Causeway) past Earls' Dykes, Tullilum, and Pickletillum to "Burrow Moor." From the end of Hospital Street there branched off southwards (by Leonard Street and Craigie) the old Edinburgh Road

The continuation of the High Street also led to Burghmuir and is called the "north road to Stirling." The south road to Stirling branched off at Earls' Dykes and traversed south-westwards past Pitheavlis. The old Dunkeld and Inverness Road passed across the Lade at Mill Wynd, through what is now the Barracks to the line of the present road past the end of Balhousie Avenue. Off this road was the "Balhousie Loan" (Balhousie Avenue), which turned southwards at the Castle entrance gate and then led down to the North Inch. Further on the main road turned westwards to a bridge over the Town's Lade called "Feu Bridge." Off the Longcauseway at Dovecotland there was another road to Feu pretty much in the line of the present Feus Road.

The "road to Dunkeld and Inverness" passed northwards from the North Port, through the North Inch towards Muirton, with a branch leading off it to Balhousie Mill, beyond the White Dyke, which formed at that time the northern boundary of the North Inch.

Across the river, from the Horsewater at Commercial Street, there led northwards the road to Scone and southwards the south road to Dundee. Passing north-eastwards by Back Wynd was the other road to Dundee. Branch roads are shewn but not named, leading to places beyond the limits of the plan.

The plan is divided up into sections and the area of each division is given in a table extending down the left-hand side of the plan, along with the names of the proprietors to which the lands belonged. Lands, the property or superiority of the Royal Burgh of Perth, within the common walls, including the streets, buildings, open spaces, and gardens, extended to 40 acres. The acreage is also given of the north and west suburbs outwith the walls:—Greyfriars' Burial Ground, the Royal Artillery Barracks (Gowrie House), Pursewell or Easter Clayholes (north side of upper High Street), Spey Gardens (south of Canal Street), North and South Inches, Cromwell's Citadel or Oliver's Mount (north-east corner of South Inch), Drumhar's Ground (Barracks), City Mills, Playfield including the Miller's Ridge (south side of upper High Street), Nether Tullilum Farm (between Tullilum and Jeanfield), Unthank Ground (south of Dovecotland), Soutar Lands (between Leonard Street and Earls' Dykes), Mercer's Croft (the *fosse* or ditch now filled in on south side of Canal Street), New Shore (opposite South Inch), Tay Flatts Ground (Isla Road), and Corbs Croft (Norie-Miller

Park). All the above lands were held by the town and extended to a total of 220 acres.

The adjoining lands belonged to the Earl of Kinnoull, Lord Gray, Lord Oliphant, Stewart Threipland of Fingask, the Glover Incorporation, King James VI. Hospital, and Alexander Wood.

The plan is embellished with the city arms and the heraldic arms of the families of the Mercers, Threiplands, Murrays, Oliphants, Hays, Charteris, and also the Glover Incorporation. The north front of King James VI. Hospital, and a portion of St. John's Church, shewing the north transept, steeple, and part of the nave, fill in spaces on the plan which would otherwise be vacant.

Plan 1774.

The title of this plan reads: "A Plan of the Town of Perth, taken from an actual survey by A. Rutherford." It was engraved by J. Kirkwood, watchmaker, and prints of it lithographed by M'Lagan and Cumming, Edinburgh, were issued as a supplement to the "Perthshire Courier" of October 1st, 1889. It also appears in the "Rental Books of King James VI. Hospital," by Rev. R. Milne, D.D. The plan measures $16\frac{1}{8}$ inches in width and $12\frac{1}{4}$ inches in height, and is drawn to a scale of 17.6 inches to the mile, imperial measure. This is the first plan of the town to be engraved. Rutherford was an Art Master in Perth Academy.

This plan does not embrace much of the surrounding lands, nor does it indicate the direction of the main roads leaving the town. More detail is given of the extent of building within the town, and what was open spaces behind and around tenements. Marked developments fall to be noted—the erection of the Perth Bridge (opened 1771), and the formation of George Street, Bridge Lane, and Charlotte Street, the latter meeting the end of the old Dunkeld Road as it leaves the North Inch and enters North Port. The Edinburgh Road is continued from the South Inch by Princes Street to South Street. Otherwise there is little to add to what is shewn on the previous plan.

The outline of St. John's Church shews the Revestry projecting on the north side of the choir, where the Scottish Parliaments were held. The Flesh Market occupies the site of the City Halls; the Guild Hall where it is at present; the Council House stretching across the foot of High Street; the Prison (Tolbooth) where the Municipal Buildings are now; the Artillery Barracks and Gardens (Gowrie House) at end of South Street, next the river; the Bank House on the south side of High Street, where St. John Street is now; the Episcopal Meeting House off the north side of High Street, in what is now known as Parliament Close; the Burgher Meeting House was the old Wilson Church, in the centre of Scott Street between High Street and South Street; the Anti-Burgher House, where the North Church Hall now is, off the north side

of High Street; the Congregational Meeting House is shewn where St. Paul's Church Hall is now (this building has until recently been known as the Glassite Church).

A factory existed then between Newrow and South Methven Street, on the site of the "Rodine" works. A printed cotton manufactory stood on the north side of the Lade where the Public Wash-house is now in Mill Street. Another factory is shewn on the east side of Mill Wynd, and a tanned leather factory where Pullars' works are in Mill Street, west of Curfew Row. The mill on the Balhousie Lane at North Port is now designated a "snuff mill," and the oil mill continues on the main Lade east of Skinnergate. A barley mill is shewn at the Horse Cross. The Town's stables stood in the middle of Cromwell's Citadel. The Deadlands occupy the riverside at the mouth of the main Lade, and the walk between Mary's Chapel at the foot of High Street and the North Inch remains. The Academy was at the Kirkside, opposite the west end of St. John's Church, and the Grammar School on South Street, at the end of St. Anne's Lane.

The ditch which existed around the old city walls is distinctly shewn, bridged at intervals, and the line of the old walls indicated as passages. The North Shore is at the foot of High Street and the South Shore below Canal Street. The Hospital Gardens, including Pomarium, embrace the lands south of the King James VI. Hospital Buildings. The Spey Gardens lie between the ditch (Canal Street) and the South Inch. To the north of the town, west of the North Inch, is the Blackfriars' Ground. Besides the streets mentioned in the plan of 1765, there is now recorded—Shuttle Row (in line of Scott Street between South Street and Canal Street); Masterton's Vennel (now Cutlog Vennel); Baxter's Vennel (now Guard Vennel); School Vennel (now St. Anne's Lane); Salt Vennel (in line of St. John Street, between South Street and the Salt Market at the east end of St. John's Church). At Bridgend, East Bridge Street (Lochy Brae) is shewn for the first time. Gibraltar Quay is a promontory at the north end of what is now the Norie-Miller Park grounds.

Antiquities referred to on the plan, in addition to some already mentioned, include St. Anne's Chapel, north end of St. Anne's Lane; Bishop of Dunkeld's Palace, off South Street, in line of St. John Street, and opposite the same but on the west side of Watergate, the Earl of Errol's Palace; the Spey Tower was at the south end of Speygate; the Monks' Tower, south-east corner of Gowrie House Gardens, on the city wall; the Chapel of Loretto, on the north side of South Street, near the Port; Chartreux Monastery, on site of King James VI. Hospital; St. Paul's Chapel, south side of High Street above Newrow; Bow Butts, where archery was practised by order of King James I., to the south of upper High Street, and south-west of Clayholes; the Convention

or Parliament House, on north side of High Street, near Parliament Close. (There is no historical record confirming the assumption that the Scottish Parliaments met here. A very ancient mansion-house was demolished near this site in 1808, and this may have been occupied on occasion by the early Stuart Kings). The Castle Gavel and Port or Red Bridge Port, at north end of Skinnergate; Blackfriars' Monastery, in Blackfriars' ground behind Atholl Crescent; "Couvre few row" (Curfew Row); House of the Green, on site of Post Office, in 1774 at the west corner of Watergate and High Street; "Colledge Yeard," now North St. John's Place, opposite City Hall; Parsonage House, corner of Fleshers' Vennel and South St. John's Place; Earl of Atholl's House. west corner of Speygate and South Street; Turret Bridge Port, in city wall at High Street Port.

On the plan is an impression of the old seal of the town, which is similar to the city arms of to-day but the eagle has only one head.

Plan 1783.

There is a plan of Perth inserted in the corner of a map named "The Counties of Perth and Clackmanan," surveyed by James Stobie, engraved by Thomas Conder, and published in London, 1783. The scale of the map is one inch to the mile, but that of the plan of the town is 13 inches to the mile. The size of the inserted plan is 9 inches by $8\frac{5}{8}$ inches. James Stobie was Factor to the Duke of Atholl.

In addition to what is shewn on the plan of 1774, there are a few more houses added in Leonard Street, and Pomarium is partly built on. The Bank office on High Street is shewn where St. John Street is now, and the Post Office at at the west corner of High Street and Watergate. On the east side of the river what is now called Ardchoille is named Annesfield. Potterhill is called Potterfield.

As on the previous plan, the old seal of the town—the single-headed eagle—is repeated.

A second edition of this map and plan was published in 1805; a copy is preserved in the Perth Museum. In 1827 there was published by John Thomson, Edinburgh, a copy of Stobie's map, reduced to a scale of one-half inch to the mile, made by William Johnson, land surveyor, and engraved by Sidy Hall, Bury St. Bloomsbury. On this map the plan of 1783 is amended to shew the improvements on the north and south sides of the town that had been carried out in the interval. A copy of this map can be seen in the Sandeman Public Library, shewing the railways, and published by W. & A. K. Johnston about 1847. This plan, reduced to 9 inches by $8\frac{1}{2}$ inches, and amended, appears with a "Guide to the City of Perth with its Environs," by R. Morison, Perth, 1812.

Plan 1792.

"A Plan of the ancient Town of Perth and its Environs, laid down from an actual survey; and most respectfully dedicated to the Hon. Alexander Fechney, Esq., Provost; James Proudfoot, Esq., Dean of Guild; James Ramsay, John Campbell, Donald Macdonald, and John Whittat, Bailies; Thomas Hay Marshall, Treasurer; John Macewan, Convener; and the other Members of the Town Council of Perth, by their much obliged and most humble Servt., William Macfarlane. 4th June, 1792." So the title reads. It was engraved by J. Kirkwood, Edinburgh, and from an advertisement paragraph on the plan, William Macfarlane was a Land Surveyor in Perth.

The height top to bottom is 22 inches and the breadth 34 inches. The scale is 9.7 inches to the mile, imperial measure. The plan embraces the whole of the Burghmuir, Goodlyburn, Tulloch, Muirton, and Lower Craigie. On the east side of the river, Quarry Mill, Kinnoull Hill, and Barnhill are included. The drawing is wonderfully accurate, and contains a mass of detailed information not given on earlier plans of the town.

The arms of the town (the double-headed eagle), and a view of Scone Palace from the south-west, and also one of Few House, the residence of Ebenezer Marshall, Esq., of Killcairney, relieve the two top corners and bottom of the plan.

The built-up areas of the old town, and its small suburbs on the north and west sides, shew to a smaller scale the streets and buildings described on the plan of 1774, with the exception of one or two minor changes. The re-vestry on the north side of the choir in St. John's Church has been removed to form the street; more houses appear in Leonard Street, and Pomarium Street and Cross Street formed, the ground having been feued out by the Glover Incorporation. To the list of vennels there is added Cow Row and Horner's Row, both between South Street and Canal Street.

An explanatory note on the plan reads thus: "The black and dotted lines are the new intended streets, which when finished will make Perth one of the most delightful towns in Europe. It is the ancient Capital of Scotland, and still retains its former privileges."

The Blackfriars' ground, which had been feued to Thomas Anderson, is shewn laid off in streets and buildings nearly corresponding with all the streets now formed north of Mill Street, and this scheme is continued on the plan into the Balhousie lands. It was carried out a few years later, under the Lord Provostship of Thomas Hay Marshall, and was considered one of the best town planning schemes outside of Edinburgh. Not only the north side of the town, but the Spey Gardens and the Hospital lands

south of Canal Street were also planned. This led to the formation of Marshall Place and adjoining streets and the straightening of the north and west boundaries of the South Inch.

In addition to the principal buildings narrated on the plan of 1774, there now appear the following:—The Highland Kirk (Gaelic Church), south side of Canal Street, now Leslie's Printing Works); the Glovers' Hall (west side of George Street); the Perth Banking Office (also on west side of George Street); Bank of Scotland Office (west side of Princes Street); Town Register (Record Room and Town Clerk's Office, Municipal Buildings, built about this time); Cotton Manufactory (south side of Canal Street, next Gaelic Church); another two Cotton Mills (one on the Lade at Perth Foundry above City Mills, and one at Horse Cross adjoining the Barley Mill there); Perth Brewery (Wright's, North Methven Street); Bridgend Brewery (junction of Isla Road and Strathmore Street); and Craigie Brewery (Malt Barns). The Perth Bridge is referred to as a strong and handsome building, adding much to the beauty of the town. The foundation was laid in 1765, and the structure completed in 1771.

The town planning of the north end of the town indicated a change in the line of the Dunkeld Road. Up to this date the road approached the town by the considerable village at Muirton and through the middle of the North Inch to the west end of Charlotte Street; and the line of the present road up to the point where it joins the Crieff Road is marked as "Intended Dunkeld Road in a line from Almond Bridge." The erection of a new bridge over the Almond was considered in 1769. After the Perth Bridge was opened in 1771, the turnpike road to Crieff was formed along Charlotte Street, Atholl Street, Barrack Street, and northwards and westwards, and in 1791 a branch road (North Methven Street) was formed from it to join with the street between the Ports (South Methven Street).

The old Crieff Road led out of the town by the "Turret Bridge Port" (High Street Port) to the bridge on the River Turret. It is marked on the plan as the road to Tippermuir. This road led past Dovecotland to the Burghmuir, and is one of the "longcauseways" referred to in the Royal Charters of the town. Another longcauseway extended from the South Port by the Cow Causeway (Kinnoull Causeway) past Pickletillum and Viewlands Road to Burghmuir. It is designated as the "Lane to Perth Woods." A branch road is shewn leading off this road into Earls' Dykes and Needless Road past Pitheavlis Castle to lower Cherrybank and the Burghmuir. This is called the "road to Glasgow," and it is the southmost of the three longcauseways leading to the Town's Muir, or "Perth Woods" as it is designated on the plan. At this time the Burghmuir was completely covered with timber. At the east end of the Cow or Kinnoull Causeway

the old Edinburgh Road branched off, following the line of Leonard Street (across what is now the railway) past Carr's Croft and lower Craigie. The new road to Edinburgh from Princes Street through the South Inch had already been constructed, during 1769.

On the east side of the river the Isla Road is marked as "Scone Road." The new village of Scone had not been erected at this time. The present New Scone Road is marked "Turnpike Road to Coupar-Angus," having been formed in 1789 with its "turnpike" adjacent to the entrance to Rosemount (Ardchoille) in Strathmore Street.

The road in line with the bridge, passing along what is now East Bridge Street, Lochy Brae, and Gannochy, is designated the "old road to Coupar-Angus." The turnpike road to Dundee at this time passed from the end of the bridge southwards along Commercial Street. The hill road to Dundee branched off Commercial Street at the Horsewater and passed up Union Street Lane to the present line of Bowerswell Road and Hatton Road.

The lands around the town are shewn with a great degree of care. The areas of arable land are marked in a manner to distinguish them from pasture lands. The routes of burns and rivulets are clearly drawn in, and the positions of wells and fountains indicated.

About this time arrangements were made to extend the North Inch above the "white dyke" which formed the northern boundary of the original Inch and separated it from the lands of Balhousie. The racecourse is shewn extending into the portion which was added. Off the Dunkeld Road, which then passed westwards through the North Inch, a road branched at the Muirtown of Balhousie to the Bleachworks at Tulloch. It followed the line of the road which passes at present the Tollhouse on Dunkeld Road.

The fields at Tulloch, Hillyland, and Feu are named. North of the Crieff Road such names appear as Brick Park, Drying Park, Cotters' Park, Old Croft, and Feu Haugh; and south of the turnpike road are Brown Tod, Back Hill Park, "Holyland," and the plateau east of Brahan (the site of the new school) is called "Washing-house Park." Further south in the Goodlyburn area are Gallows Park and Gibbet Park. On the south side of the Burghmuir Road is the old place of execution. East of Goodlyburn are Meadowland, North Latch and South Latch. Wallshill, which then belonged to the Glover Incorporation, was west of the road to Feu House. East of Feus Road, and between it and the "King's Lead" from "Almond Water," were Claypots and the King's Butts. On the south side of Dovecotland was Messrs. Dow & Coy.'s Rope Walk.

The lands of Pitheavlis belonged to the Oliphants; Pickletillum to Lord Gray; Upper Tillylum (Rose Crescent area) to the Glover

Incorporation, as also did St. Leonard's Ley and the Hospital lands of St. Leonard's.

In addition to Oakbank Road and the roads bounding the Burghmuir, division roads are shewn. One is named the "Great Avenue," extending the whole width of the Wood from east to west, and in a line with the existing track north of the Isolation Hospital. The Burghmuir had not been feued out at this time. In the wood west of what is now Cleeve mansion-house is the "Perth Quarry,"' from which stones were taken for the erection of buildings in the district.

To the west of Newrow and Leonard Street were gardens belonging to Mr. Oliphant, Mr. Wood, and the Town. The north end of Moncreiffe Island is shewn as part of the lands of Barnhill, and the south end the property of Sir Thomas Moncrieff.

On the Bridgend side of the river the lands of "Kincarrachy" were the property of James Sharp, Esq., and Rosemount of Mr. George Meliss. Between Isla Road and the river the houses and grounds belonged to Mr. George Sandeman, Mr. W. Stewart, Bailie Marshall, Mr. Stewart (of Taybank) and Mr. Patrick Kerr (of Kinmonth). At the riverside, between Mr. Sandeman's and Mr. W. Stewart's grounds, was a sawmill driven by water from the burn in Quarrymill Den and carried down to this point in a mill lade. This place is still known to boys using rowing boats on the river as the "Sawmill Stream." Potterhill belonged to Mr. Wm. Mercer, and Bankhead to Mr. John Bissett.

The lands south of Bowerswell Road was Messrs. Dixon & Brown's Nursery. Gask Hill was an elevated piece of ground which was cut away and used as a quarry when the section of the Dundee Road opposite this point was constructed some years later. Corb's Croft embraced the northern part of Norie-Miller Park. The burn south of old Kinnoull Kirk and the Glebe formed the boundary between the lands of the Earl of Kinnoull and the lands of Barnhill (Bellwood was not yet erected). On both sides of the Dundee Road were nurseries belonging to Messrs. Dixon & Brown. The site of Kinnoull Castle is indicated, at the riverside near the laundry of Hillside Homes, and south of that was the mansion of Woodend. At the south end of Barnhill lands, on high ground overlooking the site of "Laird Walls" farm steading and the Tollhouse on the Dundee Road, is "Tay Law."

Kinnoull Hill is shewn with the "Montague's Walk" leading to the top from the Porter Lodge (the present entrance to the hill behind St. Mary's Monastery), the Goul Moire, Windy Goul, and Goul Hill; and on the Cliffs—Yellow Craigs, Horse Head, King's Garden, Stony Ogle, Eagle's Snout, and Dragon's Hole.

Nineteenth Century Plans.

Plan 1801.

On a map of the "Counties of Fife and Kinross, with Rivers Forth and Tay," surveyed and engraved by John Ainslie, there is a clearly drawn plan of Perth and its streets. This reference is given in "Old Maps of Scotland," by John E. Shearer, Stirling, 1905, page 75. Copies can be seen in the libraries of the Royal Scottish Geographical Society, the British Museum, and the Bodleian.

Plan 1806.

"This Plan of Perth, with the Intended Additions and Improvements, is respectfully Inscribed to Thomas Hay Marshall, Esq.," and appears in the "Memorabilia of Perth," published by William Morison in 1806.

It measures $10\frac{3}{4}$ inches by $8\frac{1}{4}$ inches, and was engraved by Kirkwood & Sons. There is no scale attached, but it corresponds very closely to William Macfarlane's plan of 1792. The additions and improvements mentioned in the title follow pretty much those projected on the last-mentioned plan, but as all the buildings are hachured in the same manner, it is difficult to know from the plan what really existed at that date. There are certain new features that are noticeable. Gowrie House is removed; the road to Auchterarder *via* County Place and York Place formed; Canal Street and Methven Street, as well as most of the streets that now exist at the north and south sides of the old town, are shewn as constructed; the old Council House extending across the foot of High Street is away; St. John Street is formed; and generally the area embraced by the plan is similar to the centre portions of the town to-day. The plan only extends from Earls' Dykes or Elibank Street on the west to Kinnoull Church Glebe on the east; and from Balhousie Castle and Mill on the north to the South Inch on the south part.

A front view of the "Seminaries" (the Old Academy in Rose Terrace), which were opened in 1807, is shewn at the top right-hand corner.

Plan 1808.

"Plan of the City of Perth and environs, by R. Reid, 1808." In size it is 82 inches by $43\frac{3}{4}$ inches, and drawn to a scale of 44 inches to the mile. This plan is in the Burgh Surveyor's office.

It embraces an area extending from the top of the North Inch and the Annaty Burn on the north to Craigie Malt Barns on the south; and from Tullilumb on the west to Potterhill and Kinnoull Glebe on the east.

Lithographed copies of this plan, reduced in size to 40½ inches by 27 inches, and to a scale of 32.4 inches to the mile, were issued in 1809. "Scottish Topography," by Sir Arthur Mitchell, K.C.B., and C. G. Cash, F.R.S.G.S. Edinburgh: University Press, for Scottish History Society, 1917. Vol. II., pge. 593.

[As all the plans from this date onwards, as far as the centre of the town is concerned, are very similar, to descibe them in detail would serve no purpose, and attention will be drawn only to outstanding features, developments, or improvements.]

Plan 1823.

"Plan of the City of Perth, from actual survey by John Wood, Edinr., 1823. Engraved by T. Clerk, and published by the Proprietors, Canaan & William Swinton, 60 Princes St., and J. Ritchie, High St., Edinr." It appeared in "Wood's Town Atlas," and in size it is 25½ inches by 20 inches. The scale is equivalent to 15.75 inches to a mile.

According to the references given on the plan, Cumming Vennel is Oliphant Vennel of to-day. The population of each of the four parishes is detailed, the total being 19,068. The Bank of Scotland office is on the west side of Princes Street; Perth Bank, west side of George Street; Post Office, corner of George Street and Charlotte Street; Union Bank, foot of High Street, where National Bank is now; and the Star Hotel (Star Buildings), south side of Canal Street. The various churches are shewn and the names of the ministers given.

Plan 1829.

"Plan of the proposed Works for supplying the City of Perth and its Suburbs with Water, 1829." Copies of this plan have been lithographed by Leslie, Perth. In size it is 10⅜ inches by 15⅜ inches. The scale is 12.8 inches to the mile.

The plan shews the boundary of the area to be supplied with water. From Barossa Place on the north to Marshall Place and the Inch on the south; and from Earls' Dykes on the west to the river on the east. Bridgend was not included. The receiving well is shewn at the north end of Moncreiffe Island, the suction pipe under the river, and the pump-house and tank nearly opposite the south-east corner of Greyfriars' Burial Ground (not at the end of Marshall Place). The distributing pipes are indicated along the principal streets.

Plan 1832.

"Plan of Perth and boundary of the Burgh, shewing the Ancient Royalty, and the extended line under the Reform Act. Compiled from various plans by James Rollo." It is undated. Rollo died 13th February, 1869. On the passing of the Reform

Act of 1832, plans were prepared by the several Cities, Burghs, and Towns in Scotland, and boundaries were fixed by the Parliamentary Commissioners.

On this plan the Ancient Royalty is coloured red, and the extended area up to the Parliamentary boundary is coloured green. The boundary line is fixed by points which are figured on the plan and these correspond with the legal description of the limits in respect of the Parliamentary representation of the town, given on page 549 of "Perth: its Annals and Archives," by David Peacock. There is also coloured in gold, on the plan, five small areas which are "subjects held of Subject Superiors supposed not Burgage." These are at St. Paul's Square; west side of South Methven Street, between High Street and West Mill Street; west corner of St. John Street and South Street; south side of High Street, between Watergate and the river; and at Paul Street.

The plan in size is 33 inches by 41 inches, and drawn to a scale of 12 inches to a mile. The original is in the Burgh Surveyors' office, but reduced lithographic copies have been prepared, to a scale of a little less than 6 inches to a mile, by Wm. Banks, lithographer, Waterloo Place, Edinburgh. This reduced plan is 15 inches by 18 inches in size. It extends from South Muirton on the north to St. Magdalene's Farm buildings on the south; and from Hillend on the west to Kinnoull Hill Lodge on the east.

Plan 1838 *circa*.

"Plan of Perth," published by James Morison, Junr., Perth. It is undated, but there are illustrations of public buildings upon it by which an approximate date can be fixed. The buildings are: County Buildings, 1820; Murray's Lunatic Asylum, 1827; Infirmary, York Place, 1838; and St. Leonard's Church, King Street, 1834. The Water Pumping Station, erected in 1830, is shewn, but the Public Baths in Mill Street, 1846; the Railway Station, 1847; and the old City Hall, 1845, are not indicated. The date must therefore be about 1838.

It is $19\frac{3}{4}$ inches by $13\frac{1}{8}$ inches in size, and the scale is 15.68 inches to the mile.

Lithographed copies of this plan were published by J. & D. Nichol, Montrose and Edinburgh, in 1841, along with seven other town plans accompanied with explanatory remarks, in their "Cities and Towns of Scotland."

Plan 1845.

"The City of Perth, lithographed for the Perth Directory by W. & J. Gardner, 1845." It was lithographed on stone by W. Gardner, and is $19\frac{1}{2}$ inches by 14 inches in size. The drawing and

scale correspond exactly with the plan of 1838, which shews that it must have been prepared from it.

An important change might be noted: The City Hall, which had just been completed, is shewn for the first time. It stood on the site of the existing hall.

Plan 1845-6 *circa*.

"Perth, by J. Rapkin." Published in London. The size is $8\frac{1}{2}$ inches by 12 inches, and the scale 10.56 inches to the mile. This plan is referred to in "Scottish Topography," by Sir Arthur Mitchell, K.C.B., and C. G. Cash, F.R.S.G.S. Edinburgh: University Press, for Scottish History Society, 1917. Vol. II., page 593. It is also referred to in "Early Maps of Scotland," published by the Royal Geographical Society of Scotland, 1936. It can also be seen in the Edinburgh University Library.

Plan 1858-59.

A plan, 6 inches by $3\frac{7}{8}$ inches, is attached to the Post Office Directory, 1858-59, by C. G. Sidey, Postmaster, P.O., Perth.

Plan 1879.

This plan was published by J. Young, Sons, & Watson, Printers, Perth, and shews considerable changes on the last plan. The railways had been formed in the interval, and numerous industrial premises erected. The Live Stock Auction Marts, Caledonian Road and Victoria Street, and Pullars' Dye Works in Kinnoull Street, are shewn. Balhousie Works, Campbell's Dye Works, and the Wallace Works, all on Dunkeld Road, have been built.

In size it is $19\frac{1}{2}$ inches by 14 inches, and the scale is 18 inches to the mile. This plan is affixed to "The Strangers' Guide to the Fair City," published by D. Robertson, Perth, 1881. A copy can be seen in the Sandeman Public Library.

Ordnance Survey Plan, 1863.

The Ordnance Survey of Perth and District was made in 1859-64, and issued first in 1873. The plans were provided in three scales:—

(1) The scale of the Parish Plans is the 1-2500 of the actual length on the ground, and is equal to 25.344 inches to a mile, which is very approximately equal to one square inch to one acre, the square of 1.0018 inch being equal to one acre. The length of each sheet is $1\frac{1}{2}$ miles and the width one mile. The area of each sheet is therefore 960 acres.

(2) The scale of the Plans of the County is 6 inches to a mile, and each sheet contains the same area as 16 sheets of the Parish Plans.

(3) The Plans of Towns are drawn to a scale of 10 feet to a mile, or 1-500 of the actual length on the ground.

The 25-inch and 6-inch plans of this district were revised during 1894-1900. The Ordnance Survey have also published maps 16 miles to an inch, 10 miles to an inch, 4 miles to an inch, 2 miles to an inch, and one mile to an inch.

All plans of the town subsequent to this date have been based, more or less, on the Ordnance Survey, *e.g.*, those attached to directories and time-tables by D. Leslie and J. Young & Sons, and guide books published by T. Hunter & Sons, J. Christie, and D. Robertson.

Abstract List of Plans.

Date A.D.	Author.	Scale of Plan in inches to one mile.	Size in inches.	Where Deposited.
1715-16	Louis Petit.	26.4	$14 \times 25\frac{1}{2}$	National Library of Scotland, Edinburgh.
1715-16	Not known.	14.4	$28\frac{1}{4} \times 18\frac{7}{8}$	Military Plans in British Museum—King's Collection. Photo. Prints in Perth Museum.
1715-16	Brigdr. Petit.	10.56	14×20	National Library of Scotland, Edinburgh.
1745	Jas. Leigh Jones.	19.6	$6\frac{3}{4} \times 9\frac{1}{4}$	National Library of Scotland, Edinburgh.
1745-46	Lieut. Eyres.	14.2	$13\frac{1}{2} \times 8\frac{1}{2}$	Military Plans in British Museum—King's Collection. Photo. Prints in Perth Museum.
1765	Henry Buist.	26.5	$38\frac{1}{2} \times 31$	Perth Museum. Reduced Copies in Dr. Milne's "Blackfriars of Perth."
1774	A. Rutherford.	17.6	$12\frac{1}{4} \times 16\frac{1}{8}$	"Perthshire Courier," Oct. 1st, 1889. Attached to "Rental Books of King James VI. Hospital," by Dr. Milne.
1783	James Stobie.	13	$9 \times 8\frac{5}{8}$	Inserted in Stobie's "Map of the Counties of Perth and Clackmannan." In Perth Museum. Later editions by J. Thomson and W. Johnston in and W. Johnston in Sandeman Public Library.

ABSTRACT LIST OF PLANS—continued.

DATE A.D.	AUTHOR.	Scale of Plan in inches to one mile.	Size in inches.	WHERE DEPOSITED.
1792	Wm. Macfarlane.	9.7	22 × 34	Engraved Copies. Perth Museum. Town Clerk's Office.
1801	John Ainslie.	——	——	On Map of Counties of Fife and Kinross, by J. Ainslie. Referred to in "Maps of Scotland," by Shearer. Copies in Libraries of R.S.G.S., British Museum, and Bodleian.
1806	Wm. Morison.	9.7	$10\frac{3}{4} \times 8\frac{1}{4}$	Attached to "Memorabilia of Perth." Sandeman Public Library.
1808	R. Reid.	44	$82 \times 43\frac{3}{4}$	Burgh Surveyor's Office.
1823	John Wood.	15.75	$25\frac{1}{2} \times 20$	Perth Museum.
1829	Perth Water Supply. Litho. by Leslie.	12.8	$10\frac{3}{8} \times 15\frac{3}{8}$	Sandeman Public Library. Town Clerk's Office.
1832	James Rollo. (Survey under Reform Act).	12	33 × 41	Burgh Surveyor's Office.
1832	Reduced copies.	6 (approx.)	15 × 18	Burgh Surveyor's Office. Town Clerk's Office.
1838 *circa*.	James Morison, Junr.	15.68	$19\frac{3}{4} \times 13\frac{1}{8}$	Litho. Copies. Published by F. & D. Nichol in their "Cities and Towns of Scotland," 1841.
1845	W. & J. Gardner.	15.68	$19\frac{1}{2} \times 14$	Perth Directory. By Gardner.
1845-6 *circa*.	J. Rapkin.	10.56	$8\frac{1}{2} \times 12$	Edinburgh University Library. Referred to in "Scottish Topography," Vol. II., p. 593, and in "Early Maps," by R.S.G.S.
1858-59	C. G. Sidey.	——	——	Post Office Directory.
1879	J. Young, Sons, & Watson.	18	$19\frac{1}{2} \times 14$	In D. Robertson's "Guide to Perth." Sandeman Public Library.
1863 to date	Ordnance Survey.	10 ft., 5 ft.; 25, 6, 4 in.; and less.	Sheets vary according to scale.	Burgh Surveyor's Office. Smaller Scale Sheets in Sandeman Public Library.

The earlier surveys have been drawn to old measures of length, but to enable the plans to be easily compared the equivalent of the scales is given in imperial measure.

ADDENDA.

Since the article on "Early Plans of Perth" went to press, the Town Council have arranged for photographic reproductions of the following three Plans being prepared and deposited in the Perth Museum:—

Plan 1715-16, by Louis Petit.

Plan 1715-16, by Brigdr. Petit.

Plan 1745, by Jas. Leigh Jones.

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CONTENTS

Page

II. Looking Back (Presidential Address) - - - - - - 23

III. Some Recent Developments in Scottish Prehistory 35

IV. Biology of Waterworks - - - - - - - - - 39

Proceedings—

List of Office-Bearers - - - - - - - - - xvii.

The Archæological Section - - - - - - - - xviii.

Children's Essay Competition - - - - - - - xix.

Obituaries - - - - - - - - - - - - - xx.

Abstract of Accounts - - - - - - - - - xxiii.

Meteorological Observations, 1943-48 - - - - xxv.

TRANSACTIONS
OF THE
PERTHSHIRE SOCIETY OF NATURAL SCIENCE

II.—LOOKING BACK.

(Presidential Address, read 22nd March, 1946)

By Cyril Walmesley, A.M.I.C.E., M.I.W.E.

Seventy-nine years ago, on the 28th of February, 1867, a group of 15 or 16 enthusiastic naturalists met in a room in King James VI's Hospital and founded the Perthshire Society of Natural Science.

They had in view two main objects—firstly, "to work out the Natural History of Perthshire," and secondly, "to promote the study of Natural Science."

Dr. Buchanan White, a keen botanist and zoologist, was elected President, an office which he held with great distinction until 1871, and to which he was recalled again in 1884 for a further period of 8 years, making a total of 13 years' service in the Chair.

The first Secretary was a Mr. J. Stewart, and the first Treasurer Mr. J. Bruce, both of whom held office for two years.

Following the inaugural meeting, the Society met for a time in the Glovers Hall in George Street. In 1871, a room in Kirkside was secured to serve as a store room and library, and the following year the Society found itself in a position to hire a room in St. Ann's Lane, where the library, then consisting of some 50 volumes of standard works on Natural Science, was housed, and the nucleus of a natural history museum formed. For the next 9 years the Society held its meetings in these rooms on the first Thursday of each month, commencing at 8.15 p.m.

On the occasion of the third Annual Meeting, held on 3rd March, 1870, Dr. Buchanan White opened his Presidential Address with these words:

"To-day the Society has entered upon the fourth year of its existence, and I think that we should congratulate ourselves upon the fact that the first three, and probably the most momentous years of our life as a Society, have been passed in safety. I say most momentous, for it is the progress made during the second and third years of its existence which decides whether an association such as

the Perthshire Society of Natural Science shall stand or fall. In the first year everything is novel, there is a plethora of papers and communications, and all the members are enthusiastic; but by the time the second year is reached the novelty has begun to wear off, the quarries (so to speak) from which most easily materials for papers can be drawn are exhausted, and it is only those members whose hearts and souls are in the study of nature that remain enthusiastic. But they must not be enthusiastic for themselves and their studies alone; they must be so for the well-being of their Society. And when an Association, however lengthy be its list of members, and however prosperous it may be as regards its funds, unfortunately ceases to have such members, then woe for that Society."

To-day we can read these words of one of the founders of our Society with some measure of complacency for the fact that our Association has weathered the vicissitudes of 76 Sessions since the occasion on which they were uttered, and, having survived the cataclysms of two World Wars, has now crossed the threshold of its 80th year, shows clearly, I think, that the enthusiastic spirits have not been wanting.

But their labours constitute a challenge to us, and we must meet that challenge and bear forward the torch which has been so valiantly carried by the veterans of the past and is now entrusted to us.

Continuing his address, Dr. White recalled that at the founding of the Society there were 16 members, and these had increased to 89 by March, 1870. At the 34 monthly meetings which had been held, for there does not appear to have been any summer recess, 46 papers containing more or less original matter had been read, besides other communications. These papers comprised 16 on Botany, 10 on General Natural History, 8 on Entomology, 3 each on Conchology, Ornithology and other branches of Zoology, 2 on Geology and Mineralogy, and 1 on Astronomy. Of these 46 papers, Dr. Buchanan White had contributed no less than 13 himself.

In 1871, the Society started publication of a quarterly magazine entitled " The Scottish Naturalist," and Dr. Buchanan White, vacating the Presidential Chair, took on the Editorship of this new venture. Seven years later this magazine was taken over by Messrs. Blackwood & Sons, still under the Editorship of Dr. White. Later it changed hands twice, and in 1892 it reappeared as " The Annals of Scottish Natural History."

The Proceedings of the Society for the Session 1869-70 were published in 1870 in a small volume, but thereafter until 1881 they appeared in " The Scottish Naturalist," which was the official publication of the Society. From 1881 to 1886 the Society issued its Proceedings in the form of reprints from reports of the meetings, etc., which had appeared in the " Perthshire Constitutional." It was found, however, that this arrangement had a serious drawback

in that the selection and arrangement of the matter which was most suited for newspaper publication was not always the best adapted for the Proceedings of a Scientific Society. But it must be admitted that the fullness of these newspaper reports, often plentifully interspersed with spicy Latin names and scientific jargon, suggests that the public of those days was capable of consuming, and, let us hope, digesting, much stronger meat than is considered suitable for the present generation.

In 1886, the Council decided to commence a new series of Transactions and Proceedings, specially printed for the Society under the supervision of a Publishing Committee, and in 1887 the first number of this new series was published. This series has continued to the present day, though the Publishing Committee has faded out and the work is carried out by the Editor, under the general direction of the Council, and with the aid of an endowment fund provided largely by Mr. C. G. Mathew of Craigmakerran and an anonymous donor.

The titles of the papers which have been published under the auspices of this Society range over the whole alphabet, from Archæology to Zoology, and many are of a quality of which any Learned Society might be proud, embodying as they do the results of years of painstaking observation and research. Our forerunners have contributed much to the storehouse of knowledge, particularly with regard to the nature lore of the County of Perthshire, and it must be our ambition and resolve to do our share in carrying on their labours.

When the Society was in its early teens and growing sturdily, it began to be felt that the accommodation in St. Ann's Lane was inadequate, and further, that it was very desirable that a Regional Natural History Museum should be provided wherein the natural history of Perthshire should be recorded, preserved, and exhibited to the public.

In 1877, Sir Thomas Moncreiffe, in his Presidential Address, boldly advocated the building of a new lecture hall, museum, and library. His ideas were enlarged and developed by his successor in the Chair, Prof. Geikie, " the argument being that the Society should no longer confine itself entirely to its original programme, but should promote scientific and other higher branches of education, not only by its own work in the Lecture Room and Museum, but by encouraging and giving facilities to other educational movements."

The outcome of this was the raising of funds and the building, in collaboration with other bodies, of the block of public buildings in Tay Street, the centre section of which constituted the new Museum, Lecture Hall, and Library of the Society. This was

opened in 1881, and proved so successful that within a few years we find the Council concerned with the question of extensions.

Again the necessary funds were raised, and new buildings added at the rear of the original museum. These extensions were formally opened on 29th November, 1895, by Sir William Flower, K.C.B., F.R.S., Director of the British Museum of Natural History, in London. In his opening speech, Sir William pointed out the necessity of a whole-time, trained and paid Curator if a museum is to prosper and be a useful cultural institution. This was a step which the Society had already taken by appointing Mr. Alex. M. Rodger of University College, Dundee, as the first paid professional Curator. Mr. Rodger entered upon his new duties on 1st January, 1895. Prior to this, Col. Drummond Hay had acted as Honorary Curator, and he continued in this capacity until his death in 1896.

Although the Society was in a flourishing condition at this time, its membership being in the neighbourhood of 360, the funds accruing from a membership subscription of 5/6 per year could hardly sustain the expense of a professional Curator's Salary, and other methods of raising money had to be adopted. I suspect that much of it was privately subscribed by enthusiastic members.

And may I here draw attention to the remarkable fact that the annual subscription of 5/6 per year dates from the foundation of the Society and has never been varied to this day. I wonder if any other Scientific Society has maintained its subscription unaltered for 79 years? Not only is the present-day subscription the same as in 1867, but the original entrance fee of 2/6 was discontinued many years ago. When one thinks of the difference in purchasing power of the pound to-day as compared with seven or eight decades ago, and that our membership to-day is about half of what it was at its zenith of 442 members in 1905, it is not surprising that our present-day activities are very much curtailed by comparison with those of our forerunners in the dashing '90's!

Well, to revert to our narrative, I imagine that it was the problem of the Curator's Salary which prompted the Society to pass a resolution at an Extraordinary General Meeting held on 18th August, 1896, under the Presidency of Mr. Henry Coates, to offer the Museum Buildings and their contents (except the contents of the Library and Lecture Room) to the Town Council of Perth, on condition that they should be maintained in a thorough state of efficiency under the charge of a thoroughly qualified scientific Curator, and further, that the Society should have the sole and exclusive use of the Lecture Room and Library, subject to paying a fair rent for the same.

This offer was considered by the Town Council in September, 1896, when it was resolved to defer decision for a year. Financial considerations proved a stumbling block to the negotiations, and it

was not until 1902 that the Town Council agreed to accept the free gift of the Perthshire Natural History Museum, on condition that the Society should guarantee to contribute the sum of £300 a year for a period of five years towards the cost of maintenance. By various efforts, the members of the Society raised the necessary moneys, and the bargain was duly sealed, the key being handed over in the Society's Library by Sir Robert Pullar, representing the Trustees, to Lord Provost Love.

The ensuing chapter of the Society's history covered a period of more than a quarter of a century, after which, the Town Council, having decided to devote a bequest they had received from the late Mr. Brough, to the building of a new Art Gallery and Museum which would incorporate the Marshall Monument containing the Library and Museum formerly belonging to the Perth Literary and Antiquarian Society, commenced the erection of the premises wherein we are now met. When these were completed, the premises in Tay Street would become redundant, and the Town Council decided that they should be disposed of. An agreement was thereupon come to between the Town Council and the Society, under the terms of which the Society agreed to relinquish its claim on the Tay Street premises in return for accommodation in the new premises which were in course of erection.

This new Art Gallery and Museum was formally opened on 10th August, 1935, by their Royal Highnesses the Duke and Duchess of York, now their Majesties the King and Queen; and on the 18th of November, 1935, the first meeting of the Society in the present premises was held under the Presidency of Mr. William Malloch. On that evening, this room was filled to capacity by members and their friends, when Prof. A. D. Peacock of University College, Dundee, a member of the Society, delivered an address entitled "The Amateur Naturalist." This was followed by a cinema film, shown by Mr. Davidson of Messrs. Blackadder's, depicting events in Perth during the Royal Jubilee celebrations and at the opening of these premises by T.R.H. the Duke and Duchess of York.

Having thus outlined the history of our Society, let us now retrace our steps and note some of its activities.

The Society has, at different periods, organised various "Sections" within its membership for the furtherance of special studies or activities, and has in addition played an important, indeed a leading part in the formation of some independent Societies.

The first-born of these children of the Society is the Mountain Club, founded in 1875. This Club is open only to members of the Society who have ascended a Perthshire mountain of not less than 3,000 ft. altitude and thereafter been duly initiated. The motto of the Club is: "Salix herbacea Floreat." Salix herbacea being the the dwarf alpine willow, the smallest British shrub. The Club had

its own Officers. There was the " Cairnmaster " or president, a " Scribe and Annalist," " A Quaich-bearer," a " Geometer," and a " Bard." The duties of the first two are fairly obvious. The Quaich-bearer was the purveyor of the " mountain-dew " and had charge of the Club Quaich, which has its part in the rites of the Club meetings. The " Geometer " was charged with the duty of ascertaining that the members had reached the altitude requisite for a meeting, for which purpose the Club possesses a pocket aneroid. The duties of the Bard appear to have been the most arduous for, according to the rules of the Club, it was his duty to compose a poem specially for each meeting of the Club, and these poems were by no means limited to one or two verses.

The first "Cairnmaster" was, I believe, Sir Thomas Moncreiffe, and Dr. Buchanan White the first " Scribe and Annalist."

On the death of Sir Thomas Moncreiffe, meetings of the Club were discontinued until 1884, when a meeting was held on the 28th June on the summit of Ben Chonzie, when Col. Drummond Hay was elected Cairnmaster; Mr. R. Brown, Geometer; Mr. Barclay, Quaich-bearer, and Mr. John Young, Bard. I think the Scribe and Annalist would be the indefatigable Dr. Buchanan White, though his appointment or reappointment is not specifically mentioned.

Of late years, the appointment of officials by the Mountain Club seems to have fallen into desuetude. I think it must have been the War of 1914-18 which was responsible for this. Since then, the President of the Society seems to have assumed the functions of Cairnmaster, Quaich-bearer, and Geometer, at least that is the impression I have obtained from the meetings I have attended, and from the fact that on my election to the Presidential Chair, the Club's Quaich and Aneroid were handed over to me by my predecessor in Office. Presumably the Society's Hon. Secretary is supposed to act as Scribe and Annalist, though there are few references to the Mountain Club in the Proceedings of the Society since the first World War, and the Office of Bard seems to have fallen into disuse.

In the earlier days it was customary for the members of the Mountain Club to be summonded to meet on a certain peak at a certain hour, for in a report of a meeting on Stuc a Chroin, one of the peaks of Ben Voirlich, it is recorded that the meeting was held in mist and driving rain at the exact hour for which summonses were issued.

As to the proceedings of this Club, they are discreetly veiled in mystery, for, as Dr. Buchanan White wrote in his report of a meeting of the Club on Am Binnain (?), one of the peaks of Ben More, on 28th July, 1888, " at the proper elevation on the hill a meeting of the Mountain Club was held."

The poems written for these occasions were published in the Society's proceedings.

Having attended several of these meetings, I regret to have to record the impression that they were but the ghosts of the past.

The second World War having been responsible for another hiatus in the meetings of this Club, it has not fallen to my lot to act as Cairnmaster on any occasion.

In 1876, the Society was largely instrumental in founding another Association, "The Cryptogamic Society of Scotland," whose first meeting was held in Perth.

A notable member of this Society was Mr. James Menzies, whose loss we have recently had to mourn. Mr. Menzies was a recognised expert on this branch of botany, having found many rare fungi not previously recorded in Perthshire, and distinguishing himself in 1912 by discovering an entirely new species, which was named in his honour, Calycella Menziesi (Boud).

In the year 1877, the Society made a most remarkable discovery. They discovered the astonishing fact that interest in Natural Science was not exclusively confined to the male sex. In the light of this profound brainwave they threw open their ranks to members of the fair sex, and, I am sure, profited greatly thereby.

But I do not know whether it was the ladies who were responsible that same session for the audacious proceeding of the Society in presuming to discuss the Town's Water Supply. This action of the Society in daring to discuss such a subject aroused great indignation in some quarters, where the opinion was held that the Society should confine its deliberations to bugs and beetles. But Dr. Buchanan White claimed that it was the Society's discussions which led to the extensions to the water supply which were carried out in 1887.

Seven years later, in 1884, at a meeting held in the Society's Rooms in Tay Street, "The East of Scotland Union of Naturalists' Societies" came into being, with Dr. Buchanan White as its first President, and Mr. F. W. Young of Dundee as its first Secretary. This federation covered the areas of the Counties of Aberdeen, Fife, Forfar, Kincardine, Kinross, and Perth.

The year 1899 saw two important developments in the affairs of our Society.

The first of these was the formation of the Photographic Section of the Society. The proposal had been made that a Photographic Society should be established in the City. The suggestion was then put forward that, instead of forming a separate Association, the Perthshire Society of Natural Science should be approached with the proposal that they should enlarge the scope of their activities by the establishment of a Photographic Section. The fact that a number of the would-be members of the proposed Photographic

Society were already members of the Natural Science Society, added weight to the proposal. The Society welcomed the scheme, and the Photographic Section came into being, with a membership of 38 in the first year.

The Section had its own Chairman, Secretary, and Committee, the first Chairman being Mr. J. W. Munro, and the first Secretary, Mr. Wm. Ellison.

The Section has had its ups and downs. After an enthusiastic start and a few years of vigour, it fell into a state of coma from which it was resuscitated in 1898, and proceeded to make history, for on 17th January, 1903, delegates from 16 Photographic Societies met in the Natural Science Library in Tay Street, and resolved to establish the Scottish Photographic Federation.

In July of the same year, the Photographic Convention of the United Kingdom met in our rooms under the able Chairmanship of its President, Sir Robert Pullar, and in February of the following year, the Society had the honour of playing the part of host to the newly-formed Scottish National Photographic Federation and the first Scottish National Photographic Salon.

How the Section fared during the twenty years or so following the brilliant success of this Session, I do not know, but my recollection of the period from 1928, when I had the honour of being admitted to membership of the Society, until 1935, when the Society took up its abode in these premises, is that the Section was very quiescent if not indeed moribund. Perhaps I am mistaken, but be this as it may, the Section certainly came to life soon after the removal from Tay Street to George Street, for in 1937, by the favour of the Town Council in granting us the free use of these beautiful premises and all necessary assistance, the 29th Scottish National Photographic Salon was held here in the Art Gallery. It was a most successful Salon, the beauty and interest of the exhibits being enhanced by the fine galleries in which they were displayed.

In addition to the exhibition of photographs, a number of interesting lectures were delivered in this room, and were greatly appreciated by the public.

Where many contributed so much to the success of this Salon, it is perhaps invidious to single out any one name for mention, but I am sure that those who took part in the organisation of this exhibition will agree with me that no one did more to encompass the success of the venture than Mr. J. J. Robertson, who acted with such efficiency as Salon Secretary.

Not only was the Salon an artistic success, but it also proved a financial success, and left the Society with sufficient funds in hand to purchase a good microscope and a photographic enlarger, the latter of which is in much demand by members of the Photographic Section.

To-day, the Photographic Section is undoubtedly the most vigorous limb of the Society. I hope its vigour will be emulated by other limbs, so that our Society may have a symmetrical and well-developed body, which will " do its bit " for the cultural progress of this County and City.

The second development of 1899 which proved a landmark in the Society's history was the institution of the Children's Essay Competition, which had for its object the encouragement of nature study among school children. The Subject set for the first Competition was " A Visit to the Perthshire Natural History Museum," and 45 entries were received. I believe it was the generosity of Mr. Melville Gray which was responsible for this step.

These Competitions have been held annually since their inauguration, and have been productive of some very excellent essays, showing keen interest in and observation of the wonders of Nature, together with a larger number of other descriptions.

In 1925, the Committee which had undertaken the setting up of the Charles M'Intosh Memorial at Dunkeld, having in hand a surplus of £130, handed this sum over to our Society to be invested and administered by the Council of the Perthshire Society of Natural Science, the interest therefrom to be used for Essay Competitions in Nature knowledge, open to all Schools in Perthshire, and to provide prizes therefor to be known as Charles M'Intosh Memorial Prizes.

In connection with these Competitions, the Society inaugurated, during the Session 1904-5, a Junior Section, open to boys and girls who had taken part in the Essay Competitions. The Section started with a membership of 30. Mr. Alex. Rodger, Curator of the Museum, took a great interest in this Junior Section, and did much to foster it up to the time of his death in 1914. How long the Junior Section survived Mr. Rodger's death I am not sure, but I have not come across any reference to its existence during the past quarter of a century.

Now the Council has revived the Section in a somewhat different form, as you have heard earlier this evening, and we hope that it will prove attractive and beneficial to a number of our young friends, and that they, when they say good-bye to the Schoolroom and are no longer eligible for Junior membership, will remain in our Society as Associates or full members.

And I would say to you, Junior Members, do not hesitate to make known your interests and wherein you desire help, for the Society wants to help you in your study of the wonders of Nature, and I am sure that you can help the Society, if only by asking intelligent questions. There is no better way of discovering how little one knows of any subject than by trying to explain it to another.

But it is not only indirectly that the younger generation can help

in the advance of the knowledge of Nature. A few weeks ago, a faint star, normally quite invisible without a telescope, suddenly became quite bright and then quickly faded again. And the first person in Britain to notice the outburst and to bring it to the notice of the Astronomer Royal, was a 15-year-old boy.

For many years prior to 1935, when the Society's centre was changed from Tay Street to George Street, the members evoked considerable interest in archæological matters, and studies in this section were carried on conjointly with the natural history, anthropological, and photographic activities of the Society.

In the summer months, the botanical excursions were often arranged to include a visit to some relic of the past.

Recently, a Council for Archæology has been set up in London, and the country divided into regions of which Scotland is one.

A number of Societies akin to ours have joined the Scottish Regional Group with the object of encouraging the study of Archæology and assisting the constituent Societies in the provision of speakers.

The youngest Section formed within the Society is the Microscopical Section, which was started in 1934. After holding five very promising meetings, just before the removal from Tay Street to these premises, it fell into abeyance, but it is hoped that it will now come to life again, if sufficient interested members turn up at our Friday evening Club meetings.

As long ago as 1883, the Society held a very successful Microscopic Exhibition, and some fine papers on microscopical matters appear in our Transactions, notably under the authorship of Mr. G. F. Bates.

Mention may here be made of some Publications of interest, other than the Scottish Naturalist and the Transactions, for which the Society has been responsible.

The first of these was the Guide to the Perthshire Natural History Museum, compiled by Dr. Buchanan White, the first edition of which was published in 1884.

In the Session 1892-3 " The Natural History of the Banks of the Tay " was published in book form, as well as appearing in the Transactions. This was a symposium, comprising papers on the physiography, stratigraphical, and physical geology, surface deposits, flowering plants, mollusca, birds and mammals of the Tay, and also the chemistry of the water, each paper being by a different author.

In 1897, the Society published Dr. Buchanan White's " Flora of Perthshire " under the editorship of Prof. J. W. H. Trail of Aberdeen, one of the most complete regional floras which had then appeared.

In this brief and very incomplete outline of the history of our

Society, I have said little or nothing of the men and women who have contributed so much to its success and high standing. Indeed, it would be impossible to do justice to them in a single paper. The names of a few—a very few—of the " enthusiastic spirits " have been mentioned incidentally, but there are many others which have not been referred to, and I would suggest that some member with a biographical flair might recall for us on some future evening the lives and work of those who have contributed so much to our Society.

The Society has retained many of its officers for long periods. I am only the eleventh member to occupy the Chair to which you have done me the honour of electing me, and when I look at the list of names of those who have occupied this Chair in the past, I feel something of a dwarf sitting in the seat of the giants.

Dr. Buchanan White, Botanist and Zoologist, served 13 years in all as President, 12 or 13 years as Editor, and 2 years as Secretary.

Col. Drummond Hay, an authority on birds and fishes, was President for 2 years, and Hon. Curator for 12.

Sir Thomas Moncreiffe, a keen Lepidopterist, was in the Chair for 5 years, and was Cairnmaster of the Mountain Club.

Prof. James Geikie, famous Geologist, held the Presidency for 2 years, and was followed by Mr. Henry Coates, Geologist and Conchologist, who reigned for no less than 15 years (a record), which has not been beaten, although his successor, Mr. William Barclay, Botanist, held office for a period of 14 years.

Mr. G. F. Bates, Geologist and Microscopist, was President for 8 years, being followed by Mr. James Menzies, Botanist and Mycologist, whose loss we have recently mourned, and who held office for 2 years.

One Past President is happily still among us, and will, we hope, be long spared to be our guide, counsellor and friend. I refer, of course, to Mr. William Malloch, who was President for 4 years and a guiding spirit for, I imagine, a quarter of a century or more. Mr. Malloch's interests are so wide that I hesitate to attach any label to his name, but I belive that, among other subjects, he knows a thing or two about fishes!

One other name remains to complete the list, that of Rector Edward Smart, Botanist, who occupied the Chair for 4 years, and who, alas, is no longer with us.

Our Secretaries and Treasurers have in some cases seen even longer periods of service than the Presidential record.

During the first 7 years, the Society had 4 Secretaries, then Mr. J. Young held office for 11 years, to be followed by Mr. S. T.

Ellison, who served for no less than 35 years—an enthusiast if ever there was one!

Mr. Ritchie was Secretary for 12 years, and Mr. W. C. Burt for 10.

Up to 1877, the Society had a new Treasurer about every 2 years, then we have Mr. M'Gregor holding office for 7 years, Mr. John Stewart for 16, Mr. A. W. Brown (who, I am glad to say, is still with us) for 14, the late Mr. James Winter for 23 years (the record), and Mr. J. F. Cumming, who has had to resign office owing to removal from Perth, for 7 years.

Mr Rodgers and Mr. M'Alpine have a long way to go to beat these records, but I hope they will have a good try.

I hope that this very inadequate sketch of the past will have served in some measure to show the worthy part which the Perthshire Society of Natural Science has played during the past three-quarters of a century, and that those present this evening who take part in the centenary celebrations of the Society 21 years hence will be able to claim that the last quarter-century was worthy of the first three.

III.—SOME RECENT DEVELOPMENTS IN SCOTTISH PREHISTORY.

By Margaret E. Crichton Stewart,
M.A., PH.D., F.S.A.SCOT.

The war years, between 1939 and 1945, might well be regarded as a period of stagnation for archæological research, but a cursory glance at the Society of Antiquaries of Scotland Proceedings for that period will astonish not so much by the quantity as by the quality of the knowledge which came to light during that time. These years have seen the recovery of essential information which has helped to fill the gaps in the archæological record of Scotland, and in this paper, attention will be drawn to those finds and researches which have particular bearing on the Neolithic and Early Bronze Ages.

For some time there has been cumulative information about the burials in the great series of chambered cairns throughout Scotland, but practically nothing was known of the domestic lives of the people who built the cairns and are presumably buried inside. There are a number of so-called "open sites," where shards of typical Neolithic pottery have been picked up, but it is inconceivable that the ruling caste, whose bones rest in such elaborate structures, lived in make-shift wattle or skin shelters on the sands at Glenluce, among the dunes at Gullane, or on the foreshore at Rothesay. More permanent dwellings must exist, though so far, in Scotland, the ideal association of chambered cairn and village community has not been found.

In Ireland, such an association probably exists at Carrowkeel, in Sligo. There, on the summit of a limestone ridge, are five magnificent chambered tombs, and at a lower elevation, the site of a village community represented by over fifty round huts, some as much as 45 ft. in diameter. Some connection between the settlement and the adjacent cemetery on the hilltop is highly probable.

Though no similar site has yet been recognised in Scotland, evidence of a rather different kind has recently been revealed. Excavation has disclosed the permanent settlements of two compact communities, whose inhabitants, though they may not have been the builders of the chambered cairns, certainly existed contemporaneously with the period of these monuments.

The village of Skara Brae on the Bay of Skail, Orkney, was excavated between the years 1928 and 1930, and an intensive study of the culture revealed there was made by Professor Gordon Childe. The villagers of Skara Brae had no knowledge of metal or of agriculture, but, though they lived in a Neolithic context, this was no proof that chronologically they should be placed within the so-called Neolithic period. Orkney was then, as now, Ultima Thule, and a

primitive community might well have persisted there long after its appropriate period in time had passed away. So the absence of metal was no criterion as to date, and the lack of comparable relics in a known context elsewhere gave rise to prolonged uncertainty as to the exact position of Skara Brae in Scottish prehistory.

Just before the outbreak of war, work was commenced on a second village site in Orkney, at Rinyo, on the island of Rousay. The village and culture revealed at Rinyo are in all essentials similar to that found at Skara Brae, but, in 1937, at Rinyo, an early Bronze Age Beaker pottery shard was found in one of the latest occupation levels and, more recently, the earliest occupation level in one hut at Rinyo yielded a fragment of typical Neolithic pottery, such as is known from the chambered cairns in Orkney. This shard is conclusive proof that the earliest huts at Rinyo were occupied while the communal chambered tombs were in use.

The villages of Rinyo and Skara Brae may, then, be regarded as permanently settled Neolithic communities whose inhabitants, though they certainly were not the builders of the chambered cairns, existed at a time when these monuments were in use.

In 1939, Sir Lindsay Scott described a site on a tiny island in an inland loch in North Uist, which he interpreted as a settlement of Neolithic specialist potters. The site was too small to provide either pasture or tillage, but it revealed the remains of a habitation and two pottery kilns, with a vast accumulation of broken shards. The kilns had been in use over quite a long period of time, and their output must have been far greater than was needed to meet the demands of the tiny community on the island or even of the prehistoric population on the shores of the loch. It has been suggested that these kilns were manufacturing Neolithic pottery for export. Certain of the shards are very similar to pottery from chambered cairns on the island of Rousay, in Orkney, but this fact is hardly sufficient to support the theory of an early export trade from a Hebridean manufactory.

Verification would require the petrological examination of shards from every Neolithic domestic site in the west and north of Scotland, and, so far, nothing approaching the required scale of research has been undertaken.

At the same time, these are the first Neolithic kilns manufacturing chambered tomb pottery discovered, so far, in Scotland. Further survey within the chambered cairn province should reveal other similar sites, and may disclose not only an early specialisation in the manufacture of pottery, but a system of barter and exchange.

In the Proceedings of the Society of Antiquaries for 1942-43, Professor Childe records the existence of a long and probably chambered cairn on the south side of the Earn opposite Crieff at a site named Rottenreoch on the Ordnance 1 inch map.

A study of the distribution of chambered cairns in Scotland shows how the vogue for this type of tomb passed west to east primarily via the north of Scotland. But that there was also overland contact between east and west is proved by the presence in Perthshire of chambered cairns of a type known mainly from west and south-west Scotland.

Including the example just cited at Rottenreoch, the others are located at Kindrochat, near Comrie, and at Auchnafree in Wester Glenalmond. The Kindrochat cairn was excavated some years ago by Professor Childe. Rottenreoch lies only a few miles to the eastward, and also in the valley of the Earn.

In 1943, Professor Childe described a megalithic cist within the grounds of Ardmarnock House, near Kilfinan, Argyllshire. The cist is really the denuded chamber of a long cairn, the loose stones of which have disappeared in the course of centuries. The cist has been much disturbed, principally owing to trees having been planted over the site, but the enormous side slabs, each measuring nearly six feet in length, are still *in situ*. Although the chamber itself is 5 ft. 6 ins. in height, it is closed by a transverse slab which is only just over 4 ft. in height, and whose upper edge has been hollowed out to a depth of 3 inches. A foot below the hollow, but not directly below the centre, is a cup mark pecked out by hammering on both sides of the slab. The outer cup mark is surrounded by a well-defined ring cut in the stone, and the two cups correspond with a remarkable precision. It seems fairly certain that the intention of the builders was to cut a hole through the slab. Now it has been established, mainly through the comparative studies of Professor Childe, that the Scottish chambered cairns find their closest prototypes all along the Atlantic seaboard from Ireland to the Mediterranean, so that it is not surprising to learn that tombs of this type in Portugal, Brittany, Ireland, and the Isle of Man, amongst other places, are often closed by so-called porthole slabs. These are either single slabs, or pairs of slabs trimmed to form an aperture when joined. But, going further afield, prehistoric rock-cut tombs in Sicily and certain graves in Sardinia were entered by a small window or square cut in the closure slab. Is it possible that the builders of the Ardmarnock cist, confused by a dual folk-memory of hollowed out portholes and actual apertures cut in the closure slab, finally turned their pecked hollow into a genuine cup mark by surrounding it with a ring, and thereby bringing it into line with the hundreds of other examples widespread in just this part of Argyllshire? Whatever the plan in the minds of the builders, this slab is unique among the chambered cairns of Scotland.

In 1931, two very remarkable Early Bronze Age burials were unearthed near Kirkcaldy. The relics have recently been re-examined, and the results reveal what a wealth of human detail can

be derived from archæological discoveries through the strict application of scientific methods.

The two graves were within a few feet of one another, and were built of a type of freestone not known in the immediate locality.

The first cist, when opened, contained a skeleton which crumbled to dust on being exposed to the air, a beaker urn of a rather degenerate type, a bronze blade with a haft of hazelwood, a bronze pin, a flint flake, twelve conical jet buttons, and an elongated jet bead.

The beaker has been very crudely decorated by an incised chevron pattern. On the upper part of the pot the clay was already too dry when the decoration was made, and this may indicate that the potter drew the pattern when the pot was inverted mouth downward.

The little bronze blade is really a pin hammered flat, and its hazelwood haft is from 3 to 4 inches in length. As the cist probably contained the skeleton of a woman, the hazelwood-handled knife may have ranked high among her treasured possessions.

The bronze pin, though on examination it was found to be rectangular in cross-section at one end and circular at the other, was probably a needle, and may even have been hafted on wood or bone.

The jet buttons are beautifully graded for size, and because of their type of perforation, were presumably sewn on to some fabric by way of decoration. This is the largest single find of these buttons in Scotland, though isolated specimens are well-known in Early Bronze Age graves.

In the second cist was the skeleton of a male, which had been covered by some leathery material. A knife-dagger hafted in bone and a sheath, to which adhered fragments of woven fabric, were lying by his side. The bronze knife-dagger has been very much corroded, and the point is missing, but enough remains to show it had been round-heeled and fastened to a bone haft by three rivets.

The sheath consisted of two layers of hide sewn together with a thread of sinew. An additional piece of hide had been sewn round the mouth of the sheath in order to strengthen it. This additional strip had been perforated with holes in which fragments of a hide lace could still be seen. The sheath had been carried in a leather frog.

The fabric which was seen to be adhering to the leather had been woven from vegetable fibre.

These, then, are some of the latest finds and researches in early Scottish prehistory, which, despite the war years, has shown a vigour and initiative which augurs well for the future.

IV.—BIOLOGY OF WATERWORKS.

By Cyril Walmesley, A.M.I.C.E., M.I.W.E.

To the Civil Engineer engaged upon the design and construction of any form of hydraulic works, water is first and foremost a fluid having certain well-defined physical and mechanical characteristics.

In his youth he was taught that water had the formula H_2O. In his professional life he must frequently wish that the fluid with which he has to deal were simply H_2O—and nothing else !

The remarkable solvent capacity of water renders the existence of natural unadulterated H_2O impossible, and the Engineer has to take into account the very complex chemical properties of the natural fluid when selecting the materials of which he builds his structures.

To the man concerned with the construction and more especially the maintenance of works for providing a supply of *potable* water, the chemical properties of the liquid are of even greater importance, for not only is he concerned with its action in corroding or forming deposits in his mains, or in carrying into solution poisonous materials such as lead; with the necessity of removing excessive quantities of salts from hard waters; or with the reaction of the water to the chemicals used in purification; but he has to take into account the fact that upon the nature of the dissolved gases or salts depends the character and abundance of the flora and fauna which it will support. Minute and unsuspected changes in the quantity or relative proportions of these salts, changes in temperature or in periods of storage often have a remarkable influence on the organisms which make it their habitat.

As an example of this I may cite the case of two small service reservoirs constructed side by side, of the same depth and form, supplied from the same pipe which divides into two branches, one discharging into each reservoir, in similar positons, the outlet pipes being also joined. When I emptied each in turn for cleaning and examination, I found considerable differences in their flora and fauna. For example the walls of one were covered with patches of the fresh-water sponge, but no trace of this was found in the other. The only factor to account for these differences is that the pipes leading to and from the one containing the sponges were larger than those serving the adjoining reservoir so that there was a more rapid circulation of water in the one than in the other. After refilling, the differences remained, for although the sponges have not reappeared so far, the plankton is rarely the same in both.

I propose, therefore, in this talk, to note a few of the biological problems with which the Water Engineer has to contend, aided by his invaluable colleagues the bacteriologist, the chemist and the

biologist. These problems are extremely diverse and it is impossible to do more than refer briefly to some of the more usual ones.

Beginning with the lowest forms of life, the most familiar organisms are the bacteria. (I use this term in a loose sense to indicate the general order of "microbes.") Water supplies drawn from deep wells are, normally, free from all forms of life, unless surface water finds access through fissures or permeable strata which have not been efficiently sealed off. But in the majority of water sources, bacteria are more or less abundant, and it is the duty of the Water Engineer to so design and operate his works that the water which is delivered to the Consumer shall contain a minimum number of such organisms and that the permitted quota shall not contain any that are pathogenic to man. The variety of the bacterial flora of water is very great, but fortunately the number of species which are harmful is small. Of the latter the best known are those of Typhoid and Paratyphoid, Cholera, Dysentry and Gastro-enteritis.

Provided that these enemies of mankind are absent, we can regard without apprehension a bacterial count of a hundred or more of the harmless varieties per c.c. Fortunately for us, the pathogenic bacteria are not indigenous to water and do not thrive or indeed survive therein for very long. The mere process of storage for some weeks before use provides a very effective defence against these objectionable parasites, provided of course that the water is guarded against contamination whilst in storage.

For example, the late Sir Alexander Houston showed that one week's storage served to eliminate the typhoid bacillus from a water containing at the start 56 of these organisms in every c.c., while three weeks served to eliminate a contamination of 37,800 per c.c. He also found that one week's storage killed off 99.9% of the dreaded cholera vibrios.

The principle source of pathogenic bacteria in water is sewage, and the prepondering organisms in sewage are those of the colon group. These are always present in all faecal matter and greatly outnumber any of the more inimical organisms which may or may not be present. The presence of B.coli in water is therefore a danger signal indicating contamination by faecal matter. While B.coli are not so far as I am aware themselves pathogenic, they are apt to keep bad company, and if present in any quantity, may be accompanied by dangerous organisms, though in much smaller numbers. If then the colon bacilli are found to be absent from a sample of water, it may confidently be assumed that no pathogenic bacteria are present.

Unfortunately, the bacteriologist cannot differentiate definitely between the colon organisms derived from human sources and those emanating from other warm-blooded animals, and a water *may* contain a relatively large number of such bacteria without danger.

In the absence of such knowledge we must however regard with suspicion any water which contains these ubiquitous organisms.

As the colon bacilli can in favourable circumstances multiply outside the animal body their numbers may not invariably be proportional to the amount of contamination entering the water supply.

Being a relatively hardy form, this organism is much more difficult to destroy in water than the pathogenic bacteria for which water is an uncongenial medium, so that when the Water Engineer by the various methods of purification, succeeds in reducing the content of colon bacilli to such an extent that they are not present on the average in 50 or 100 c.c. of the sample, he is confident that the more undesirable forms are absent.

Another fact for which the Water Engineer can thank his stars is that none of the disease-producing organisms viable in water are of the spore-producing kind.

The bacteriologist in reporting on his examination of a sample of water, usually states that he found typical B.coli present or absent in quantities of the water ranging from 1/10th to 100 c.c., and gives the number of organisms viable at blood heat on nutrient agar after 2 to 4 days incubation and a similar count on gelatine incubated at 20°—22°C, i.e., room temperature.

In addition, the presence or absence of B. Welchii, alias B.enteriditis sporogenes is frequently investigated and if circumstances render it desirable, other organisms such as streptococci may be sought for.

The Water Engineer is not a bacteriologist, and he relies on the specialist to tell him if the water is safe or not. A detailed enumeration of the species of bacteria present in the water for which he is responsible would, generally speaking, convey little to him. He should, however, be able to interpret the significance of a simple report such as is usually furnished in routine bacteriological examinations, so that he may understand and appreciate the effect of, or necessity for, variations in the treatment to which the water is submitted, in order that the best results may be obtained. A bacteriological report requires for its proper interpretation a knowledge of the history of the water from its source to the tap, and the Engineer is naturally in a better position than anyone else in respect of this knowledge.

It not infrequently happens that where, as is often the case, water after filtration and perhaps sterilization is stored for some days in open service reservoirs, the water leaving the reservoir compares unfavourably as regards bacterial contents with the practically sterile water entering the reservoir. This aftergrowth as it is called is closely related to the growth and decay of plant life in the reservoir. When algae are in active development the

water becomes well oxygenated and bacterial development is inhibited thereby, but as the algae die and decompose later in the year, they afford food for any stray bacteria enabling them to multiply rapidly so that while the total bacterial count of the water entering the reservoir may be one or two per c.c. the outgoing water may at times contain some hundreds per c.c. In the absence of any contamination of the reservoir these organisms are mainly those associated with vegetable matter and have little significance from the health point of view. If spore-bearing organisms are present in the raw water, their spores may find their way past the filtration plant and being resistant to chlorination, survive to enter the service reservoirs, where, if conditions are favourable they may change to the vegetative state and cause a rapid increase in the bacterial flora.

The modern method of sterilization by chloramine, i.e., a compound of chlorine and ammonia, provides an effective barrier against such aftergrowths, since it allows of the maintenance of a sterilizing residual throughout the period of storage so that the outgoing water is as practically free from bacteria as the incoming.

While the majority of the bacteria with which the Water Engineer has to deal, only reveal themselves to the bacteriologist, there are certain forms which, though not of the pathogenic variety, can cause very serious trouble in a water supply. Of these the so-called iron bacteria are sometimes serious offenders. They are thread bacteria which develop in waters containing iron and organic matter in solution. They cause the precipitation of the iron as insoluble ferric hydroxide and this is retained in the gelatinous sheaths in which the bacterial cells are enveloped. The sheaths thus become hard and rigid and as the bacterium continues to grow and extend itself beyond the dead encrusted part of the thread, its filament soon attains a length of several millimetres. If this growth takes place in the water mains their carrying capacity may become seriously diminished and as the filaments are detached from time to time, as for example by an increase in draw off, the floating particles cause a discolouration of the water and give rise to complaints.

The most dreaded of these organisms is Crenothrix polyspora which is liable to develop in well or ground waters containing organic matter and ferrous salts in solution. It consists of a gelatinous tube or sheath containing cells not unlike many of the filamentous algae, but much smaller and of course devoid of chlorophyll. As its name indicates, it produces spores, both macro and micro spores, and is thus able to multiply at an amazing rate if conditions are favourable. It may develop in wells, reservoirs, open or covered, on filters or in pipes, and has occasionally given rise to serious calamities as at Cheltenham in 1896, Berlin in 1878 and Rotterdam in 1887, when it suddenly developed to such an

extent as to make the water unfit for use. It attaches itself to any convenient object—stones, water weeds, walls of reservoirs or pipes, etc.—or may occur as gelatinous masses on the floors of reservoirs.

Another common form of Iron bacterium is Leptothrix ochracea which occurs as ochre-coloured flocculent masses in boggy pools or ferruginous waters, and is perhaps the species most frequently met with. I have usually found this in open waters, and occasionally in covered water ways, but so far I have never found it occuring in water mains.

Leptothrix consists of gelatinous filaments, often reaching the considerable length of several millimetres. The young threads are transparent, but as iron is deposited in them they turn reddish yellow and eventually become completely clogged and rigid with iron oxide. No cell structure is visible even when stained.

In water mains, so far as my experience goes, the usual form of iron bacteria is that of Spirophyllum ferrugineum. This organism has the form of a flat ribbon with thickened edges, twisted so as to form a sort of screw. Like the other members of its class the young threads are transparent, but as time goes on, they become encrusted with precipitated iron oxide and their form unrecognisable, unless the salts are removed by treatment with acetic acid. No cell structure is visible, but the threads, in addition to longitudinal growth, also produce a sort of bud, called a conidium, which developes into a new ribbon. Another form said to be very common in water pipes is Gallionella ferruginea. This is a thread very similar to Leptothrix, and like it showing no cell divisions. It has the peculiarity of bending double like a hairpin and the two arms then twist round one another to form a double spiral. In this state it presents a close resemblance to Spirophyllum. Like Spirophyllum it produces Conidia. Personally, although I have found it in open waters I have only found it occasionally in water mains.

Other forms less frequently found in connection with water supply are Cladothrix dichotoma, Clonothrix fusca, etc.

The part which iron bacteria play in the formation of the nodular incrustation so frequently found in iron water pipes is by no means completely known. I have found such incrustations almost entirely composed of living threads and dead sheaths of Spirophyllum, whilst in other cases, as for example at Perth, no trace of iron bacteria is to be found in the incrustation.

. . . . . .

Leaving the bacteria, the next class of organism which demands our attention is that of the algae and diatoms.

These minute plants are an important factor in most water

supplies. As allies of the Water Engineer they play a predominant part in slow sand filtration, forming as they do the major part of the surface scum on which the effective work of the filter depends. Yet even here they are not an unmixed blessing, for if they are too abundant in the raw water or too vigorous in their growth and multiplication on the beds they quickly choke up the filters, necessitating the frequent cleaning of the latter. In such cases it is often necessary to subject the raw water to preliminary screening through a bed of relatively coarse sand and gravel to remove the bulk of the unwanted vegetation, or to reduce its growth by chemical treatment.

If the filtered water is stored in open service reservoirs, as is frequently the case, algae are liable to develop therein and become a serious nuisance. Being chlorophyll-bearing plants they can only live in waters exposed to light and consequently are most abundant during the summer months, although the diatoms may reach their maximum development during the spring and again in the autumn.

Algae are not in themselves detrimental to health, indeed during their active growth and accompanying evolution of oxygen, the bacterial flora of a reservoir may be greatly reduced. But when they die and decompose in the winter they provide food for saprophytic organisms, so that it is often found that the seasonal variation in the numbers of algae and bacteria in a reservoir or lake are in inverse ratio. In some cases at least it is probable that the algal cells actually ingest bacteria and thus purify the water.

But living or dead, algae are often a source of great annoyance—choking screens and filters and necessitating continual cleaning. From service reservoirs they pass into the mains where they die and are deposited, to reappear as brown floating particles or masses in the consumers' taps, whenever an extra rapid draw off or other disturbance stirs up this sediment. They may occasionally develop in service reservoirs to such an extent as to render the water green and cloudy—even to the extent of making it unusable.

From a Waterworks point of view, algae may be divided into two main classes—the nekton or fixed forms, such as the filamentous algae, Spirogyra, Zygnema, Ulothrix, etc.; some of the colony forming diatoms such as Gomphonema, Tabellaria, etc.; and the plankton, or free floating forms, whose number is legion and size often extremely minute.

Some forms belong to both classes at different stages of their career.

Of the two forms I consider the plankton the most troublesome. Given favourable conditions these forms can multiply at such a rate as to change a clear service reservoir into a turbid one in a few days, and worse still, some of the organisms have the unfortunate

characteristic of secreting certain essential oils with very powerful flavouring properties.

When such organisms develop in a service reservoir, complaints of taste and smell soon begin to come in from consumers, although no trace of such may be found in samples taken direct from the affected reservoir. This is due to the fact that the flavouring substance is not given off until the disintegration of the organism secreting it is brought about by the pressure in the mains or by heating of the water, just as the scent of a geranium is given off when the leaf is crushed. But nothing will convince the unfortunate consumer that the " aroma " is as harmless as that of, say, tea, and that he is not in imminent danger of contracting all sorts of diseases from drinking the water. Needless to say the Water Engineer comes in for a storm of abuse. Some investigators have classified odours produced by various organisms as aromatic, grassy, fishy, violets, nasturtiums, etc., but the consumer uses less euphemistic epithets.

Among the diatoms and algae which may cause taste troubles are Cyclotella, Asterionella, Fragillaria, Synedra, Cladophora, Coelastrum, Ulothrix, Anabena, Oscillatoria, Aphanizomenon, etc.

Some algae have the power of extracting the half-bound CO_2 from Calcium or Magnesium bicarbonates in water and may thus cause a rapid change in alkalinity.

I have known the reaction of a mountain stream with a flow of about 2 million gallons per day change from neutral in the early morning to a decided alkalinity in the evening of a bright summer day. Water was being taken from the stream and passed through mechanical filters for domestic purposes, pending the completion of an impounding reservoir. When making the routine tests later in the day than usual during a hot summer, I was astonished to find the raw water gave an alkaline reaction. The rocky bed of the river was covered with filamentous algae and it occurred to me that this might be extracting CO_2 from the water during the period of insolation. Tests showed that the reaction in the early morning was neutral and rose progressively until evening, having become alkaline by afternoon. During the hours of darkness the plants absorb oxygen and give out CO_2, and the reaction became neutral again during the night.

That the action was indeed due to algae was proved by putting samples into jars, with and without algae, exposing one set to sunlight and keeping the other in darkness.

Algae and Diatoms provide food for sponges, polyzoa, protozoa, mollusca, etc. So that even if not troublesome in themselves, they may support the existence of more objectionable organisms.

The higher forms of plant life such as Anacharis, the Potamogetons, Water Crowfoot, Chara, Myriophyllum, Bladder-

wort, Ceratophyllum, Nitella, Lemna, etc., are usually only found in the *storage* reservoirs of waterworks. While during their period of active growth they oxygenate the water and are thus far beneficial, their decay provides food for saprophytic organisms, and may occasionally cause objectionable tastes or odours. Coming adrift they can cause great trouble by choking the outlet screens, etc., while the broken particles may reach the filters or service reservoirs and cause trouble there. Unfortunately, the methods which are available for dealing with algae are not applicable to these higher plants, and the only treatment so far discovered is their bodily removal, whenever the growth becomes extensive enough to cause trouble. This is a costly and difficult job and in many cases almost impracticable. (A local example is Anacharis in the South Inch Pond.)

Before leaving the vegetable for the animal kingdom, it might be of interest to mention an experience which I think may rightly be included within the scope of this talk.

Thirteen years ago, in the month of May, on visiting Viewlands Reservoir, I was not a little perturbed to find at one corner a floating film, some square yards in extent, of what appeared to be bright yellow paint, though without any sign of oil. Thinking that some miscreant had tipped some noxious substance into the reservoir, I secured a sample for examination, and then skimmed off the remainder and removed it from the reservoir. Upon examining the yellow substance under the microscope, I was astonished to find that it was pine pollen. As the nearest pine trees are some miles away the presence of the pollen was very surprising and provided a striking illustration of the way in which minute particles such as spores can be disseminated by the wind.

Since then I have looked for this phenomenon every year and have always found a little pollen in May or June, especially after a high wind.

Let us now take a brief glance at the fauna of waterworks. Beginning at the bottom of the scale, the first organisms with which we have to deal are the protozoa. Water containing decaying vegetable matter will almost always be found to contain numerous microscopic animalculae such as Amoeba, Paramecium, Vorticella, various Monads, Euglena, Dinobryon, Coleps, Chilodon, Euplotes, Stentor, Peridinium, Ceratium, Volvox, Pandorina, Synura, Actinosphaerium, etc.

These are single-celled organisms, mostly furnished either with cilia or flagella with which they swim through the water, or being stationary, cause a current to flow past them bringing food with it. They feed on bacteria, algae, diatoms, etc., and act the part of scavengers. They are most entertaining to watch under the microscope, but this is small compensation for the trouble which they can

cause if present in large numbers. Like the algae, some of these organisms can impart disagreeable flavours to the water they inhabit, Dinobryon, Pandorina and Synura being particularly notorious in this connection.

A little higher in the scale of existence are the Rotifers or so-called wheel animalcules, and various microscopic worms.

Sometimes these little creatures are so numerous as to cause trouble at the outlet screens.

At a waterworks with which I was connected before coming to Perth, the water from the storage reservoirs was passed through a double battery of wire-cloth screens, having 14,400 meshes to the square inch. A staff of men was kept at work day and night in the screening chambers cleaning the screens as they became choked. At one time these men were involved in a strike, and the head-quarters staff took over their duties for a few weeks. It was an interesting experience, for the material arrested by the screens varied very greatly both in nature and quantity, and often within very short periods. Normally the screens required cleaning every hour or two, but at times, particularly when a thunderstorm approached, the screens choked up so rapidly that we could hardly keep pace with them. The bulk of this spate of plankton consisted, at that time, of rotifers. I took a tubeful of these away with me intending to examine them under the microscope next morning, but when I opened the tube I found only a decomposed mass with a highly unpleasant smell. These minute creatures decay with great rapidity after death.

On another occasion I found the screens retaining what looked like thick green paint, and found this to consist of an almost pure culture of Volvox.

The Polyzoa have, I am told, few representatives in Scottish waters, and personally I have only found the common Hydra, and on one occasion, Plumatella repens, but in one Scottish Burgh, great trouble is caused by Paludicella.

In the south of England, however, these creatures are more common, and as they find a congenial home in water mains, provided that the water contains sufficient food for them, they sometimes cause serious trouble by choking up the mains and services. In some instances, when the installation of filtration plant has removed their food supply, their wholesale death and decomposition has provided a most disconcerting problem for the Water Engineer.

The Polyzoa are among the most beautiful of objects under the microscope, especially when seen illuminated on a dark ground; but they are not desirable ornaments for a waterworks.

The Crustacea are represented by the so-called water fleas—Daphnia, Cyclops, Canthrocamptus, Diaptomus, Bosmina, Sida, etc., the fresh water shrimp, Gammarus, and the fresh water louse,

Asellus. These creatures are visible to the naked eye, and the appearance of one in John Citizen's tumbler is apt to make him feel peevish.

They may occur in such quantities as to choke up screens and filter beds.

The so-called fresh water louse, Asellus aquaticus, is sometimes found in enormous quantities in pipes, and for years presented a baffling problem to the management of one water authority which I served. The supply was derived from upland streams, impounded in reservoirs, and receiving no treatment other than passage through fine screens. Although of excellent quality, the water contained sufficient food in the form of diatoms and minute algae to support the life of these creatures, who in their turn, provided means of subsistence to larger troubles.

The fresh water shrimp, Gammarus Pulex, is very wide-spread and is probably to be found in most storage reservoirs. I have not found it thriving in mains, though it is quite possible it will do so. Though quite harmless in themselves, one would get a nasty shock on finding one in one's tumbler, and the Water Engineer responsible is liable to come in for some caustic remarks should such an untoward occurence take place.

The Spongidiae are represented by two species only, Spongilla lacustris and Ephydalia fluviatilis. In the south of England, and on the Continent, serious trouble has been caused by growths of the fresh water sponge in pipe-lines, resulting in a great diminution in the carrying capacity of the mains, and even worse, most obnoxious smells and tastes when, owing to failure of the food supply, these creatures die and decompose.

I have not personally met with trouble from these organisms and have indeed only come across them in one instance, that which I have mentioned at the beginning of this talk, when I referred to the case of the two small service reservoirs side by side, one of which carried growths of spongilla on its walls. This reservoir had not, so far as I can ascertain, been emptied for a period of 40 years. Owing to the fact that some houses supplied from it are practically level with its top, it had always to be kept within 2 feet of overflow level otherwise the water failed to reach the taps of these houses. I was much puzzled by a curious whitish circle about 18 inches in diameter near the bottom of this south wall and about 14 feet below top water level. It looked like a ring of whitewash with a black centre. On emptying the reservoir for cleaning and examination I found this mysterious ring to be a growth of spongilla lacrustis in the form of a thin film on the brown glazed tiles. It was growing outwards from the centre, the ring slowly increasing in diameter as the central part died off, in much the same manner as the so-called fairy rings found on lawns. The black centre was composed of the dead

skeleton (spicules) with entangled particles of mud. A considerable number of small rings of the same growth were also found on the walls where direct sunlight never penetrated. The growths were all film-like and rather resembled the lichen growths often found on limestone and other rocks.

The next group we come to are the Mollusca. The fresh water snails found in storage and service reservoirs feed on algae and no doubt play a useful part as scavengers and, so long as they do not gain access to the mains, they probably do more good than harm. Some forms, however, can live and thrive in water mains under considerable pressure, and I have painful recollections of trouble with one species of these—Paludestrina.

I never found a single specimen of this in any of the reservoirs connected with the supply, nor did it appear to be present in any numbers in the mains, but in four instances it was disgorged in unpleasantly large numbers from consumers' taps. In each case, although a large number of services were supplied from the same street main, only one house in each district was affected. The little creatures, which in the adult stage are about $\frac{1}{8}''$ long, appeared to have found a congenial home in the service pipe, where they were breeding in large numbers. They did not live long after being discharged from the tap. Probably the sudden change of pressure from say 6 or 7 atmospheres to one, was too much for them. In each case I found that the service pipe was an old one and that it contained a disused branch forming a " dead end " which was presumably considered a desirable residence by the snails. The remedy I used was to empty the service pipe and then pass hot water, or hot salt and water through it. To do this effectively one had to locate any dead ends and disused branches, in some cases a difficult matter. After the fourth complaint of this trouble I made arrangements to use a small portable steam boiler to blow steam through the affected pipe, but fortunately no further occasion arose.

How the snails first got into the pipes is a mystery.

In the south of England and the Continent, the fresh water mussel has occasionally played havoc with water supplies. One case is recorded near London where a main, 3 feet in diameter, carrying unfiltered water to the purification works, became so infested with Dreissensia polymorpha as to have its bore reduced to 9 inches.

Many insects such as Mayflies, Mosquitoes, Gnats, Stoneflies, etc., pass their immature stages in water, and thus come under the professional notice of the Water Engineer. The jelly-like egg masses of these are often found on reservoir screens or the surface of filters, and later, swarms of wriggling larvae make their appearance. So long as these keep to the reservoirs they do little

harm, but if by any mischance, one should brave the hazardous journey to a citizen's tap, his reception is apt to be frigid, though the note which accompanies him in his subsequent journey to the Engineer's office will probably be quite warm.

Some larvae may cause trouble in filter beds by burrowing into the sand and breaking the surface film.

Various opinions have been expressed as to the beneficence or otherwise of fish in reservoirs, and I think one's views on the subject to some extent depend upon whether one is or is not a keen fisherman. Beneficial or not, they are naturally found in storage reservoirs, and undoubtedly help to maintain the balance of life in keeping down the numbers of crustacea and insect larvae. Occasionally they are found in service reservoirs, but as these usually contain water which has been filtered or otherwise treated, they do not find a very congenial abode there, since food is apt to be very scarce.

Whatever their uses in reservoirs, there is one member of this order which sometimes occasions great trouble to the Water Engineer, viz., the common eel. This creature seems able to thrive almost anywhere and occasionally gains access to the mains. Here, if the water is not so filtered as to remove all food supplies, it can thrive and grow for a long time, until some day he ventures into one of the smaller branches and finds himself forced by the pressure of the water into the form of a plug, causing a restriction or total stoppage of the supply and presently, if he is not located and removed before the pressure disintegrates him, provides a wholly unappreciated flavour and body to the water. The Engineer then has a happy time trying to flush out his remains from the network of pipes, and extracting fragments from service pipes and ballcocks which have been choked thereby.

Trouble with other varieties of fish is not common, though I have heard of the supply of part of a large Scottish town being cut off through a shoal of, I think perch, finding their way into a screening chamber, where they were drawn against the outlet screens and completely blocked them.

The forms of life we have considered so far are, with the exception of the pathogenic bacteria, indigenous to water, and therefore, factors which have to be taken into account in designing or managing a system of water supply.

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CONTENTS

	Page
A History of Perth's Water Supply—Part I, 1751-1870	51
A History of Perth's Water Supply—Part II, 1870-1930	59
Chapters in Perthshire Church History	72
Proceedings	xxxi
Children's Essay Competition	xliii
Abstract of Accounts	xliv
Meteorological Observations, 1949-53	xlvi

TRANSACTIONS
OF THE
PERTHSHIRE SOCIETY OF
NATURAL SCIENCE

A HISTORY OF PERTH'S WATER SUPPLY.*

By CYRIL WALMESLEY, A.M.I.C.E., M.I.W.E., F.R.A.S.

PART I: 1751-1870.

EARLY SCHEMES AND SUPPLIES, 1751-1830.

In September, 1751, the Town Council, in order to serve the inhabitants with clean water, recommended to the Magistrates that they should " cause make and fix " at the North Shore (i.e., at the foot of the High Street), which was then being rebuilt, a pump, with a lead pipe into the river for conveying water to the pump. This recommendation seems to have been carried out, but the location of the pump was evidently not found to be very convenient, for, in the following year (October, 1752), the Town Council decided that it would be better to have a pump in the High Street " where the pillory is commonly erected," and called for estimates to be taken of the expense of conveying the water from the well on the North Shore to the proposed pump by lead pipes and big wooden pipes, and that, thereafter, the necessary works should be executed.

At this time the inhabitants of the city were dependent for their water supply upon shallow wells—of which there must have been a considerable number—on the Lades, which ran as open water-courses through the town, and on the River Tay.

Towards the end of the 1750's the Town Council and Magistrates appear to have become imbued with the idea of having a public water supply laid on in the city, and during the next seventy years, all sorts of schemes were put forward to this end. Thus, in 1759, the Magistrates called for " an estimate of the expense of building a reservoir at the Common Milns for holding a sufficient quantity of water from the Miln lead and of conveying the water in pipes to different parts of the town." This scheme seems to have been abortive, for rather less than three years later (January, 1762) one,

* President's Address, 27th March, 1953.

Patrick M'Gillivrie, a glover, laid a proposal before the Town Council in which he offered to bring water " from the Miln lead above the upper Waulk Mill and distribute it in wooden pipes to eleven different places in the town. Also to construct a reservoir on the lands of Drumhar for storing and filtering the water." The cost was to be £150, subject to the proviso that the Town Council should supply the necessary trees for making the pipes from their Burgh Muir plantations and that the £150 be raised by the petitioner from the voluntary contributions of the inhabitants.

The Council accepted the offer on condition that M'Gillivrie raised the £150 before the trees were cut down and that he undertook " to uphold the pipes for seven years." The citizens, however, were loath to part with their bawbees, and the requisite £150 was not wholly subscribed. Still, the Council decided to let M'Gillivrie go ahead, and he seems to have constructed the reservoir adjacent to the Miln lead, for, in February, 1765, we find the Council agreeing to give the wood necessary for making the pipes to convey the water from the reservoir through the Newrow to the Hospital (King James VI), and from thence along the South Street to the middle of the Watergate. In September of the same year Patrick M'Gillivrie asked the Council to make up the balance due to him for carrying out the scheme, as he saw no prospect of extracting any further subscriptions from the townsfolk. The Magistrates agreed to pay the balance justly due to him, after checking his accounts, and to recover the subscription money " by legal means *or otherwise*." !

The Town Council evidently appreciated M'Gillivrie's services, for it is recorded that, in March, 1766, it voted him 20 guineas for his trouble. M'Gillivrie's wooden pipes seem to have continued in use for more than twenty years, but by 1789 they were evidently in a very bad state, for it is recorded that on 1st June, 1789, the Magistrates decided to cancel their contract with one, John Scott, wheelwright, for upholding the water pipes for £12 per annum, because he had " grossly neglected his business so that the pipes are in great disrepair." They also gave orders for the wooden pipes in the High Street to be replaced by leaden ones and three years later, in 1792, lead pipes, $3\frac{1}{2}$ inches in bore and weighing 48 lb. per yard, were laid and jointed with solder in South Street by R. Menzies, coppersmith, at the contract price of 11/3 per yard.

Meantime, the question of a better water supply for the city again began to exercise the minds of Councillors and Magistrates. Thus, in 1781, Alexander Gibson, master of the Academy, was asked to investigate the possibility of getting a supply from the springs on "the lands of Magdalenes in the neighbourhood belonging to David Stewart Moncrieff of Moredun." Then, in 1785, a committee which had been " appointed to consider the bringing

in of spring water to the Town in lead pipes for the use of the inhabitants" reported on the yield of a number of springs in the neighbourhood, including two at Huntingtower, the "Quarry Well" at the "Town Wood," and two "Springs on the Hill of Kinnoull, one of which rises at Robert Johnston's farm and the other at the back of the nursery." The yield of all these springs was measured and stated in Scots pints per 24 hours. (1 Scots pint=3 imperial pints.)

Two years later, in October, 1787, the Town Council appointed another committee to bring in a scheme for conveying spring water to the town, and in December this committee arranged for a Bill being presented to Parliament "for Water Supply, Streets, etc." Evidently this did not proceed far, for in 1795 the Town Council appointed yet another committee "to consider the most proper method of bringing water into the Town." It was probably in connection with the activities of this committee that, in 1796, the Council awarded three guineas to Andrew Johnston, stocking-maker, for his pains in making the model of a machine for filtering water from the Town's lade to be brought into the different wells of the town and which had been approved by the Town Council. Nothing, however, seems to have come of the deliberations of this committee, and the water supply problem went from bad to worse, for in 1799 the supply was frequently interrupted by stoppages in the street pipes "owing, it is thought, to some defect in the manner of laying them," and it was resolved "to correspond with some man of Science in Edinburgh or elsewhere as to the proper manner of laying the pipes so that there may be a constant supply."

The next proposal—in 1808—was to utilise Craigie Burn as a source of supply, but this in its turn came to nothing.

Shortly after this, an outstanding figure came into prominence in the person of Dr. Adam Anderson, LL.D., F.R.S.L. & E., Rector of Perth Academy, and later (1837) Professor of Natural Philosophy in the University of St. Andrews. About 1810, Dr. Anderson, at the request of the Magistrates, investigated several possible sources of supply, including the "Great Spring of Clathymore," about 7 miles from Perth, the River Almond at Cromwell Park Falls and the River Tay at Linn of Campsie, and decided that none was suitable. The problem was then shelved for a few years until the position of the supply became so desperate that the Guildry Incorporation took a hand and called in Dr. Anderson and Mr. Jardine, an engineer, to report on the possibility of using the Lade to afford the motive power for pumping water from the Tay to supply the town. It was found, however, that the power available was insufficient for the purpose. For the purposes of this scheme it had been proposed to sink a well in the North Inch near the river bank, into which water

would infiltrate and would then be pumped into the supply, but, on analysing the water so obtained, Anderson wrote that "he found to his surprise that it contained in solution so large a proportion of the Muriate of Lime as to render it unfit for almost every culinary and domestic purpose." Trial pits dug on the North Inch at different distances from the river all yielded water of similar quality, as did "all the wells along the banks of the river from the Bridge to the County Buildings." A 9 ft. pipe was driven into the gravel 200 yards above the Bridge and 10 yards from the west bank until the upper end stood 2 feet above the surface of the water. Water rose in this pipe to a level 15 inches above the level of the river, and Anderson reports that this water was "charged with saline matter to nearly as great an extent as the water I had already examined."

Eventually, Dr. Anderson decided that the only place where a pure supply of water from the Tay could be obtained would be from a well sunk in the northern part of Moncreiffe Island. He accordingly drew up a scheme for the construction of a "filter gallery" on Moncreiffe Island, an elevated "Cistern" on the west bank of the river with pumping machinery to raise the water to the cistern, and a pipe across the bed of the river to convey the water from the filter to the pumping engines. Water was then to be conveyed from the cistern throughout the town by means of iron pipes. This project was approved by the Magistrates, and Parliamentary sanction sought for its execution. In 1829 Perth's first Water Act received the Royal Assent, and early in 1832 the supply was functioning.

The original works consisted of an infiltration gallery 240 ft. long, 8 ft. high, and 2 ft. 6 in. wide, built in the upstream end of Moncreiffe Island, its floor being about 4 ft. below the lowest level of the river water. A 12-in. cast-iron pipe, laid under the river bed, conveyed the water from this "filter" to the "Water House," a massive circular building (now known as the "Round House") surmounted by a cast-iron tank, 42 ft. in diameter and 18 ft. deep, covered with a cast-iron dome. Its top water level was about 40 ft. above the street. Adjoining this Round House were a small engine-room and a boiler house, together with a masonry chimney, 110 ft. high—this latter being still in use to-day. In the engine-room was installed a 12 H.P. beam engine, having a cylinder of $20\frac{1}{2}$ in. bore and a stroke of 39 inches, operating a bucket pump which delivered water into the cistern. From the cistern water was distributed to the city by cast-iron pipes ranging from 10 in. to $2\frac{1}{2}$ in. in bore and having a total length of $5\frac{1}{4}$ miles. The cistern, the pipes crossing the river, a large cast-iron vase which originally adorned the top of the chimney and the first beam engine were all supplied by the Dundee Foundry Company. In 1833 a second beam engine, similar

to the first, was supplied by Russel of Kirkcaldy. Dr. Anderson gives the total cost of the Works as £13,609 11s. 11½d.

The original "Area of Supply" was included within a line starting at the river bank in line with Marshall Place, running along the South side of Marshall Place to the North-West corner of the South Inch and thence westwards to Earl's Dykes. The boundary then turned northwards approximately on the present railway line to where it crosses the West High Street at Dovecotland, then swinging eastwards to include the Horse Barracks (now Queen's Barracks), and thence along what is now Barossa Place to the North Inch. The line then skirted the North Inch to Perth Bridge, and followed the river bank back to the starting point. But, before the Water House was completed, the Commissioners were being petitioned to include other streets in the privileged area—one of the first petitioners being Dr. Anderson himself, who resided in Leonard Bank.

James Turnbull, who had acted as clerk of works during the construction of the Water House, was appointed Superintendent at the magnificent salary of £25 per annum—presumably a part-time job. No office accommodation was provided.

The first engineman was one, James Gray, who took charge of the steam engine for a wage of 16/- per week, assisted by a boilerman (J. Imries) at 12/- per week.

The Commissioners voted Dr. Anderson the sum of £315 for all his services—an emolument which he, with some reason, considered inadequate! In 1834 he submitted a report to the Commissioners detailing the steps which had been taken to provide Perth with a water supply and in a covering letter pointed out that he had acted not only as Engineer but also as Chemist and that the analyses alone, which he had carried out, would have cost £150 if done by an independent chemist. This letter appears to have been "allowed to lie on the table," for in 1837 he wrote again complaining that he had had no reply to his letter of 1834, and mentioning that he had been requested to send a sketch and description of the reservoir for transmission to the King of Prussia, so that a facsimile could be erected in Berlin.

The first Joint Clerks to the Commissioners (Mackenzie & Reid) were paid (jointly) £20 per annum, while the Collector was paid 5% on the sum he collected "to afford a stimulus to exertion." The Collector also received £10 for making up the books, and £10 as Treasurer. In all, he appears to have netted about £75 a year.

The amount of water pumped during the year 1834 was 37 million gallons, or about 100,000 gallons per day.

Superintendent Turnbull died in 1838, and James Gray, who seems to have been a very intelligent man, was put in charge of the Waterworks at a wage of 21/- per week, for which he was told that "extra diligence is expected."! He seems to have been expected to work day and night.

While some of the well-to-do citizens had water taps within their houses, the majority drew their supplies from the "street-wells," and from the very start these street-wells were a source of trouble. There was no drainage system and consequently the surroundings of the wells were constantly water-logged, a source of annoyance, particularly to the unfortunate householder whose dwelling adjoined the well. Consequently, the Commissioners were continually being petitioned to remove the well to some other location. If the petition was granted, a new one frequently arrived from the next sufferer. Vandalism, too, was rife and difficulty was experienced in keeping the wells in order.

In spite of their not over-generous treatment of Dr. Anderson, who was now Professor of Natural Philosophy in the University of St. Andrews, the Commissioners could not dispense with his services for long, and in 1841 they were again consulting him. In 1845 the yield of the Moncreiffe Island Filter was falling off, due to dredging, which had lowered the river bed three feet. With Anderson's help another 100 feet was added to the length of the filter gallery. In the following year the Dundee & Perth Railway Co. proposed to construct a railway bridge across the Tay adjoining the Water Works, and in December, 1846, Dr. Anderson was briefed to watch over the interests of the Commissioners, but ten days later his death was announced. The Commissioners resolved to attend his funeral as a body and voted his representatives 50 guineas in recognition of his recent services.

Daniel Stephenson, civil engineer, Dundee, was now engaged to keep an eye on the operations of the Railway Company. As one of the bridge piers was to straddle the river pipe, the Commissioners insisted that the Railway Company should first lay a new pipe to safeguard the supply—an operation which the Railway Company looked upon as a scandalous waste of money, but had to carry out. As they eventually broke out a large part of the old pipe, there seems to have been some justification for the Commissioners' attitude. This old pipe was repaired and brought into use again in 1866, and is still serviceable.

About 1850, it was decided to put inscriptions on the Water House, on the south side over the doorway. These consisted of a metal plate with particulars of the erection of the building: "This edifice . . . . 1832" on the large panel, and below it, where Dr. Anderson had chalked them, the words "Aquam igne et aqua

haurio." Later, when the present engine-room was built, these inscriptions were removed to their present position on the east façade of the Round House.

The difference between present-day labour conditions and those obtaining 100 years ago is clearly shown by the following extract from the minutes of the Water Commissioners, dated 4th October, 1855:—" It was brought to the notice of the Commissioners that Andrew Imrie has 16/6 per week of wages and Alexander M'Lagan has 18/- per week and that to supply the town aright these men now require to attend at the Engine House during the following hours, viz.: Tuesday to Saturday, from 3 o'clock in the morning till 6 o'clock in the evening. On Sundays from 5 till 9 in the morning and from (Sunday) midnight till 6 in the evening of Monday. (Total 97 hours per week.) The Commissioners in considering the great length of these working hours deliberated whether it would not be well to employ a man additional to the present so that, by shifts, to relieve the present men in part. But, as the men themselves wish to continue the present long hours if an addition is made to their wages, the Commissioners agreed to add 2/- per week to the present wages."

In view of the increasing demand for water, it was now becoming evident that the cast-iron cistern was no longer adequate to supply the town, and that a larger reservoir at a greater elevation was required. So, in 1860, Chas. Ower, civil engineer, of Dundee, was called in to advise as to the best location for a new reservoir, and he recommended a site at Wellshill. This being approved, the new reservoir was completed in June, 1862, and brought into service in July of that year. It had a capacity of 400,000 gallons, with a top water-level of about 80 feet—20 feet higher than the cistern at the Water House, the use of which was now discontinued.

James Gray, " being now advanced in years and frail," was retired in January, 1863, and Alex. Bates appointed full-time Superintendent at £80 per annum, increased to £100 the following year. He died on 18th April, 1870.

In May, 1864, on the death of Mr. Garvie, the Commissioners arranged that the " Town Chamberlain " would take over the duties of Collector and Treasurer.

On 5th May, 1870, John Peattie, engineer, Charteris Street, was appointed Superintendent of Waterworks, and the same year, John Young, civil engineer, was asked to report on the water supply of Perth.

Up to this time the benefits of the supply of water from the Perth Waterworks were confined to the area west of the river, and were not available to those who dwelt on the east bank.

The suburb of Bridgend was served by the Bridgend of Perth Water Company, Ltd., whose works, constructed about 1858, consisted of an intake on the Langley Burn with adjacent sand filters, an underground reservoir at " Cuddy's Grave " at the side of the Scone Road and a 4 in. cast-iron main from this reservoir along Strathmore Street and Main Street to the junction with Perth Bridge, where it diminished to 3 in. bore and continued along Gowrie Street to the foot of Manse Brae. Smaller pipes of 2½ in. bore were also provided in Keir Street, Lochy Brae, Back Wynd, Commercial Street and Union Lane.

A water column connected with this supply stood on the east kerb of Main Street, near the Bridge, until the 1930's. It was used by the Cleansing Department for filling street-washing carts, but the old main had to be cut at one or two points to make way for other services, and the water column, being of no further use, was removed.

Outbreaks of cholera occurred in Bridgend in 1849 and 1866, but these do not seem to have been attributable to the Water Company's undertaking, whose consumers escaped this visitation. The victims seem to have been those who had to draw their water from the river, and probably private wells contributed to the spread of the disease.

A private waterworks was also constructed about 1859 by the Earl of Kinnoull to supply his feus. The source of this was Muirhall Quarry, out of which water was siphoned through a 2 in. lead pipe, which conveyed the water to a filter-house, the ruins of which still remain in the field to the west of the quarry. From here a 2½ in. cast-iron pipe passed to the south of Mount Tabor Road, supplying at least one house in that road. A 1½ in. branch pipe, off the 2½ in., ran across the fields to Annat Lodge and Greenbank. The 2½ in. went past the junction of Bowerswell and Manse Roads and down Manse Road to Craigard Road, from the foot of which a ½ in. pipe ran along the southern half of Brompton Terrace and down Manse Road, probably to the Manse. Another pipe passed down Witch Brae to Rio, while a ⅝ in. pipe supplied Fernhill. A branch pipe from Manse Road, above Fernhill entrance, cut across the middle of Dupplin, Brompton (north) and Kinnoull Terraces, with connections to various houses, including Rosebank. Bowerswell had its own well, supplied by a spring.

At Wellbank there were two adjacent " wells " fed from a spring. One of these served the house and the other was used by the public, being approached by a flight of steps from the Dundee Road.

There are a number of other springs in this area providing supplies to individual properties. A well and pumping-engine at

Broompark formerly supplied Murray's Royal Asylum, and an underground cistern, built like a " bottle dungeon " in the grounds of Barnhill Sanatorium, is thought to have supplied houses in Fairmount Terrace, being apparently supplied through a small lead pipe from an unidentified source.

An interesting sidelight on the times is provided by a letter addressed to the Town Council by one, William Bisset, petitioning for the restoration of a street " well " which had been removed from " the foot of Barossa Place," because his " occupation as a clothes-watcher on that side of the North Inch depends upon a supply of water for bleaching purposes." Failing the restoration of the " well," he complains that he will require to suspend bleaching—which would " put the public and himself greatly about." But his petition failed to move the Town Council.

A HISTORY OF PERTH'S WATER SUPPLY.*

By Cyril Walmesley, A.M.I.C.E., M.I.W.E., F.R.A.S.

Part II : 1870-1930.

Difficulty was being experienced in obtaining a sufficient supply from the Moncreiffe Island " filter," and, in 1871, a report was obtained from James Leslie, civil engineer, of Edinburgh, on means of augmenting the supply. Earlier in the year Wm. Frew, plumber, had submitted a report giving his views on the same matter. Both agreed that a larger pipe was required to carry the water across the river, and Frew suggested that this pipe should be of rectangular section, 1 foot high and 4 feet wide, to reduce loss of head. Another civil engineer, John Buchanan, suggested a supply from Loch Freuchie. None of these proposals came to anything.

In April of the same year, the cast-iron vase which adorned the top of the chimney at the Water House fell off, making a hole in the roof of the engine-house and damaging one of the engines.

July saw the adoption of the first " Regulations " governing the conditions under which supplies of water would be afforded.

In 1872, Alex. Davidson, of whom more will be heard later, was engaged as a plumber, the Committee entrusted with this appointment being instructed to be careful not to let him bargain for any number of hours of labour per day!

The same year, the Commissioners considered the propriety of taking down the old disused Water Tank at the Water House, and

* President's Address, 26th March, 1954.

selling it as old iron and stone. They thought it might realise £500. But, as the ground on which it stands was not then required for any other purpose, and especially, as there seemed to be a strong feeling on the part of the public against its removal, they decided to let it remain for the present, but to remove and sell the interior sole (bottom of tank) and masonry and put a window in the top. The proceeds realised about £100.

1872 also saw the completion of the new boiler house to the west of the engine-house and the erection of an office at the south-west corner of the Works.

The following year it became necessary to scrape the river pipes to increase their carrying capacity, but, unfortunately, the scraper stuck in the pipe. A state of emergency ensued, and it was probably in this connection that Peattie called in the services of the bell-man to warn the townsfolk.

The number of street wells in use at this time was reported to be seventy. The original " valves " on the water mains appear to have been large brass plug-cocks, for there is mention at this time of their replacement by sluice valves and the replacement of brass fire-cocks by spindle hydrants.

The first reference to algal troubles occurs in April, 1874, when Peattie advises that the windows of Wellshill Reservoir be closed up to keep the water cooler and reduce the " vegetation on the surface."

In January, 1875, Alex. Davidson resigned his job as plumber at the Waterworks. He is next heard of in 1891 as one of the Commissioners. Wm. Greig, Clerk to the Commissioners for 27 years, also resigned in 1875, and Alex. Wilson, solicitor, succeeded him at a salary of £40 per annum, which was just double that which Greig had received.

There was now growing discontent in the areas surrounding the favoured " water area," because of the unwillingness of the Water Commissioners to extend their area of supply. They were authorised and indeed willing to supply places outside their area of supply provided that the inhabitants of those places met the cost of extending the mains, but they were not prepared to seek Parliamentary powers to enlarge the area of supply, and in this attitude they seem to have been encouraged by many of the ratepayers within the city, who were afraid of having to pay higher water rates if the boundaries of the Commission were enlarged.

In 1875 a conference between the Police Commissioners, Water Commissioners, Bridgend Water Company and the Earl of Kinnoull took place to discuss the water supply of Bridgend, but no agreement was reached. The following year a committee of citizens engaged Bateman of London to visit Perth and report on the supply.

The report was duly submitted and discussed, both by the committee of citizens and the Commissioners, but the two could not agree. The committee of citizens thereupon decided to promote a Bill in Parliament, which would, *inter alia*, transfer the existing waterworks to a new body. The Commissioners decided to oppose the Bill, and conducted a referendum of their own consumers to find whether they were (1) Satisfied or not with the the present supply; and (2) In favour or against the proposed Bill. The replies were: (1) Satisfied, 2932; Not Satisfied, 354; and (2) Against the Bill, 2733; In Favour, 496. They then called a meeting of their consumers, which appointed a committee of ratepayers to join with the Commissioners in opposing the Bill. Hawksley, of London, and Leslie, of Edinburgh, were called in to inspect the Works and report on the proposed Bill. Peattie and the Clerk were sent to London to attend the Parliamentary Committee, but the House of Commons decided that the Police Commissioners were the proper Local Authority to have control of the water supply. The Water Commissioners then tried to come to terms with the Police Commissioners, but failed, and decided to lodge a petition to the House of Lords. Eventually they withdrew further opposition.

Two other items of interest occur about this time—May, 1877. The Sir Walter Scott Monument has been moved from the foot of High Street, thereby leaving the Drinking Fountain there unprotected in the middle of the street; and the last entry in the old Water Commissioners' Minute Book: "The lead main pipes supplying Dovecotland have given way very frequently of late."

On 2nd August the Perth Water Act, 1877, received the Royal Assent. This Act provided, *inter alia*, for the taking over by the new Commissioners of the Works and duties of the existing Commissioners; the extension of the area of supply to include the whole of the City and Royal Burgh of Perth and an area one mile wide immediately beyond the Burgh boundary; the construction of a Reservoir on the Burgh Muir of Perth, and another Reservoir on the lands of Tullylumb Farm near the Mansion House called Atholbank, together with the necessary mains, etc.

The first Commission appointed by the Act consisted of the Lord Provost and 24 named citizens, who were to hold office until the first elections. Thereafter, the Commissioners were to be the Lord Provost and 24 elected representatives—six for each of the four wards. After the expiration of a year, the Police Commissioners were to have the right to transfer the undertaking to their own control.

The new Commissioners appointed Mr. Bateman as engineer to carry out the new works, with Mr. Young (Perth) as resident engineer. Peattie and the Thomsons, manager and joint treasurers

under the old Commission, were appointed to the service of the new Commission for a period of one year, and their appointments renewed from year to year thereafter, as the Act did not allow any appointment to be made for a longer period, although I do not think that this rule applied to the Clerk to the Commission.

The legality of the action of the old Commissioners in appropriating £350 of their funds for opposing the Perth Water Bill had been the subject of long argument, and finally, the new Commissioners took the matter to Court. The Lord Ordinary (Lord Craighall) pronounced interlocutor for the old Commissioners in January, 1879, but, on appeal by the new Commissioners, the decision was reversed, and the old Commissioners were surcharged.

Meantime, contracts for the new works had been placed, and the work put in hand, but things did not always run smoothly. On completion, the Viewlands reservoir was found to be leaking badly, and much difficulty was met with in making the new well within the Round House watertight. In connection with this well, it is interesting to read that in December, 1878, the Commissioners decided to employ destitute, unemployed men to dig out the foundations for the new engines (these and the well formed parts of the same structure), and as many as 80 were employed on the job at a time. How they managed to work in such a crowd in an area only 40 feet across is somewhat astonishing!

Peattie seems to have disapproved of the way the new works were being carried out and to have been at loggerheads with the Consulting Engineer, Bateman. He considered that, in accepting the tender of James Watt & Co., of Soho, for new steam engines and boilers, the Commissioners had chosen the worst offer submitted, and the following entry in his diary, under the date, 13th May, 1879, speaks for itself: " Met Mr. Bateman at Works, charged me with ' doing more mischief and damage to the Work than any other man in Perth.' Resented the charge. He said the well shall be there or he would have nothing to do with it." Other entries of interest in his diary about this time mention:—The stopping of the engines from 10 a.m. to 4 p.m. on a certain Thursday in October, being a " Sacramental Fast Day "; the rebuilding of the Moncreiffe Island Filter; Reconstruction of the Office; arrival of cargoes of pipes at the Harbour (this, apparently, being the usual means of carriage at this time); the opening of the new Municipal Buildings on 7th November, 1879; and on 29th December, 1879, a " Fearfull Storm of Wind and Rain during last night. The Tay Bridge was blown down and the mail train from Edinburgh engulphed with over 200 passengers."

Members of the P.S.N.S. may be interested to know that on 10th March, 1884, the Clerk was instructed to take out a small debt

summons against the Society for recovery of the water rate on their premises in Tay Street for the current year, but Sheriff-Substitute Graham found their premises not liable to water rate.

The works of the Bridgend Water Works Co. were purchased for the sum of £1428 18s. 0d., and those of the Earl of Kinnoull for £1500. The Kinnoull works supplied Hatton and Gannochy Farms and the Gilgal Pendicle in addition to the feuars on the hill. The claims of these three farms were bought out for £647 10s. 0d. in preference to assuming the obligation to continue a free supply.

Skeet resigned the Clerkship of the Water Commissioners in September, 1878, and the post was then merged with the Clerkship of the Police Commissioners, held by Wm. MacLeish. The place of meeting of the Water Commissioners at this time was the Scone and Perth Masons' Hall, 12 High Street, and the meetings were held in the evenings. In September, 1879, the venue was changed to the Police Court Room, 16 Tay Street, and two months later, to the Commissioners' Hall, High Street (the newly opened Municipal Buildings).

About June, 1880, water from the Perth supply was available on the east side of the river, and in October of the same year, the supply from Muirhall Quarry to the Kinnoull feus was shut off and the Perth supply turned on. A few houses—Annat Lodge, Rosemount, etc.—were not connected to the new supply, and in 1928 the writer found that these houses were still supplied from the Quarry. To-day the Quarry supply is entirely out of action.

The consumers in the new areas of supply were charged a higher water rate than those in the original area. The rates in 1880 being 8d. in the old and 1/- in the new. This differential rate disappeared after the year 1888-9. The daily consumption was about 1,400,000 gallons.

Among the Commissioners' new consumers was the General Prison, which had hitherto had its own supply from springs on the lands of St. Magdalenes. This private supply was later acquired by the Railway as a supply to the Sheds at Perth South. In 1945 it was transferred to the Town Council in exchange for an obligation to furnish a certain quantity of water free to the Railway in perpetuity —this transaction being necessary to permit of the development of the Moncreiffe Housing Site.

While the new reservoirs and pumping engines enabled water to be distributed over a wider area, the quantity of water available for distribution soon proved to be inadequate. Shortages and restrictions were of frequent occurrence, and by 1886, the Commissioners were seeking means of augmenting the supply, and had an experimental pit sunk in the Stanners Island. As an emergency measure,

a trench was excavated in Moncreiffe Island, near the river bank, out of which water was pumped into the Filter Tunnel. A year later, James Ritchie, civil engineer, was engaged to advise as to an auxiliary supply, and a further experimental well was sunk near the tip of Moncreiffe Island and investigated by Ritchie and Peattie. Parliamentary powers were sought to acquire Moncreiffe Island, and to construct works for obtaining an auxiliary supply from it (including a new pipe across the river); to construct a new Filter Tunnel in the gravel bank above Perth Bridge, and a main to convey water from it to the Water House, where a new suction well was to be sunk. Peattie and John Chalmers, Burgh Surveyor, were to be local engineers for the Bill, with John Young as Consultant.

Perth Water and Gas Act received the Royal Assent on 16th May, 1888, and the same year, Peattie submitted plans and estimates for a Filter above Perth Bridge, a new Well at the Water House, and a pipe-line connecting the two. After getting these " vetted " by Leslie, of Edinburgh, the Commissioners approved them and accepted the tender of Wilson, of Bridge of Earn, for carrying out the work. Wilson, however, soon found that he had undertaken more than he could carry out, and made little progress, so the work was taken from him and given to D. & R. Taylor, who completed the job. The supply from this " Auxiliary Filter " was turned on by the Lord Provost on 15th June, 1893. The projected extension of the Moncreiffe Island Filter was not proceeded with.

In May, 1891, Robert Thomson, City Chamberlain, and Treasurer and Collector to the Water Commissioners, died. His father, James Thomson, who had held the joint offices with his son, had died nine years previously. Robert Keay, Assistant Town Clerk, was now appointed to the vacant offices.

On 6th November, 1893, the Commissioners suffered a further loss by the sudden death of John Peattie. He was succeeded on 21st December, 1893, by Alexander Davidson, who had been one of the Commissioners, but had resigned a few days previously in order to be eligible for the appointment.

Items of interest in the Minutes of this period include:—

(1) A report that the Water Manager and Burgh Surveyor had been instructed to supply a drinking well and trough at Bowerswell in place of the old supply now discontinued. In this connection, it may be mentioned that during recent main-laying operations in Bowerswell Road, an old stone-built well was uncovered in the roadway near the present drinking well. The writer wonders if this was the original " Bowers Well."

(2) In January, 1894, Dr. Thomson, of Perth Academy, was given permission to take water samples from the two filter beds

for analysis in connection with a paper he was preparing for submission to the P.S.N.S. on the condition of the water at various parts of the River Tay. This report thereon was satisfactory and confirmed previous analyses.

(3) A sidelight on labour conditions is shed by an instruction in April, 1895, that the employees at the Waterworks were to work overtime without extra pay, except in exceptional circumstances, and no time off in lieu was to be allowed.

(4) In May, 1895, electric light was installed at the Water House, the current being generated on the premises. The telephone had been installed about 7 years earlier, so the Works were keeping up to date, in fact, it would appear that this electric lighting was unique in Perth at that time, for, in 1898, John Dewar & Sons, Ltd. were granted permission to have a small electric battery, used in connection with their phonograph, charged at the Water House, this being the only place in Perth where it could be done.

Davidson seems to have been electrically minded, for he had electric water-level indicators installed in 1896 to record at the Water House the level of the water in the three reservoirs. These are in use to the present day.

1895 opened with a period of severe frost, when much trouble was experienced with burst mains and frozen pipes, and Davidson records that on the afternoon of 11th February he walked across the Tay.

(5) In 1896, the portion of Moncreiffe Island not required for waterworks purposes, was leased to the Allotments' Association and to the King James VI Golf Club.

The reservoirs at Burghmuir and Viewlands were giving a lot of trouble owing to serious leakages, and in 1896 the construction of a new reservoir to Davidson's designs was commenced at Burghmuir, and completed 18 months later, being opened on 9th August, 1897. This is the present Burghmuir North Reservoir, which has a capacity of 2 million gallons. About the same time, 1897, a special Water District for Burghmuir was formed.

The increasing demand for water on the east bank of the river, and particularly for the supply of Scone, necessitated a further application to Parliament for power to construct a reservoir at Muirhall, together with the necessary pumping and distributing mains. Authority for these works was granted by the Perth Water, Police and Gas Acts, 1899 (Royal Assent, 6th June, 1899). Plans were prepared by Davidson, and the contract for the construction of the reservoir went to D. & R. Taylor, who completed it in

November, 1900, and on the 30th of that month, water from Muirhall Reservoir was turned on to Scone.

Scone had been formed into a Special Water District, whose Committee provided the mains necessary for distributing the water, which was to be received from the new reservoir at Muirhall. In the course of this work, a difference of opinion arose between Davidson and the District Committee's engineer, W. R. Copeland, as to the depth below the surface at which the pipes should be laid. Davidson wanted the depth to be 3 feet, but Copeland maintained that 2 feet 6 inches was adequate to give protection against frost. Reference was made to the P.S.N.S., whose President stated that in February, 1895, he had found that frost had penetrated to a depth of 36 inches on a gravel walk at Pitcullen House, and 24 inches in a grass park. So the pipes were laid at 3 feet.

In Davidson's diary, under the date, 25th March, 1905, is the entry: " Bellman crying Scone, ' Turning off Water on Monday to make connection at Haddon Road,' 4/-." This is the last reference to the use of a Bellman which the writer has found in the records of the Waterworks.

At this time the population of Perth was 33,904, and of Scone, 1585, making the total population to be supplied, 35,489.

To supply this new reservoir, which stands some 70 feet higher than the Burghmuir Reservoirs, more powerful pumping plant was required. Accordingly, at the beginning of 1898, the Commissioners decided to build the present Engine Room on the south side of the Round House, and to instal therein a triple expansion steam engine, and also to provide a new boiler. Electric power was considered, but ruled out on account of its high cost. James Smart was appointed Architect for the new building, the Contractor being Brand & Sons (?). The contract for the engine, boiler and an overhead crane, was secured by the Glenfield Co., of Kilmarnock. This engine is still in use (1954) as a standby, but is shortly to be scrapped to make room for electrically driven pumps.

William MacLeish, Town Clerk and Clerk to the Water Commissioners, resigned in October, 1899, and was succeeded by his depute, John Begg, and with the passing of the Town Councils (Scotland) Act, 1900, the Water Commissioners, on 28th December, 1900, handed over their functions to the Town Council, the change being little more than one of name.

In 1904 the Town Council had to seek additional borrowing powers to provide for the reconstruction of the old Burghmuir Reservoir and the repair of the Viewlands Reservoir, both of which were leaking badly; for the provision of another pumping engine;

for extensions to the auxiliary filter above Perth Bridge; and for the laying of various new mains.

The new engine was supplied by Douglas & Grant, of Kirkcaldy, in 1904. It is still the main engine of the Works, having a maximum capacity of 3 million gallons per day. It runs 24 hours a day, 7 days a week, and is only stopped for necessary repairs. When the new electrically driven pumps are installed, this old engine will remain as a standby and may well serve as such for a further twenty years or so.

1904 also saw the completion of repairs to the Viewlands Reservoir by lining with bitumen sheeting. No leakage has occurred since.

In 1907, Muirhall Reservoir developed a bad crack, and Leslie & Reid, of Edinburgh, were called in to deal with its repair. They were also asked to vet Davidson's plans for the new reservoir, which was to replace the old and defective Burghmuir Reservoir. This new reservoir, known as Burghmuir South Reservoir, is of similar capacity and construction to that of the adjacent North Reservoir. It was opened on 19th October, 1909, the contractors being Henderson & Duncan.

Alexander Davidson died in December, 1911, after 18 years service as Water Manager. He seems to have been a man of strong opinions and one who liked to have his own way. Judging by the recorded Minutes, his proposals were usually accepted. That such acceptance may have been preceded by heated argument, is suggested by the following extract from the last page of his diary for 1906:—

> " When I look back and think of the opposition I had in the Council and outside of it, over matters suggested by me for the remedying and putting the water works in a proper and up-to-date state, I wonder what those would-be experts thought of themselves now when the things they said could not take place had at the present moment come to pass."

The views of the " opposition " might make amusing reading!

In January, 1912, David Stewart, who had been in the service as plumber, and later as foreman, for 33 years, was appointed to succeed Davidson as Manager.

1913 was a dry year. On 31st July, Stewart records that the level of the river was the lowest for 26 years (2 ft. $4\frac{1}{4}$ in. ?), and there was difficulty in maintaining the supply. In September illness broke out amongst the troops in Perth and the water supply was blamed.

A Committee was appointed to consider the Water Supply and Sewage Disposal Systems, and take such steps as might be necessary

to place both in a more satisfactory condition. Crouch, Hogg & Easton, of Glasgow, were called in to advise on various alternative supplies which had been suggested—Water of May, Bertha, Stormontfield, etc.

Then came the first World War, and for the moment new water schemes were shelved. There are not many references to the War, either in the Water Committee Minutes or Stewart's diaries. The Boy Scouts were roped in to guard the reservoirs, but the temptation to use them as swimming pools proved too much for the lads, and within a week they were replaced by a guard of High Constables by day and Special Constables by night.

The water shortage persisted and, in 1916, it was decided to sink an artesian bore within the Round House, in the hopes of obtaining an additional supply, but, after reaching a depth of 450 feet without tapping a source of supply, the project was abandoned (1917).

Meantime, in March, 1916, the Local Government Board intimated to the Town Council their strong disapproval of its attitude in deciding to shelve the consideration of the question of the provision of a satisfactory permanent water supply for the City. They urged that the Town Council should decide without delay upon the scheme to be adopted, so that it would be in a position to proceed with it as soon as circumstances permitted.

In 1919 an epidemic of typhoid broke out in August, and 54 cases were reported before the end of the year, the worst month being September with 36 cases. The Scottish Board of Health, successor to the Local Government Board, urged immediate consultation with a consulting engineer and bacteriologist as to the procedure to be adopted to render the existing supply safe, pending the introduction of a new supply. Mr. Hogg was called in along with Dr. J. A. Campbell of Glasgow Royal Infirmary. Hogg advised chlorination and this treatment was commenced on 6th November.

Despite the Local Government Board's prodding of three years previously, the Town Council had not come to any decision as to the scheme to be adopted for getting a satisfactory water supply, and the exploration of various possible sources was resumed. Among those considered were Water of May, Bertha (2 schemes), Stormontfield, Loch Freuchie, River Almond, Milton Burn, Loch Ordie and the Sidlaws, as well as the Tay itself.

In 1920 (31st August), Dr. Alexander Houston, the distinguished Director of Water Examination of the Metropolitan Water Board, visited the Works and inspected the filters and reservoirs. The following year, the Town Council resolved to adopt the Bertha Scheme and obtained the Perth Corporation Order, 1921, authoris-

ing the carrying out of this scheme. In April, 1922, it was resolved to proceed with this work, but in February, 1923, the engineers (Crouch & Hogg) were instructed to suspend further action on this scheme and to make a detailed survey of (1) the Loch Ordie Scheme and (2) the River Almond Scheme with relative estimates.

John Begg died on 19th September, 1922, and Robt. Adam succeeded him as Town Clerk in February, 1923.

Crouch & Hogg's report was received on 15th August, 1924, and was submitted to Sir Douglas Fox & Partners for their opinion. After further investigations, the Loch Ordie Scheme was chosen in January, 1925, and steps taken to obtain the necessary Provisional Order. A further report on the scheme was obtained from G. Midgley Taylor, civil engineer, of London.

Petitions against the Provisional Order were lodged by the Duke of Atholl, the L.M.S. Railway Co. and local ratepayers. In July, the opposition of the Duke of Atholl and of the Railway Co., was withdrawn and the Order was approved in August, 1925, A grant from the Unemployment Grants Committee was promised on condition that the work was commenced before the end of the year. The Council, therefore, resolved to invite tenders for the work without delay, so that they could be considered immediately after the November elections.

The elections, however, gave a majority to those who opposed the Loch Ordie Scheme and, at the Council Meeting on 9th November, 1925, a resolution to withdraw the Petition for the Loch Ordie Provisional Order was carried by 14 votes to 10.

In April, 1926, a Petition for a Provisional Order to authorise the carrying out of the Woody Island Scheme was signed. This Order was granted on 15th December, 1926, and in January, 1927, Hunter, Duff & Middleton, of Edinburgh, were appointed Engineers for the scheme. The contracts for the Works (divided into Contract No. I and Contract No. 2) were given to Gibson, of Rutherglen. Gibson, however, ran into difficulties with the Intake Works, and in January, 1928, at his request, the Town Council relieved him of Contract No. 1, leaving him with Contract No. 2, which covered the construction of Viewlands Reservoir and the Pumping Main. Contract No. 1 was then relet to Wotherspoon & Ballantyne, of Glasgow, who completed the Intake Works successfully.

The first sod of the Viewlands Reservoir was cut by the Lady Provost, Mrs. Dempster, on 20th July, 1927, and the reservoir was completed and ready for filling in December, 1928.

David Stewart, who had been in the service of the Department for almost 49 years, died on 4th January, 1928, and on 29th March the Town Council appointed the writer to be Water Engineer and

Manager, subject to the approval of the Scottish Board of Health—this unusual condition being one of the provisos of the Perth Corporation Water Act, 1926. The writer commenced duty on 1st June, 1928.

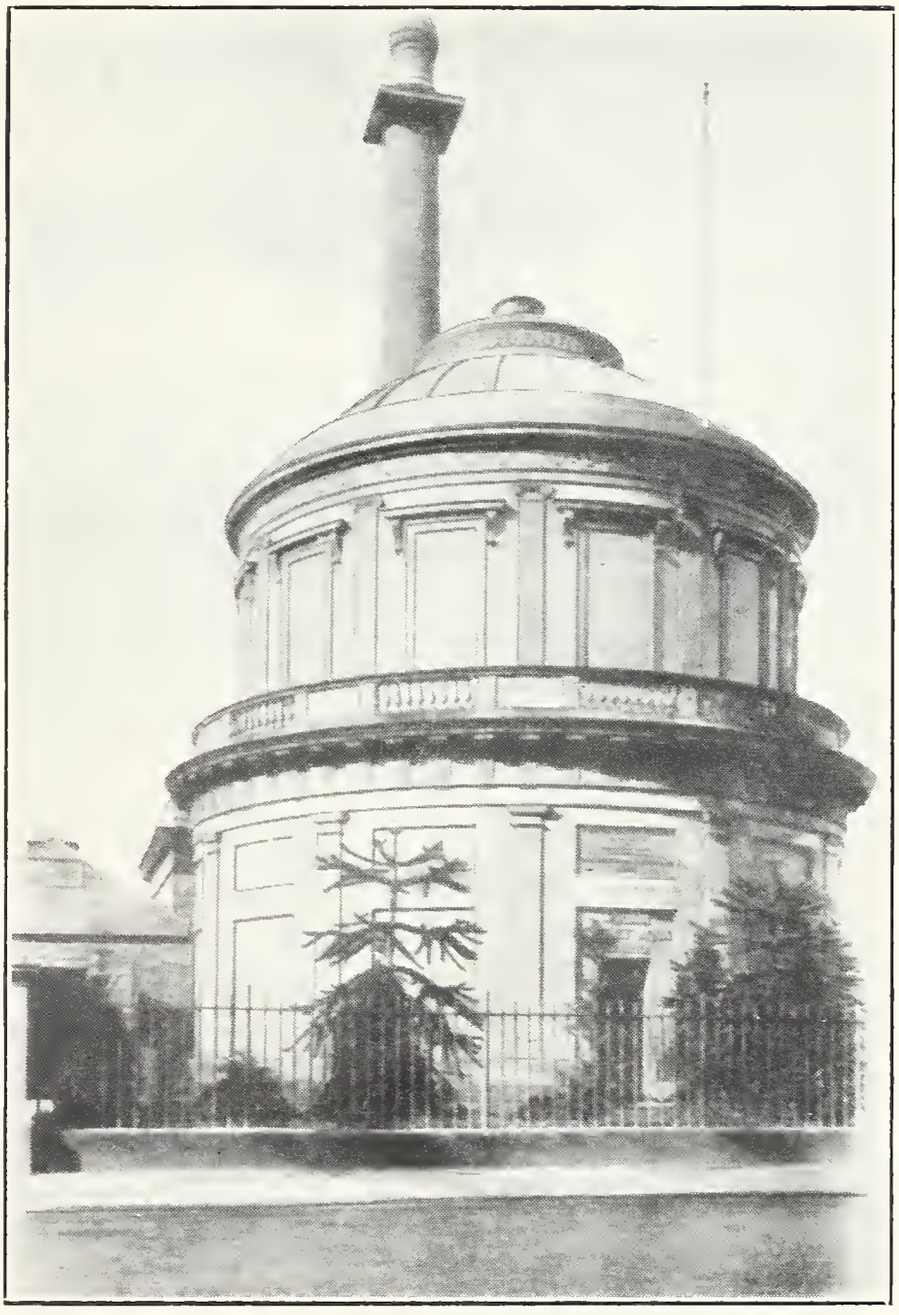
The Woody Island Scheme involved some alterations and additions to the pumping plant at the Water House, and these were carried out under the direction of W. Kerr & Co. (Consultants), of Glasgow. They involved the provision of a new steam boiler and auxiliary plant, including an air pre-heater and steel chimney; a 76 H.P. Diesel driven pumping set; and some alterations to the pumps of the steam sets. The boiler-house yard was also roofed over. As required by the Act, an up-to-date chlorinating plant using gaseous chlorine, was installed at the Water House in November, 1928.

The 30 inch main which carries the water from the new intake to the Water House was originally intended to be a gravity main and this involved its being laid at a depth of 16 or more feet. But, in November, 1928, running sand was encountered on the bottom of the pipe branch on the north part of the North Inch. On the advice of the Engineer, the plans were altered and the main was laid at a normal depth and the " Sedimentation Chamber," which is really a sand trap, was altered so as to accommodate electrically driven low lift pumps to raise the water to a level at which it would flow through the raised pipe line. To offset the extra cost of the pumps, the new pipe line was joined to the existing 18 inch main in the river bed at Perth Bridge, the extra head provided by the pumps, being sufficient to give an adequate flow through this pipe to meet the demand for a number of years.

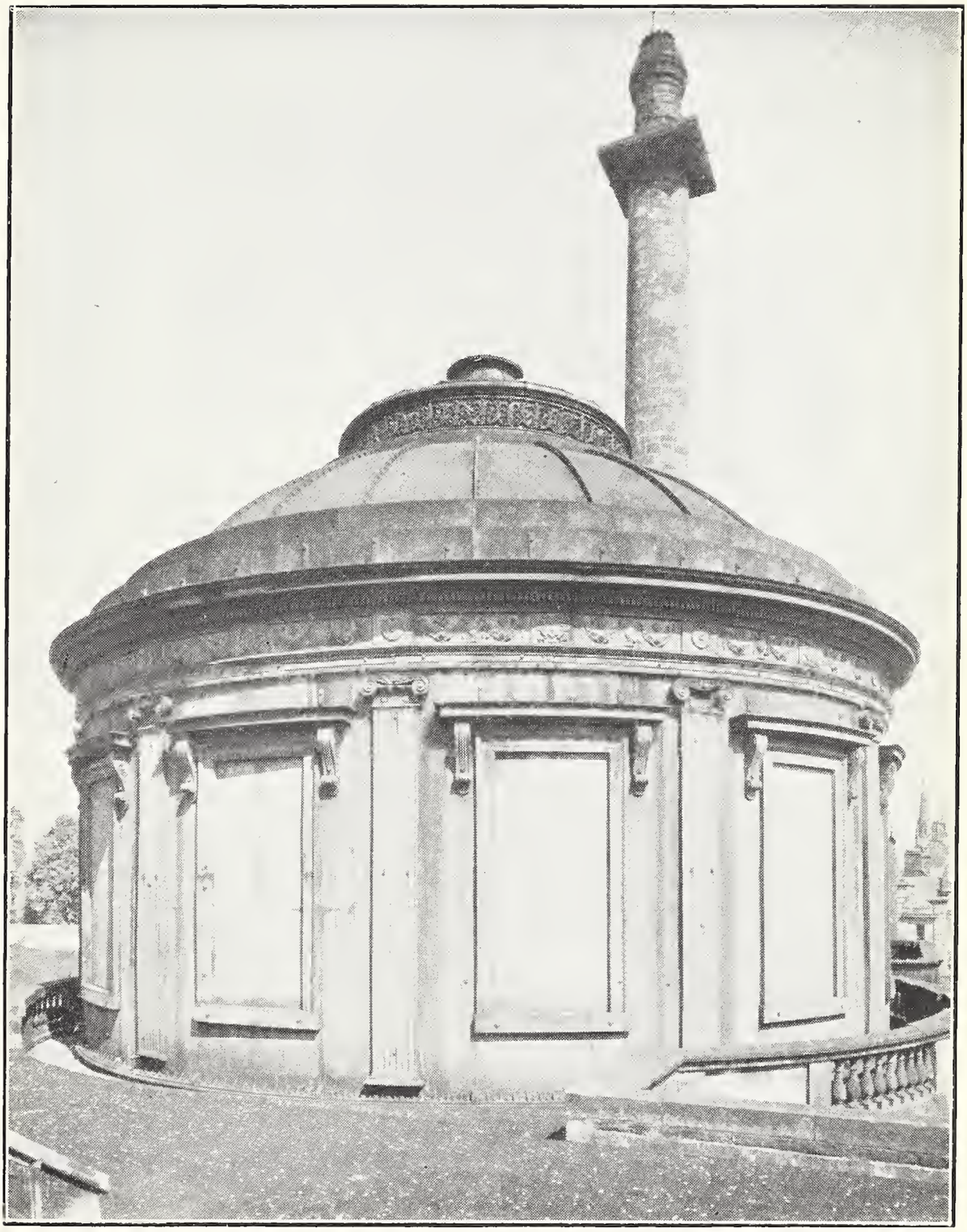
To make room for new plant at the Water House, the original beam engines, which had lain idle for probably 30 years, were broken up and removed at the end of 1928.

Filling of the new reservoir, which has a capacity of $12\frac{1}{2}$ million gallons, was commenced in January, 1929, but it was not up to the top water level until 7th July, as, of course, only the surplus over the daily demand was available for this purpose and for most of the time there was no surplus; indeed it was often difficult to meet the daily demand.

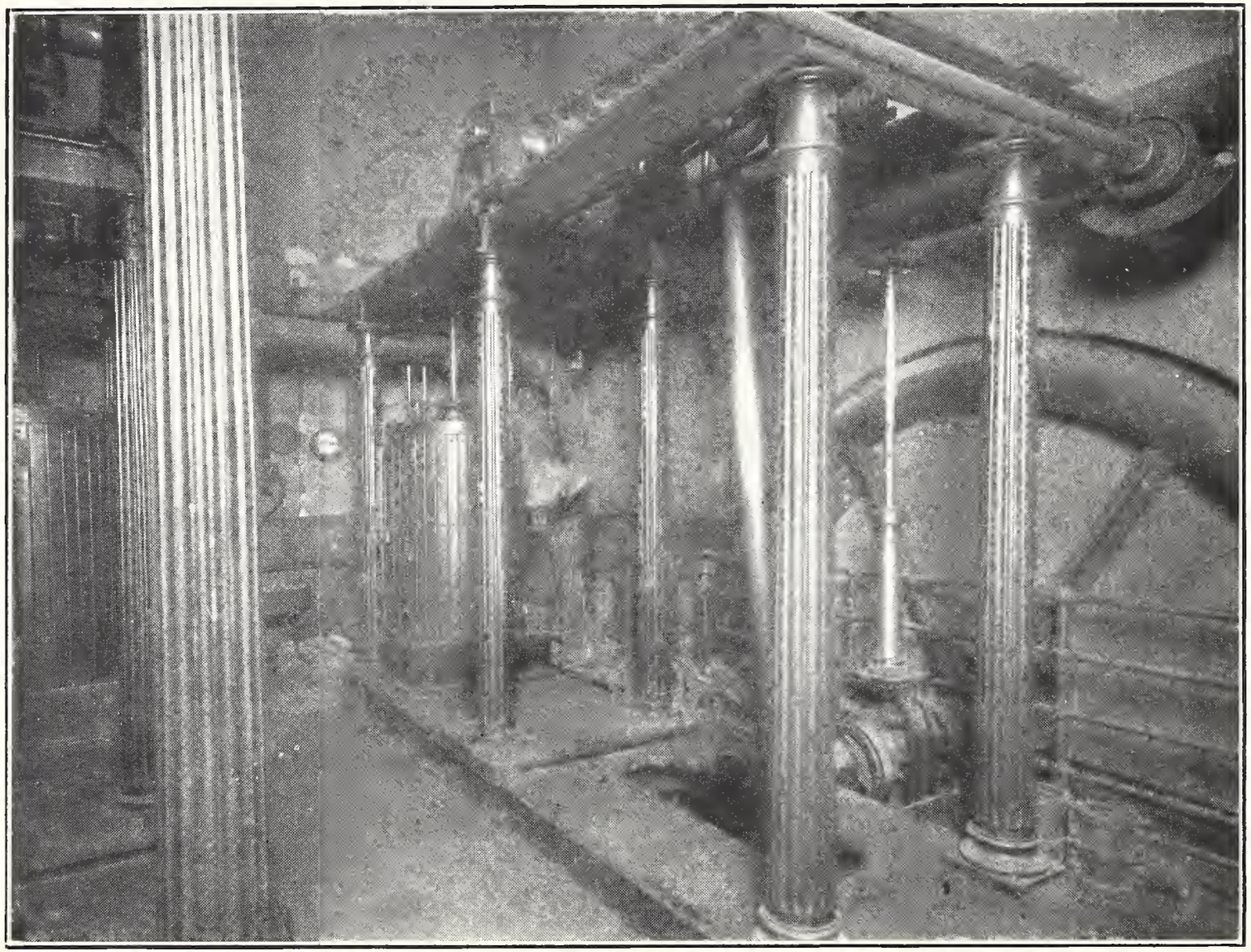
Wellshill Reservoir was then put out of service, the area previously supplied from it being now supplied from the old Viewlands Reservoir through a pressure reducing valve to prevent excessive pressure on the pipes in the low-level area of the town, which corresponds roughly with the original area of supply in Dr. Anderson's day. The mid-level area formerly supplied from the



Water House, Perth, *circa* 1880



The Dome (Old Reservoir) of the Water House as it is to-day



Old Beam Engines (Original) removed 1929

old Viewlands Reservoir now received water directly from the new Viewlands Reservoir.

In 1928 a small Laboratory for the chemical and physical examination of the water was fitted up at the Works—this being, so far as the writer knows, the first and, until very recently, the only one in any Scottish Waterworks. A Workshop with machine tools was also installed in 1930 for plant maintenance.

On Friday, 26th September, 1930, the new supply was formally inaugurated by the Rt. Hon. Wm. Adamson, Secretary of State for Scotland.

CHAPTERS IN PERTHSHIRE CHURCH HISTORY.

By GORDON DONALDSON, M.A., PH.D., F.R.HIST.S., F.S.A.(SCOT.).

The Bishoprics of Perthshire.

The parishes of Perthshire were divided among the dioceses of St. Andrews, Dunkeld and Dunblane. The history of the see of St. Andrews is national rather than regional, but any account of the Church in Perthshire must include a study of the bishoprics of Dunkeld and Dunblane, since most of their parishes lay in that county and each had its cathedral there. (Perthshire shares with Argyll the distinction of having two cathedrals within the county boundaries.) Both of those Perthshire bishoprics are of quite exceptional interest.

Dunkeld first appears as an ecclesiastical centre in the middle of the ninth century. The ancient headquarters of the Columban Church, at Iona, had been destroyed by the Norse invaders, and the Scots had in 844 united with the Picts to form the kingdom of Alba (Scotland north of the Forth and Clyde). At that juncture, relics of St. Columba, formerly at Iona, were brought to Dunkeld, a new ecclesiastical capital from which the Church could exert a unifying influence on the young kingdom. In 865 there died a prelate who was not only "abbot of Dunkeld" but also "first bishop of Fortriu." "Fortriu," while sometimes used in a narrower sense, is regularly applied to the whole of Pictland, and it may be so taken here; the term "first bishop" (*primus episcopus*) looks like an attempt to translate the Celtic "ardepscop" or head bishop.

In a Celtic monastery, the office of abbot (which carried with it jurisdiction over the monastery and its property) was not necessarily combined with that of bishop (the duties of which were spiritual and sacramental rather than administrative). At Dunkeld, while there continued to be a succession of abbots (who, far from being bishops, were latterly lay magnates rather than ecclesiastics at all), there is no record of a bishop again until after 1100. It appears, too, that the headship of the Church of Alba did not long remain at Dunkeld, and that from early in the tenth century it belonged to the bishops at St. Andrews. It has been commonly assumed that the bishopric of Dunkeld lapsed from the ninth century until the twelfth, and that the bishop at St. Andrews was the only bishop for the whole of Scotland until, after 1100, Kings Alexander I and David I divided the country into dioceses.

The many grounds on which it is possible to challenge the view that the bishops of St. Andrews were for long the sole bishops in

Scotland form no part of Perthshire history, though it may be mentioned here that their style of *ardepscop* or head bishop might itself suggest that there were other, inferior, bishops. It is, however, proper to draw attention to the evidence which makes it impossible to accept that the bishopric of Dunkeld which appeared in the twelfth century was a new creation of that period. It must first be realised that the absence of charters in the period before 1100 goes far to explain why the names of no bishops of Dunkeld have survived during a period of more than two hundred years. To argue that, because as soon as charters appear we find the names of bishops, therefore, before there were charters there were no bishops, is quite unsound. It is, again, highly significant that the first bishop who is recorded in the twelfth century was named Cormac; he was clearly a native of the country and not one of the Anglo-Norman clerics who were at that time being imported to fill high offices in the Church. An innovating king like Alexander or David, half English by blood and wholly southern in sympathy, was not likely to choose a Celt as the first bishop of a new see. It seems more probable that Cormac represents not the first of a new line, but the continuation of an old. Finally, it is most instructive to study the diocesan boundaries. Dunkeld had detached portions at Aberlady, Inchcolm, Abercorn, Cramond, Bunkle and Preston in Berwickshire, and Muckairn in Argyll; St. Andrews straggled up the east coast from the Tweed to the Dee, intermingled with Dunkeld, Dunblane and Brechin; Dunblane, too, had detached parishes, notably Abernethy. It would seem that in Dunkeld and Brechin, at least, we have bishoprics which were in origin not territorial but monastic—that is, the bishop's authority was not at first over a district but over a monastery and the scattered churches attached to it. It may, therefore, be conjectured that a monastic bishop may have continued alongside the abbot, and that, as the office of abbot became secularised, the importance of the bishop increased, until in the twelfth century he was recognised as a diocesan bishop. At Brechin, abbots and bishops continued to exist concurrently until early in the thirteenth century, and at Dunkeld the "abbacy" is referred to after there is ample charter evidence for the existence of bishops.

Dunblane, too, may have had its origin partly in a monastic bishopric, but its main interest lies in the fact that it was peculiarly a territorial bishopric—the bishopric of Strathearn, as it is sometimes called. The earls of Strathearn, if they did not found the bishopric, certainly endowed it, and retained certain proprietary rights in it. In most Scottish dioceses, whatever the formal machinery for electing bishops, the effective voice, in the twelfth and thirteenth centuries, lay with the king; but there were two exceptions—at

Whithorn the right to nominate the bishop lay with the Lord of Galloway, at Dunblane with the Earl of Strathearn. It would seem that, just as in the case of a parish, the family who endowed the church became the patron and chose the incumbent. In later times, after the Pope had taken the appointment of bishops into his own hands, one of the bulls which he issued on naming a bishop was normally directed to the king, for his information; but in the case of Dunblane the corresponding bull went to the Earl of Strathearn. In the same way, whereas in other dioceses the king seized a bishop's movable goods on his decease, in Dunblane this privilege belonged to the earl.

Some Late Medieval Developments.

During the four hundred years before the Reformation there took place a succession of developments, each of them aimed at reinvigorating the Church and adapting its equipment for its tasks. The first stage was the foundation of monasteries. The significant fact in Perthshire is the predominance of the order of Augustinian canons regular, or Black Canons, who were established at Scone, Inchaffray and Inchmahome, and had minor establishments at Strathfillan and, so it has been said, at Loch Tay and Abernethy. These canons regular were not confined to the monastic cloister, but undertook the conduct of services in parish churches, and so played a valuable part in the work of the Church throughout the country.

The monasteries were founded mainly in the twelfth century, and after them came the friaries, which were established in the thirteenth century and later. The significance of this movement is of a trend away from the older monasticism, and of a reaction against it, for the work of the friars lay not in the seclusion of a monastic house but in the busy world of men, where they acted as preachers and confessors. In Perthshire the only friars were in or near the Burgh of Perth itself, where there were Dominicans, Franciscans and Carmelites. Possibly one reason why the friars did not have more houses in Perthshire lies in the fact that they usually established themselves in towns, while Perthshire was predominantly a rural county; but it should also be remembered that the canons regular, already strongly represented in Perthshire, stood half-way between the monks in their cloistered seclusion and the friars whose work lay wholly in the world, so that where the canons regular were strong the need for friars may have seemed less pressing.

In the fact that monasticism had in general been found wanting there lies the reason for one of the unique features in Perthshire church history—the foundation of the Charterhouse of Perth in

1429. King James I, who fiercely denounced the older orders for their sloth and lack of zeal, was responsible for Scotland's solitary experiment in a purged monasticism—the introduction of the strict Carthusian order to Perth.

By the middle of the fifteenth century the value not only of monks, but also of friars, was coming to be questioned, and a new fashion in endowment arose. The typical foundation of this period was the collegiate church, where a number of clergy and choristers were established on the lines of a cathedral, to maintain the services in a dignified manner. This movement is illustrated in Perthshire by the collegiate churches of Methven, Abernethy, Innerpeffray, and perhaps Tullibardine.

It happened that these various attempts to reinvigorate the Church were not only neglectful of the parishes, but were actually harmful to them. The whole structure of cathedrals, abbeys and collegiate churches was financed largely at the expense of the parishes. In theory, the tithes or teinds which were rendered on all produce of the land went to the support of the local parson and of the services in the parish church. But in practice the great bulk of those teinds was diverted to endow monasteries, cathedrals and collegiate churches. When a parish was " appropriated " to one of those institutions, revenues which should have supported a well-qualified parson were drained away, leaving only a slender residue to provide for an underpaid vicar to serve the parish church. It has usually been said that two-thirds, or perhaps three-quarters, of Scotland's parishes were so appropriated, but the proportion was even higher in some areas. In the shire of Lanark, ten parishes out of thirty-nine were not appropriated; in the diocese of Galloway, five out of forty-five remained unappropriated, in the diocese of Orkney only one, and in Ayrshire, it seems, not even one. In Perthshire, out of roughly 100 parishes, there were only about a dozen—Ardeonaig, Collace, Dupplin, Kilmaveonaig, Lude, Luncarty, Muckhart, Rannoch, St. Madoes, Struan, and Tulliallan—where it is possible to state with confidence that there was no diversion of teinds. There are one or two other doubtful cases, but it is plain that in less than 15% of the Perthshire parishes did the whole of the revenues continue to be available for the service of the local church.

And where were the teinds going in the other cases? In twenty-one parishes, to the canons and dignitaries (chancellor, chantor, treasurer) of Dunkeld cathedral and in six to the bishop of Dunkeld; in eight to the bishop, dignitaries and canons of Dunblane; and in three to collegiate churches. Of the monasteries, Inchaffray had twelve parishes, Scone ten, Cambuskenneth six, Dunfermline four,

Coupar three, Holyrood two, and St. Andrews priory, Inchmahome, and Pittenweem one each. (It should be noted that of those forty monastic appropriations no less than thirty-three were to houses of Augustinian canons, who could themselves serve as vicars of their annexed parish churches.) There were one or two cases where the appropriated revenues were divided between two institutions; and in certain instances it has not been possible to determine what the appropriation was.

The principal indictment of the medieval church is that it was top-heavy. Its resources were concentrated at the higher levels of the structure, which were maintained at the expense of the parishes, where the clergy were consequently of low intellectual and moral standard and the laity were ill instructed. Diversion of revenues from the parishes also led to neglect of the church buildings and failure to repair them when they suffered damage. The churches of Perthshire did not suffer, as did those of the Lothians and Borders, from repeated English invasions; but they suffered through the disturbed state of the country, especially of the Highland area. The cathedrals for Highland dioceses were all planted in or near the Lowlands, but even so they did not enjoy security. When Bishop Thomas Lauder of Dunkeld (1452-75) was celebrating high mass in his cathedral one Whitsunday, Alexander Robertson burst into the church with a band of armed men, and the bishop had to seek refuge from their arrows by climbing up into the rafters above the Choir. It was for good reason that the bishop obtained permission to hold his synods at Tullilum, " on account of the ferocity of the Highland caterans against churchmen." Yet it was not only caterans who caused trouble, for in 1514 one claimant to the bishopric of Dunkeld seized the palace and cathedral and stood a siege there at the hands of his rival. Nor was it only cathedrals that suffered, for in 1561 it was impossible to exact certain dues from the parson of Rannoch because that parish had been " heryit be the Clan Gregour " and wholly laid waste.

Perthshire and the Reformation.

Out of a hundred clergy who are known to have held benefices in Perthshire in 1560—cathedral dignitaries, canons, parsons and vicars—only seven can be shown unquestionably to have continued to serve their parishes, as ministers, exhorters or readers, under the new *regime*. In another ten cases the evidence is inconclusive, while two more served as ministers in new spheres and not in their old parishes. The percentage of those who served in the reformed church can perhaps be put at about 15, which is a low figure in comparison with dioceses like Orkney and Galloway, where the percentage was

about 50; and Perthshire's percentage is certainly below the average for Scotland as a whole.

Yet it would be quite unsound to argue that the clergy of Perthshire were peculiarly conservative or that the Reformation was especially unwelcome to them. It must be realised that there was very little financial inducement to a beneficed clergyman to enter the ministry of the reformed church. Whether or not he did so, he was assured of two-thirds of his income for his life; if he undertook ministerial duties his only reward, as a rule, was permission to retain the other third as well. In effect, therefore, he received two-thirds of his salary for doing nothing, whereas by working he merely became entitled to the remaining third. This was not an attractive proposition, and one that was not likely to appeal unless reinforced by some other influence or motive. It seems significant that in the dioceses where an unusually high percentage of the old clergy came into the reformed church—Orkney and Galloway—the bishop himself was an enthusiast for the Reformation and, it may be presumed, influenced his clergy to follow his example.

In Perthshire, such leadership—or pressure—from a bishop was lacking. William Chisholm, bishop of Dunblane, attached himself firmly to the papal cause and went off to France, where he died as bishop of Vaison. Robert Crichton of Dunkeld, perhaps the most honourable figure among the Scottish bishops of the period, is a much more complex character. The evidence as to his attitude to the Reformation is at first sight conflicting, but an examination of it suggests that while Crichton was a conservative he was not a papalist, and that in his latter days he was willing to countenance a reformed *regime* on the Anglican model. However, neither Chisholm or Crichton was likely to influence his clergy to accept the Reformation in the 1560s, and it may be concluded that the Perthshire clergy who did enter the ministry of the reformed church did so from the promptings of their own consciences and not because of either financial inducements or episcopal pressure.

If the cathedral clergy, the parsons and the vicars of Perthshire in the main stood aloof from the Reformation, the same is true of the Perthshire friars (although Alexander Young, prior of Tullilum, seems to have become a minister). The canons regular, on the other hand, show a different record. It is unlikely that in 1560 the total number of canons in Scone and Inchaffray together would much exceed thirty, of whom a proportion would be beyond the age for active service. Yet no less than nine canons from those two houses appear as ministers, exhorters or readers in the reformed church. It would seem that the Black Canons served Perthshire well after the Reformation, as they had done before it.

The reformed church organisation developed rapidly in Perthshire, and there was soon a numerous staff of ministers, exhorters and readers. By 1567-8 there were at least 21 ministers, 15 exhorters and 42 readers at work in the county—78 in all, a figure which, although by no means satisfactory for 100 parishes, was not hopelessly inadequate. It is at this point—1567-8—that we first have lists of the reformed clergy in the area. Yet we are not completely in the dark as to the position at a much earlier point. In 1561 and 1562, although we do not have the names or numbers of the reformed clergy, we do know the total sums expended on stipends. Now, the Perthshire total for 1562 was £2621 6s. 8d., which is only £70 less than that for 1569—£2691 16s. 11d. It is therefore a reasonable deduction that the staff of the reformed church was already practically the same by 1562 as it was to be six years later. Even for 1561, we find that the figure was £2036 3s. 4d. This is £600 less than the figure for 1562—nearly 20% less—but even so it would seem that in the first year when the reformed church was organised there were already some 60 ministers, exhorters and readers at work in Perthshire.

Much of the credit for this achievement must go to John Winram, who, as superintendent of Fife and Perthshire, was responsible for the examination and admission of all the reformed clergy in the area. Winram was a man of mature years, wide experience, and considerable dignity. He brought to his office the prestige of a cleric who, as subprior of St. Andrews, had acted as dean and vicar-general in the primatial see. As a superintendent he was styled " my Lord," he was addressed by a countess as " Father," and on his tombstone he is designated " Episcopus Fifanorum " or " Bishop of the men of Fife." But Winram could not have planted these clergy unless he had the support not only of the parishioners but of the lairds. The late Dr. Gillies discovered a document which shows that in May, 1561, Colin Campbell of Glenorchy undertook to pay a stipend for a minister at Kenmore, and it is unlikely that this instance, in a remote Highland part of the county was unique. There is perhaps a parallel between the action of Glenorchy at the Reformation and that of his descendant, the Marquis of Breadalbane, at the Disruption; Breadalbane then joined the Free Church, exerted his influence on his tenants to follow his example, and built churches for congregations at Aberfeldy, Kenmore, and Killin.

In the original constitution of the Scottish reformed church, administrative powers had lain with individuals, not with committees; with superintendents, not with presbyteries. But Andrew Melville began a campaign for the transference of power to presbyteries in 1575, and in 1581 he succeeded in having a scheme of presbyteries approved. As it was clearly impracticable to change

the whole organisation of the church in a day, the first step was to set up a number of experimental or model presbyteries at some points in the Lowlands, one of them at Perth. Evidence exists that this plan did materialise, and that the Perth presbytery was functioning by 1583, when they deposed John Burdoun, vicar of Balquhidder —the first occasion on record, anywhere in Scotland, of a presbytery's exercise of the power of deposition.

The Episcopal Church in Perthshire.

The church history of Scotland for over a hundred years consists largely of the controversy as to whether the church should be governed by bishops or by presbyteries. Perthshire was remote from the main presbyterian stronghold, in the South-West, and was adjacent to the main episcopalian stronghold, in the North-East—Angus, Kincardine and Aberdeen. As we should therefore expect, the county's record is one of moderation, tending towards episcopacy. In 1662, when episcopal government had been restored after twenty years of presbyterian ascendancy, and nearly 300 ministers throughout Scotland—over a quarter of the total—were deprived because they would not accept the rule of bishops, in the synod of Perth and Stirling out of 77 ministers only 12 had to be deprived, while the remainder accepted the episcopalian *regime*.

After 1690, when presbyterian government was finally established in the Church of Scotland, the episcopalians were no longer a party within the church but a separate body outside it. Yet in a number of parishes the inclinations of the people were so strongly in favour of episcopacy that years elapsed before the episcopalian ministers could be dispossessed. One instance is that of Alexander Comrie, of Kenmore, who was not ejected from his church and manse until 1723; while at Aberfoyle there ministered the last episcopalian minister to hold a parish—William Fisher, who died, still in possession, in 1732. At Kilmaveonaig, too, is one of the only four pre-Reformation churches which are to-day in the hands of the Episcopal Church. And at certain places—Alyth, Meigle, and Muthill, for example—the episcopalians maintained their existence without a break, demonstrating their continuity with the old united Church of Scotland as it was established before 1690.

Some of the information about the Episcopal Church in Perthshire in the eighteenth century is to be found in the records of the High Court of Justiciary, because the "non-juring" or Jacobite episcopalians, who refused to acknowledge the House of Hanover, were liable to prosecution if they conducted services with congregations exceeding eight persons—later reduced to four. In 1722 we find that George Robertson had been conducting services in Glenlyon for a congregation of 50 or 60 people. There was no chapel, but over

twenty persons assembled in the house where he preached and in the byre adjoining it; some others, " of the better sort," convened in a house some five or six paces distant but still within hearing distance; while still others stood out of doors. In the same year George Sempill was in trouble for holding services at Caputh, and Francis Rait at Kinnaird. At the time of the 'Forty-Five, Perth was the scene of the labours of the Rev. Robert Lyon, one of the ten episcopalian presbyters numbered among the Jacobite prisoners. Although a chaplain, who had not borne arms, he was executed. After Culloden, there was renewed prosecution of episcopalian worship, and in the Scots *Magazine* for December, 1747, we read that " Four soldiers rushed suddenly into a room at Perth on the 20th, in which Mr. George Sempill, a non-jurant episcopal clergyman, was performing divine service. Finding his audience more numerous by two or three than the law allows, they secured him. He was next day carried before the magistrates, and committed to prison for six months, in terms of the late Act." In 1755, again, Walter Stewart in Atholl was imprisoned for six months for reading prayers to six persons, who were each fined £5.

Not all the episcopalians were Jacobites, and the " jurors " also had a footing in Perthshire. Their congregations were designated " qualified " congregations because they qualified for toleration, but as they were often ministered to by Englishmen they came to be known as " English " churches. The existence of a number of those congregations was noted in 1760 by Bishop Pococke, who made this general comment on the situation in Perthshire: " Most of the gentlemen of this county are of the Church of England, but some of their ladies go to the kirk."

After the death of Bonnie Prince Charlie in 1788, the episcopalians who had hitherto been Jacobites decided to accept King George, and four years later the acts against them were largely repealed. But one or two still held out for the Stewarts, and the last of the remnant who remained faithful to a hopeless cause was Donald MacIntosh, who ministered at Dunkeld and did not die until 1808. However, with the extinction of Jacobitism, the two sections of episcopalians—non-jurors and qualified—drew together to form the modern Scottish Episcopal Church, which continued in the nineteenth century to make its contribution to the religious life of Perthshire. Trinity College, Glenalmond, is one of its most noted institutions, and in Perth itself the Cathedral of St. Ninian was the first cathedral to be built anywhere in Britain after the Reformation.

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The Library of the Society is situated in Perth Museum and Art Gallery, and is open at all times. The Photographic and Microscopic Sections meet on Thursdays between 7 and 10 p.m.

It has been suggested that an Astronomical Section should be formed on the same lines as the existing Photographic and Microscopic Sections. The Secretary would be glad to hear from any Members who would be interested in the foundation of such a Section.

Annual Subscriptions (5/6) may be sent to the Treasurer, Mr. James F. Cumming, 186 High Street, Perth.

Report of Council, 1938-39.

The Council have pleasure in presenting to the Members of the Society their 72nd Annual Report.

Seven meetings were held during the year. These meetings have all been well attended. At one meeting we used an epidiascope to illustrate the lecture. This was kindly lent by Mr. Dickson, Agricultural Office.

During the year 3 Council Meetings were held.

7 Ordinary Members were admitted during the year, and the membership now stands at 262—Associate Members, 7; Life Members, 10; Ordinary Members, 238; Honorary Members, 2; Corresponding Members, 5.

By death the Society lost 11 members:—Mr. J. G. Farquharson, Mr. J. Graham Callander, Mr. David M'Beath, Mr. Robert Campbell, Mr. William Fenton, Mr. John Asher, Mr. James Barlas, Mr. James Winter, Mr. Norman I. Nasmyth, Mr. D. A. Haggart and Mr. Sam Ellison.

A few of the members have had most successful meetings every Wednesday evening in the Library and Laboratory.

The 41st Essay Competition for children attending Perthshire schools took as its subject "Six Perthshire Trees," when 133 essays were sent in. The prizes and certificates were presented by Mr. William Henderson of Lawton, on 5th November, 1938.

The Council regret to say that the competition for the prizes offered by Lord Provost Nimmo had a very poor entry, only one city school competing. The essays were of a low standard.

The Council wish to express their thanks to any who have in any way helped or furthered the aims and work of the Society during the past session.

Report of Council, 1939-40.

The Council have pleasure in presenting to the members of the Society their 73rd Annual Report.

During the Summer, only one excursion was held, that being to Stobhall Castle in June. It had been contemplated that a further excursion or excursions might be arranged towards the end of the Summer but, on account of the outbreak of War at the beginning of September, the proposal was abandoned.

In consequence of the various difficulties arising out of the war conditions, the Council were not able to arrange the usual monthly Meetings during the Winter. One lecture, joint with the Royal Horticultural Society of Perthshire, was held on 24th January last.

During the year the Council have held 4 meetings.

6 Ordinary Members have been admitted during the year, and the present membership is now 253—a reduction of 9 on the previous

year. The membership is made up of:—Associates, 1; Associate Members, 7; Life Members, 13; Ordinary Members, 224; Honorary Members, 3; Corresponding Members, 5. By death the Society has lost 5 members:—Messrs. James Robertson, John Watt, David Bisset, Edward Smart, and Rev. Mgr. McDaniel. Mr. Robert Hunter, one of the Trustees of the Society, died in February.

Several members held meetings in the Library and Laboratory.

The 42nd Essay Competition for children attending Perthshire schools, for which the subject was "Six Perthshire Birds," produced 72 essays from 10 schools. On account of the war conditions there was no public presentation of prizes and certificates. These were sent to the successful competitors direct.

Report of Council, 1940-41.

The Council have pleasure in presenting to the members of the Society their 74th Annual Report.

On account of the present emergency, and the fact that the Museum and Lecture Room have been closed to the public and used for A.R.P. purposes, no Lectures could be arranged to be held during the past Winter. No excursion took place during the past Summer, on account of the various restrictions arising out of the national position and the want of the usual facilities.

During the year the Council have held 2 meetings.

2 Ordinary Members have been admitted during the year, and the present membership is now 227—a reduction of 17 on the previous year. The membership is made up of:—Associates, 1; Associate Members, 7; Life Members, 12; Ordinary Members, 198; Honorary Members, 4; Corresponding Members, 5. By death the Society have lost 5 members, namely:—Mr. John Ritchie, Dr. Stirling, Mr. John M'Gregor, Dr. Bisset, and Miss Morison.

The 43rd Essay Competition for children attending Perthshire schools, for which the subject was "Six Perthshire Insects," produced only 22 essays from 4 schools. This decrease is accounted for by the evacuation of children and the consequent dislocation in the various schools. This year again there was no public presentation of prizes and certificates. These, and the medal awarded this year, were sent direct to the successful competitors.

Report of Council, 1941-42.

The Council have pleasure in presenting to the members of the Society their 75th Annual Report.

As had to be reported last year, the national emergency and the use being made of the Museum and Lecture Room for A.R.P. purposes have prevented the Society from having the use of these rooms during the year. It was accordingly not possible to arrange

for the usual Lectures to be held during the past Winter. The want of travelling facilities has also prevented the Council from being able to arrange for excursions during the Summer.

During the year the Council have held 2 meetings.

No Ordinary Members have been admitted during the year. The present membership is 221—a reduction of 6 on the previous year. The membership is made up of:—Associates, 1; Associate Members, 7; Life Members, 12; Ordinary Members, 192; Honorary Members, 4; Corresponding Members, 5. By death the Society have lost 2 members, namely, Mr. J. N. Malloch and His Grace the Duke of Atholl, both members of many years standing.

The 44th Essay Competition for children attending Perthshire schools produced 30 essays from 6 schools. This was a slight increase on the number sent in for the previous year. The subject was "Six Summer Flowers." As before, the decrease in the number of essays sent in is accounted for by the disturbance in school routine caused by the evacuation of children and the extra duties required of the teachers. There was no public presentation of the prizes and certificates, these being sent direct to the successful competitors.

Report of Council, 1942-43.

The Council submit to the members the 76th Annual Report of the Society.

On account of the national emergency, the conditions of the Society remained the same during the past year as during the previous two years. The want of the Museum and Lecture Room, which were closed the the public until a few weeks ago, prevented the Council being able to arrange lectures. The restricted travelling facilities made it impossible to hold outings during the Summer season.

During the year the Council held two meetings.

There were no members admitted during the past year. The present membership is 203—a reduction of 18 on the previous year. The membership is made up as follows:—Associates, 1; Associate Members, 7; Life Members, 12; Ordinary Members, 174; Honorary Members, 4; Corresponding Members, 5. By death the Society has lost 6 members.

The 45th Essay Competition under the Charles MacIntosh Fund for children attending Perthshire schools produced 60 essays from 6 schools. The number of essays was double those of the previous year, the increase being accounted for by the large number of entries from Caledonian Road School, Perth. The subject was "The Life History of any one Perthshire Fish." Again this year, on account of the restrictions in travelling facilities, there was no public presentation of the prizes and certificates.

OBITUARY.

John Ritchie.

On 2nd August, 1940, the Society lost through the death of Mr. John Ritchie not only a valued member, but an active and leading Office-bearer. Mr. Ritchie was appointed Curator of the Museum in 1918, and as such he continued to be guide, philosopher and friend to the Society and to all persons seeking information on matters concerning Natural Science, particularly the Natural Science of Perthshire. In 1923, Mr. Ritchie was appointed Secretary of the Society, and continued in that office until 1935. For very many years he had acted as Librarian. Mr. Ritchie's abilities were natural. He had a full knowledge of all things pertaining to his work, and his memory for details was incalculable not only to himself in connection with his duties, but was of great assistance in all matters that were referred to him by others.

Robert Hunter.

Robert Hunter become a member of the Society in December, 1909, and throughout the long period of thirty years took a keen interest in its affairs. This interest was specially manifested during the latter part of his membership, when difficult legal problems confronted the Society. We recall with gratitude the services fully and freely rendered during the negotiations for the transfer of the Museum to George Street. The smoothness with which this transaction was carried out, and the excellent terms secured for the Society, were in large measure due to the care and thought bestowed by Mr. Hunter. He, too, was the author of our revised Constitution, reflecting as it does more appropriately the real aims and objects of the Society. As an authority on Income Tax Law, his guidance and active help enabled the Council to proceed with its claim for repayment of Income Tax, and ultimately, to win the verdict of the Special Commissioners.

When the need for appointment of fresh Trustees was recognised, Mr. Hunter was one of our unanimous choices. In this capacity he acted with acceptance until the time of his death. To-night we mourn with sincere regret the passing of one who did much to promote the welfare of the Society.

—W. M.

CHILDREN'S ESSAY COMPETITION.

For the Charles MacIntosh Memorial Prizes.

1938.

Subject: "Six Perthshire Trees."

Number of Schools, 7—Number of Girls, 94; number of Boys, 39.
Examiners—Professor J. R. Peacock, Mr. Edward Smart, Mr. D. J. S. Sutherland, Miss M. C. Malcolm, and Mr. John Ritchie.

1939.

Subject: "Six Perthshire Birds."

Number of Schools, 10—Number of Competitors, 72.
Examiners—

1940.

Subject: "Six Perthshire Insects."

Number of Schools, 4—Numbers of Girls, 14; number of Boys, 8.
Examiner—Mr. Gilbert Malloch.

1941.

Subject: "Six Summer Flowers."

Number of Schools, 6—Number of Girls, 26; number of Boys, 4.
Examiners—Miss Christine C. Barclay and Mr. Andrew R. Wilson.

1942.

Subject: "The Life History of any Perthshire Fish."

Number of Schools, 6—Number of Girls, 56; number of Boys, 4.
Mr. William Malloch, B.Sc.

Examiner—Mr. William Malloch, B.Sc.

1943.

Subject: "My Favourite Roadside Hedge—Its Flora and Fauna."

Number of Schools, 7—Number of Girls, 55; number of Boys, 9.
Examiner—Mr. John T. Renton.

ABSTRACT OF ACCOUNTS for Year ending 28th Feb., 1939.

GENERAL ACCOUNT.

			Income.	Expenditure.
To 226 Subscriptions from Members			£62 3 0	
,, 6 Subscriptions from Associates			0 18 0	
,, Saving Bank Interest			0 11 0	
,, 1937-38 Postages recovered from M'Intosh Memorial Fund ...			0 7 2	
,, Credit Balance as at 28th February, 1938			27 19 10½	
By Heating and Lighting, etc.				£21 0 0
,, Janitor				6 10 0
,, Other Societies				6 8 0
,, Books and Magazines				8 12 4
,, Printing and Stationery				3 16 0
,, Sundries, *less* sale of Transactions, 5/6, and Flora of Perthshire, 8/-				6 18 6
				£53 4 10
,, Credit Balance as at 28th February, 1939				38 14 2½
Made up thus :—				
Perth Savings Bank	£28	2 7		
Due by Secretary	0	9 6½		
Due by Publication Endowment Fund Account	17	11 1		
	£46	3 2½		
Deduct :—				
Due to M'Intosh Memorial Fund Account—Capital, 12/4; Income, £5 17/10; and due to Photographic Section, 18/10	7	9 0		
	£38	14 2½		
			£91 19 0½	£91 19 0½

PUBLICATION ENDOWMENT FUND.

			Income.	Expenditure.
To Funds per last Account—£500 4% Consols			£428 9 9	
Due to General Account			8 7 11	
			£420 1 10	
,, Interest *less* Income Tax			14 10 0	
,, Income Tax refunded			5 10 0	
By Printing, etc.				29 3 2
,, Funds as at 28th February, 1939 :—				
£500 4% Consols	£428	9 9		
Due to General Account	17	11 1		
				410 18 8
			£440 1 10	£440 1 10

M'INTOSH MEMORIAL FUND.

			Income.	Expenditure.
To Funds per last Account—£130 3½% War Stock			£129 7 8	
,, Capital Balance due by General Account			0 12 4	
,, Income Balance due by General Account			5 14 7½	
,, Interest			4 11 0	
By Prizes, Printing, etc., including 1937-38 Postages, 7/2, due General Account				£4 7 9½
,, Funds as at 28th February, 1939 :—				
£130 3½% War Stock at cost	£129	7 8		
Capital Balance due by General Account ...	0	12 4		
Income Balance due by General Account ...	5	17 10		
				135 17 10
			£140 5 7½	£140 5 7½

PHOTOGRAPHIC SECTION ACCOUNT.

	Income.	Expenditure.
To Funds as per last Account	£1 6 4	
,, Subscriptions from Lockers	0 4 0	
By Sundry Expenses		£0 11 6
,, By Balance due by General Account		0 18 10
	£1 10 4	£1 10 4

J. F. CUMMING, *Treasurer.*

PERTH, 17th March, 1939.—Examined, compared with Vouchers and found correct.

(Signed) P. M'G. JACKSON, C.A., *Auditor.*

ABSTRACT OF ACCOUNTS for Year ending 28th Feb., 1940.

GENERAL ACCOUNT.

		Income.	Expenditure.
To 206 Subscriptions from Members		£56 13 0	
,, 6 Subscriptions from Associates		0 18 0	
,, Savings Bank Interest		0 14 6	
,, Credit Balance as at 28th February, 1939		38 14 2½	
By Heating and Lighting, etc.			£21 0 0
,, Janitor			6 10 0
,, Other Societies			5 7 0
,, Books and Magazines			9 4 0
,, Printing and Stationery			2 4 6
,, Sundries *less* sale of Flora of Perthshire, 7/6			3 2 6½
			£47 8 0½
,, Credit Balance as at 28th February, 1940			49 11 8
Made up thus :—			
Perth Savings Bank	£59 18 3		
Due by Secretary	0 6 11		
Due by Treasurer	0 8 0		
	£60 13 2		
Deduct :—			
Due to Publication Endowment Fund, £2 8/11; M'Intosh Memorial Fund—Capital, 12/4; Income, £6 19/5; Photographic Section, £1 0/10	11 1 6		
	£49 11 8		
		£96 19 8½	£96 19 8½

PUBLICATION ENDOWMENT FUND.

To Funds per last Account—£500 4% Consols		£428 9 9	
Due to General Account		17 11 1	
		£410 18 8	
,, Interest *less* Income Tax		13 0 0	
,, Income Tax refunded		7 0 0	
By Funds as at 28th February, 1940 :—			
£500 4% Consols	£428 9 9		
Due by General Account	2 8 11		
			£430 18 8
		£430 18 8	£430 18 8

M'INTOSH MEMORIAL FUND.

To Funds per last Account—£130 3½% War Stock		£129 7 8	
,, Capital Balance due by General Account		0 12 4	
,, Income Balance due by General Account		5 17 10	
,, Interest		4 11 0	
By Prizes, Printing, and Postages			£3 9 5
,, Funds as at 28th February, 1940 :—			
£130 3½% War Stock at cost	£129 7 8		
Capital Balance due by General Account	0 12 4		
Income Balance due by General Account	6 19 5		
			136 19 5
		£140 8 10	£140 8 10

PHOTOGRAPHIC SECTION ACCOUNT.

To Funds as per last Account	£0 18 10	
,, Subscriptions from Lockers	0 2 0	
By Balance due by General Account		£1 0 10
	£1 0 10	£1 0 10

J. F. CUMMING, *Treasurer.*

PERTH, 20th March, 1940.—Examined, compared with Vouchers and found correct.

(Signed) P. M'G. JACKSON, C.A., *Auditor.*

ABSTRACT OF ACCOUNTS for Year ending 28th Feb., 1941.

GENERAL ACCOUNT.

			Income.	Expenditure.
To 89 Subscriptions from Members			£24 12 6	
,, 1 Life Member's Supscription			5 5 0	
,, Savings Bank Interest'			1 8 3	
,, Credit Balance as at 28th February, 1940			49 11 8	
By Heating and lighting				£11 0 0
,, Other Societies				3 12 0
,, Books and Magazines, *less* sale of the Journals of Animal Ecology, £4 10/-				3 2 6
,, Printing and Stationery				0 13 6
,, Sundries				2 1 0½
				£20 9 0½
,, Credit Balance as at 28th February, 1941 ... ... Made up thus :—				60 8 4½
Perth Savings Bank	£94 15 7			
Due by Secretary (Post Book)	0 0 2½			
Due by Treasurer	0 4 11			
	£95 0 8½			
Deduct :— Due to Publication Endowment Fund, £22 8/11; M'Intosh Memorial Fund—Capital, 12/4; Income, £10 8/3; Photographic Section, £1 2/10	34 12 4			
	£60 8 4½			
			£80 17 5	£80 17 5

PUBLICATION ENDOWMENT FUND.

To Funds as per last Account—£500 4% Concols			£428 9 9	
,, Due by General Account			2 8 11	
,, Interest *less* Income Tax			11 10 0	
,, Income Tax refunded			8 10 0	
By Funds as at 28th February, 1941 :—				
£500 4% Consols	£428 9 9			
Due by General Account	22 8 11			
				£450 18 8
			£450 18 8	£450 18 8

M'INTOSH MEMORIAL FUND.

To Funds as per last Account—£130 3½% War Stock			£129 7 8	
,, Capital Balance due by General Account			0 12 4	
,, Income Balance due by General Account			6 19 5	
,, Interest			4 11 0	
By Printing, Postages, etc.				£1 2 2
,, Funds as at 28th February, 1941 :—				
£130 3½% War Stock at cost	£129 7 8			
Capital Balance due by General Account	0 12 4			
Income Balance due by General Account	10 8 3			
				140 8 3
			£141 10 5	£141 10 5

PHOTOGRAPHIC SECTION ACCOUNT.

To Funds as per last Account			£1 0 10	
,, Subscriptions from Lockers			0 2 0	
By Balance due by General Account				£1 2 10
			£1 2 10	£1 2 10

J. F. CUMMING, *Treasurer.*

PERTH, 25th March, 1941.—Examined, compared with Vouchers and found correct.

(Signed) P. M'G. JACKSON, C.A., *Auditor.*

ABSTRACT OF ACCOUNTS for Year ending 28th Feb., 1942.

GENERAL ACCOUNT.

			Income.	Expenditure.
To 25 Subscriptions from Members, 1940-41			£6 17 6	
,, Interest—Savings Bank and Defence Bonds			2 3 7	
,, Credit Balance as at 28th February, 1941			60 8 4½	
By Insurances—Fire and War Damage				£20 17 6
,, Other Societies				3 2 0
,, Books and Magazines				2 12 0
,, Sundries—Secretary and Treasurer, Posts, etc.				2 17 2
				£29 8 8
,, Credit Balance as at 28th February, 1942				40 0 9½
Made up thus :—				
£75 3% Defence Bonds at cost	£75 0 0			
Perth Savings Bank	21 9 3			
	£96 9 3			
Deduct :—				
Due to Treasurer, 14/11½; due to Publication Endowment Fund, £42 8/11; due to M'Intosh Memorial Fund—Capital, 12/4; Income, £11 9/5; due to Photographic Section, £1 2/10	56 8 5½			
	£40 0 9½			
			£69 9 5½	£69 9 5½

PUBLICATION ENDOWMENT FUND.

To Funds as per last Account—£500 4% Consols		£428 9 9	
,, Due by General Account		22 8 11	
,, Interest *less* Income Tax		10 0 0	
,, Income Tax refunded		10 0 0	
By Funds as at 28th February, 1942 :—			
£500 4% Consols at cost	£428 9 9		
Due by General Account	42 8 11		
			£470 18 8
		£470 18 8	£470 18 8

M'INTOSH MEMORIAL FUND.

To Funds as per last Account—£130 3½% War Stock		£129 7 8	
,, Capital Balance due by General Account		0 12 4	
,, Income Balance due by General Account		10 8 3	
,, Interest		4 11 0	
By Prizes, Printing, and Postages			£3 9 10
,, Funds as at 28th February, 1942 :—			
£130 3½% War Stock at cost	£129 7 8		
Capital Balance due by General Account	0 12 4		
Income Balance due by General Account	11 9 5		
			141 9 5
		£144 19 3	£144 19 3

PHOTOGRAPHIC SECTION ACCOUNT.

To Funds as per last Account		£1 2 10	
By Balance due by General Account			£1 2 10
		£1 2 10	£1 2 10

J. F. CUMMING, *Treasurer.*

PERTH, 26th March, 1942.—Examined, compared with Vouchers and found correct.

(Signed) P. M'G. JACKSON, C.A., *Auditor.*

ABSTRACT OF ACCOUNTS for Year ending 28th Feb., 1943.

GENERAL ACCOUNT.

		Income.	Expenditure.
To Subscriptions from Members, 1942-43		£38 7 0	
,, Credit Balance as at 28th February, 1942		40 0 9½	
,, Interest—Savings Bank and Defence Bonds		2 17 9	
By Insurances—Fire and War Damage			£7 17 6
,, Other Societies			3 2 0
,, Books and Magazines			4 4 0
,, Printing			0 8 6
,, Sundries—Secretary and Treasurer, Posts, etc.			2 6 8½
			£17 18 8½
,, Credit Balance as at 28th February, 1943			63 6 10
Made up thus :—			
£75 3% Defence Bonds	£75 0 0		
Perth Savings Bank	66 2 4		
Due by Treasurer	0 1 0		
	£141 3 4		
Deduct :—			
Due to M'Intosh Memorial Fund—Capital, 12/4; Income, £13 12/5; due to Publication Endowment Fund, £62 8/11; due to Photographic Section, £1 2/10	£77 16 6		
	£63 6 10		
		£81 5 6½	£81 5 6½

PUBLICATION ENDOWMENT FUND.

To Funds as per last Account—£500 4% Consols		£428 9 9	
,, Due by General Account		42 8 11	
,, Interest *less* Income Tax		10 0 0	
,, Income Tax refunded		10 0 0	
By Funds as at 28th February, 1943 :—			
£500 4% Consols	£428 9 9		
Due by General Account	62 8 11		
		£490 18 8	£490 18 8

M'INTOSH MEMORIAL FUND.

To Funds as per last Account—£130 3½% War Stock		£129 7 8	
,, Capital Balance due by General Account		0 12 4	
,, Interest		4 11 0	
By Prizes and Printing			£2 8 0
,, Funds as at 28th February, 1943 :—			
£130 3½% War Stock			129 7 8
Capital Balance due by General Account			0 12 4
Income Balance due by General Account			13 12 5
		£146 0 5	£146 0 5

PHOTOGRAPHIC SECTION ACCOUNT.

To Funds as per last Account	£1 2 10	
By Balance due by General Account		£1 2 10
	£1 2 10	£1 2 10

J. F. CUMMING, *Treasurer.*

PERTH, 23rd March, 1943.—Examined, compared with Vouchers and found correct.

(Signed) P. M'G. JACKSON, C.A., *Auditor.*

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1938.

MONTHS.	BAROMETER.	AIR TEMPERATURE °F.								HYGRO-METER.		RAIN.					WIND DIRECTION.									SUNSHINE.		
		Mean of				Absolute Maximum and Minimum.				Mean at 9 a.m.							Number of Observations at 9 a.m. and 3 p.m.											
		Maximum (A).	Minimum (B).	Mean of A and B.	Difference from Average.	Maximum	Day of Month.	Minimum	Day of Month.	Dry Bulb.	Wet Bulb.	Total Fall in mms.	Difference from Average.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	N	N E	E	S E	S	S W	W	N W	Variable.	Total Amount in Hours.	Difference from Average.	Number of Days.
	Inches.	°	°	°	°	°		°		°	°	mm.			mm.													
JAN.	29·599	45·8	35·0	40·4	+2·9	55	22	23	2	39·0	37·9	119·5	+51·7	20	25·6	9	6	5	3	1	0	21	6	20	0	59·5	+15·3	22
FEB.	30·180	47·1	34·8	41·0	+3·1	56	28	24	7, 15	38·4	37·6	14·7	−43·7	11	3·4	25	10	9	1	2	0	11	6	17	0	62·4	−2·8	20
MAR.	29·987	55·2	42·0	*48·6	+8·3	65	11	26	22	47·1	46·2	15·7	−42·0	9	5·9	19	2	4	0	0	0	21	17	18	0	113·3	+10·5	28
APR.	30·314	56·8	38·5	47·6	+3·1	65	5	24	9	46·1	43·5	†3·5	−42·2	4	1·2	3, 27	6	6	0	3	0	14	14	17	0	169·4	+28·3	30
MAY	29·932	58·7	40·4	50·2	+0·1	69	6	27	2, 5	49·1	46·9	90·0	+38·7	17	19·4	28	14	11	0	2	0	9	8	18	0	184·4	+14·6	26
JUNE	29·853	63·9	47·2	55·6	−0·2	80	13	32	7	53·6	52·6	75·4	+26·1	15	11·4	26	5	7	0	3	2	21	9	13	0	188·9	−11·2	29
JULY	29·842	66·2	50·2	58·2	−0·6	72	25	42	7	57·4	54·1	79·5	+5·6	17	17·3	7	6	6	1	1	5	13	15	15	0	118·0	−56·1	29
AUG.	30·005	69·0	51·0	60·0	+2·4	79	10	40	21	59·3	54·4	38·1	−46·5	14	13·3	29	1	12	5	4	3	20	7	9	1	150·1	−2·0	30
SEPT.	29·949	64·0	47·7	55·9	+2·7	76	8	35	2, 15	52·7	51·3	86·4	+28·5	18	13·9	13	4	6	3	14	3	10	10	10	0	101·0	−26·0	22
OCT.	29·559	57·2	43·4	50·3	+3·5	62	1, 13	33	28	48·5	46·9	138·9	+61·4	22	27·7	2	2	7	0	8	2	23	16	14	0	81·3	−8·8	28
NOV.	29·525	49·8	39·8	44·8	+3·9	60	6, 12	21	22	44·2	42·8	108·7	+37·1	22	16·2	18	0	8	3	6	3	23	8	9	0	37·6	−17·5	20
DEC.	29·757	43·1	31·4	37·3	−0·7	52	7, 12	8	22	36·2	35·5	56·6	−21·4	21	9·8	19	8	10	1	8	3	11	10	11	0	32·9	−1·9	19
Total or Average for Year	29·875	56·3	41·8	49·1	+2·3	...	...	...	...	...	...	827·0	+52·6	190	...	...	64	91	17	42	21	197	126	171	1	1298·8	−58·3	303
Highest						**80**	**13, vi.**								**27·7**	**2, x.**												
Lowest								**8**	**22 xii.**																			

*Record Highest. †Record Lowest.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1939.

MONTHS.	BAROMETER.	AIR TEMPERATURE °F.								HYGRO-METER.		RAIN.					WIND DIRECTION.									SUNSHINE.		
		Mean of				Absolute Maximum and Minimum.				Mean at 9 a.m.							Number of Observations at 9 a.m. and 3 p.m.											
		Maximum (A).	Minimum (B).	Mean of A and B.	Difference from Average.	Maximum	Day of Month.	Minimum	Day of Month.	Dry Bulb.	Wet Bulb.	Total Fall in mms.	Difference from Average.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	N	N E	E	S E	S	S W	W	N W	Calm or Variable.	Total Amount in Hours.	Difference from Average.	Number of Days.
	Inches	°	°	°	°	°		°		°	°	mm.			mm.													
JAN.	29·570	41·1	30·7	35·9	−1·6	49	15	13	6	34·5	33·4	84·6	+16·8	19	22·2	14	13	12	0	7	1	4	6	18	1	36·8	−7·4	15
FEB.	29·796	48·4	38·0	*43·2	+5·3	57	10	24	3	41·5	39·7	69·8	+11·4	19	12·6	22	1	5	0	2	0	11	20	17	0	57·9	−7·3	22
MAR.	30·007	49·7	35·1	42·4	+2·1	59	13	26	10, 24	41·4	39·4	49·1	−8·6	23	6·6	24	9	9	2	6	3	5	18	10	0	119·8	+17·0	27
APRIL	29·881	53·0	37·7	45·4	+0·9	65	12	23	7	45·1	42·2	35·0	−10·7	12	9·9	13	10	15	6	4	1	6	8	10	0	122·8	−18·3	25
MAY	30·110	61·9	42·6	52·3	+2·3	77	30	29	3	51·3	48·0	33·3	−18·0	8	10·0	5	7	15	9	8	0	9	4	10	0	167·3	−2·5	30
JUNE	30·011	68·3	46·7	57·5	+1·7	86	4	36	2	57·2	50·2	49·4	+0·1	13	13·2	11	6	4	8	2	0	18	5	16	1	254·2	+54·1	29
JULY	29·766	65·9	51·2	58·6	−0·2	73	20	38	24	56·7	54·2	91·0	+17·1	20	18·3	13	1	7	1	14	4	18	12	5	0	122·1	−52·0	27
AUG.	30·050	68·2	52·9	60·6	+3·0	78	18	42	9, 13	57·7	55·5	44·5	−40·1	13	14·3	26	2	8	10	11	5	6	16	4	0	123·1	−29·0	26
SEPT.	30·217	65·3	47·5	56·4	+3·2	73	4	31	30	51·8	50·2	54·2	−3·7	12	19·2	2	10	1	5	5	0	3	20	16	0	135·5	+7·8	27
OCT.	30·018	53·6	39·1	46·4	−0·4	59	6	25	28	41·5	40·4	107·1	+29·6	17	38·7	9	11	15	12	3	0	4	4	13	0	93·5	+3·4	21
NOV.	29·647	49·6	38·1	43·9	+3·0	55	8, 13, 25	28	3	41·7	40·3	111·8	+40·2	24	14·3	30	2	3	3	8	4	30	6	4	0	47·7	−7·4	18
DEC.	29·997	42·5	33·3	37·9	−0·1	55	1	16	29	36·1	33·3	39·5	−38·5	10	13·4	9	7	9	4	5	1	12	4	20	0	21·4	−13·4	13
Total or Average for Year	29·923	55·6	41·1	48·4	+1·6	...	...	...	...	...	...	769·3	−5·1	190	...	...	79	103	60	75	19	126	123	143	2	1302·1	−55·1	280
Highest						**86**	**4, vi.**								**38·7**	**9, x**												
Lowest,								**13**	**6, i.**																			

* Record Highest.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1940.

MONTHS.	BAROMETER.	AIR TEMPERATURE °F.								HYGRO-METER.		RAIN.					WIND DIRECTION.									SUNSHINE.		
		Mean of				Absolute Maximum and Minimum.				Mean at 9 a.m.							Number of Observations at 9 a.m. and 3 p.m.											
		Maximum (A).	Minimum (B).	Mean of A and B.	Difference from Average.	Maximum	Day of Month.	Minimum	Day of Month.	Dry Bulb.	Wet Bulb.	Total Fall in mms.	Difference from Average.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	N	N E	E	S E	S	S W	W	N W	Calm or Variable.	Total Amount in Hours.	Difference from Average.	Number of Days.
	Inches.	°	°	°	°	°		°		°	°	mm.			mm.													
JAN.	30,103	34·9	24·1	†29·5	−8·0	42	14	9	23	27·9	27·6	38·6	−29·2	11	8·4	7	21	10	10	0	1	4	1	15	0	17·8†	−26·4	11
FEB.	29·862	40·1	31·5	35·8	−2·1	52	22, 26	19	13	34·4	33·7	49·5	−8·9	12	11·7	27	3	18	13	3	0	4	7	10	0	36·8	−28·4	10
MAR.	29·804	48·6	34·8	41·7	+1·4	56	21, 25	22	14	38·6	36·9	76·6	+18·9	20	13·4	12	15	3	2	1	0	5	24	12	0	116·5	+13·7	26
APR.	29,872	52·2	38·0	45·1	+0·6	67	26	28	10, 11	42·9	40·7	54·2	+8·5	19	12·3	21	12	4	12	2	0	6	14	10	0	112·4	−28·7	23
MAY	30·061	64·3	42·4	53·4	+3·4	73	20	35	15	52·9	50·7	26·4	−24·9	13	5·6	26	9	3	8	12	1	4	21	4	0	175·0	+5·2	29
JUNE	30·104	73·5	48·4	*61·0	+5·2	*89	6	39	17	59·3	57·8	10·0	−39·3	7	2·2	22	4	2	6	0	1	18	25	4	0	273·8	+73·7	30
JULY	29·866	65·9	52·8	59·4	+0·6	80	31	42	25	56·5	55·4	166·1	+92·2	23	25	10	4	2	2	4	1	18	15	16	0	121·4	−52·7	26
AUG.	30·073	64·6	50·3	57·4	−0·2	83	3	37	27	55·8	54·9	23·9	−60·7	10	7·1	20	1	3	0	0	1	13	37	7	0	155·7	+3·6	30
SEPT.	29·852	54·4	42·7	48·6	−4·6	72	4	28	29	48·9	47·8	54·2	−3·7	11	18·6	22	5	1	0	2	0	21	19	12	0	127·7	...	30
OCT.	29·864	53·7	42·9	48·3	−1·5	64	1	33	7	45·9	44·5	102·9	+25·4	19	21·3	9	6	4	10	13	0	12	12	4	1	61·7	−28·4	20
NOV.	29·575	47·9	36·7	42·3	+1·4	55	25	27	5, 15, 22	40·4	39·1	116·3	+44·7	17	19·7	2	4	3	2	5	1	16	21	7	1	43·9	−11·2	21
DEC.	30·018	44·1	33·7	38·9	+0·9	56	16	22	13, 21	37·5	36·1	55·5	−22·5	16	11·3	5	3	1	4	3	0	13	14	24	0	27·0	−7·8	16
Total or Average for Year	29·922	53·7	39·9	46·8	+0·0	...	...	...	...	...	...	774·2	−0·2	178	...	...	87	54	69	45	6	134	210	125	2	1269·7	−37·4	272
Highest						**89**	**6, vi.**								**25**	**10 vii.**												
Lowest								**9**	**23, i.**																			

* Record Highest. † Record Lowest.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1941.

MONTHS.	BAROMETER.	AIR TEMPERATURE °F.								HYGROMETER.		RAIN.					WIND DIRECTION.									SUNSHINE.		
		Mean of				Absolute Maximum and Minimum.				Mean at 9 a.m.							Number of Observations at 9 a.m. and 3 p.m.											
		Maximum (A).	Minimum (B).	Mean of A and B.	Difference from Average.	Maximum	Day of Month.	Minimum	Day of Month.	Dry Bulb.	Wet Bulb.	Total Fall in mms.	Difference from Average.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	N	N E	E	S E	S	S W	W	N W	Calm or Variable.	Total Amount in Hours.	Difference from Average.	Number of Days.
	Inches.	°	°	°	°	°		°		°	°	mm.			mm.													
JAN.	29·964	34·9	28·7	31·8	−5·7	44	13	5	4	28·3	27·6	76·8	+9·0	11	23·3	22	1	13	15	2	1	0	4	25	1	26·7	−17·5	13
FEB.	29·480	41·3	30·5	35·9	−2·0	49	9, 10	21	25	33·5	32·8	102·5	+44·1	17	15·8	13, 14	9	1	8	6	3	9	3	17	0	59·3	−5·9	14
MAR.	29·883	44·4	31·2	37·8	−2·5	56	15	25	5	34·4	33·4	56·0	−1·7	10	14·2	5	4	15	11	4	0	7	2	19	0	86·5	−16·3	26
APR.	29·988	49·2	36·0	42·6	−1·9	63	12	28	10, 24, 29	41·3	38·9	37·4	−8·3	13	7·3	2	3	16	18	2	0	9	6	6	0	94·8†	−46·3	22
MAY	29·962	58·1	40·7	49·4	−0·6	74	29	30	6	49·8	45·9	80·9	+29·6	14	33·7	23	1	6	15	9	2	12	5	12	0	140·5	−29·3	29
JUNE	30·088	66·5	48·2	57·4	+1·6	78	22	36	3	58·4	53·1	22·6	−26·7	6	15·2	22	0	4	6	18	1	17	11	3	0	208·8	+8·7	29
JULY	29·920	69·4	53·6	61·5	+2·7	82	12	47	4, 19	62·5	58·8	82·5	+8·6	15	14·6	17 18	0	2	7	10	1	21	16	5	0	160·8	−13·3	27
AUG.	29·701	65·8	49·1	57·4	−0·2	78	1	42	15	58·4	54·2	77·0	−7·6	21	13·6	17	2	3	1	11	1	19	11	14	0	134·5	−17·6	30
SEPT.	30·206	65·1	51·4	*58·3	+5·1	78	4	39	17	57·6	55·0	24·8	−33·1	10	9·6	28	0	4	7	16	3	11	6	13	0	83·1	−44·6	25
OCT.	30·127	55·4	42·4	49·0	+2·2	64	2	26	12, 24 25	47·7	46·1	71·1	−6·4	15	30·3	9	0	9	5	7	1	20	4	16	0	87·5	−2·6	23
NOV.	29·867	48·5	34·9	41·7	+0·8	56	24	23	9	41·3	39·9	64·5	−7·1	23	19·3	13	1	16	7	13	0	9	3	11	0	34·2	−20·9	16
DEC.	30·032	46·9	35·7	41·3	+3·3	56	24	19	28	40·3	38·4	38·5	−39·5	12	12·6	14	3	0	0	2	3	27	12	15	0	37·3	+2·5	22
Total or Average for Year	29·935	53·8	40·2	47·0	+0·2	...	...	...	...	...	...	734·6	−39·8	167	...	...	24	89	100	100	16	161	83	156	1	1154·0	−203·1	276
Highest						**82**	**12 vii.**								**33·7**	**23 v.**												
Lowest								**5**	**4, i.**																			

* Record Highest. † Record Lowest.

BRITISH MUSEUM

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1942.

MONTHS.	BAROMETER.	AIR TEMPERATURE °F.								HYGRO-METER.		RAIN.					WIND DIRECTION.									SUNSHINE.		
		Mean of		Mean of A and B.	Difference from Average.	Absolute Maximum and Minimum.				Mean at 9 a.m.		Total Fall in mms.	Difference from Average.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	Number of Observations at 9 a.m. and 3 p.m.									Total Amount in Hours.	Difference from Average.	Number of Days.
		Maximum (A).	Minimum (B).			Maximum.	Day of Month.	Minimum	Day of Month.	Dry Bulb.	Wet Bulb.						N	N E	E	S E	S	S W	W	N W	Calm or Variable.			
	Inches.	°	°	°	°	°		°		°	°	mm.	mm.		mm.													
JAN.	29·933	38·3	28·5	33·4	−4·1	52	3	17	11	32·6	31·7	84·6	+16·8	18	15·8	3	1	7	4	8	0	13	14	15	0	22·0	−22·2	11
FEB.	30·114	39·0	27·0	33·0	−4·9	46	12	17	20	31·8	30·8	30·6	−27·8	11	14·3	2	1	5	5	6	0	13	13	13	0	52·6	−12·6	21
MAR.	29·879	46·0	40·0	43·0	+2·7	61	23, 24	16	8	36·5	32·0	49·0	−8·7	16	20·0	5	7	10	10	13	1	8	2	11	0	80·3	−20·5	19
APR.	29·941	55·7	37·2	46·5	+2·0	71	16	29	30	47·3	42·2	51·5	+5·8	10	16·3	22	2	7	6	20	2	12	4	7	0	194·6	+53·5	28
MAY	29·925	60·1	40·9	50·5	+0·5	68	4	28	13	52·3	48·0	77·0	+25·7	13	11·8	17	0	4	5	24	7	17	3	2	0	231·2*	+61·4	31
JUNE	30·119	65·0	47·0	56·0	+0·2	76	4, 6	39	11	57·8	52·3	27·2	−22·1	8	10·4	21	1	6	6	9	3	18	5	12	0	166·7	−33·4	27
JULY	29·893	67·5	50·5	59·0	+0·2	75	2, 19	43	12, 26 28	60·4	55·9	51·2	−22·7	18	12·3	16	0	7	0	3	7	20	8	17	0	195·4	+21·3	31
AUG.	29·844	66·2	53·2	59·7	+2·1	77	1	47	28	59·3	58·1	74·8	−9·8	23	21·3	10	0	4	6	10	6	22	10	4	0	89·4†	−62·7	27
SEPT.	29·793	61·5	47·2	54·4	+1·2	66	1, 8, 11	27	27	53·3	50·9	79·3	+21·4	13	34·6	20	1	2	2	8	5	20	11	11	0	144·5	+16·8	27
OCT.	29·709	54·9	43·1	49·0	+2·2	64	14	28	30	48·6	43·1	49·4	−28·1	19	11·6	23	0	5	0	3	3	30	10	11	0	82·1	−8·0	26
NOV.	30·207	47·8	31·2	39·5	−0·5	56	18	21	4	37·1	31·2	10·9†	−60·7	6	4·1	6	3	0	0	1	0	13	10	33	0	78·8	+23·7	22
DEC.	30·055	48·1	37·2	42·7	+4·7	56	7	21	3, 4	42·1	41·0	49·7	−28·3	20	10·3	10	1	0	2	8	4	22	12	13	0	30·9	−3·8	15
Total or Average for Year	29·951	54·2	40·3	47·3	+0·5	...	...	...	...	...	...	635·2	-139·2	175	...	...	17	57	46	113	38	208	102	149	0	1368·5	+11·4	285
Highest						**77**	**1,viii.**								**34·6**	**20, ix.**												
Lowest								**16**	**8, iii.**																			

* Record Highest. † Record Lowest. Height of Station above Sea Level—77 feet. Position—56° 24′ N. Lat., 3° 27′ W. Long.

OFFICE-BEARERS.

Session 1949-50.

President—Cyril Walmesley, a.m.i.c.e., m.i.w.e.

Vice-Presidents—

Messrs. Eric Annandale, t.d., b.a.; P. K. M'Laren, f.i.b.p., a.r.p.s.; J. Gilchrist; Mrs. Margt. Stewart, m.a., ph.d., f.s.a.scot.

Editor—D. J. S. Sutherland, m.a., b.sc., ph.d.

Secretary and Librarian—

Mr. James Wood, Perth Museum and Art Gallery.

Treasurer—Mr. K. M. MacAlpine, m.a.

Members of Council—

Mr. J. M. Munro, m.a., b.sc.; Mr. Jas. Aitken; Mr. R. Gloag Thomson; Mr. A. Wilson; Miss C. Mailer, m.a.; Mr. R. Butchart.

Trustees—

The Earl of Mansfield, b.a., f.z.s., m.b.o.v.; Mr. Gilbert Malloch; Mr. Wm. Malloch, b.sc.; Mr. A. C. Campbell.

The Library of the Society is situated in Perth Museum and Art Gallery, and is available at all times when the Museum is open. The Photographic and Microscopic Sections meet on Fridays between 7 and 10 p.m.

The present membership consists of 139 ordinary members, 2 life members, 2 associate members, 1 associate and 20 junior members.

Annual Subscriptions (5/6) may be sent to the Treasurer, Mr K. M. MacAlpine, m.a., 6 Murray Crescent, Perth.

The Archæological Section of the Perthshire Society of Natural Science.

A meeting of all those interested in the work of an Archæological Section was held in the Library of the Art Gallery on 24th February, 1948. As a result of this meeting, the Section was formed, under the Chairmanship of Mrs. Stewart. It was decided to concentrate on the prehistory and history of Perthshire, and to further this project by twice-monthly evening meetings in the Art Gallery during the winter session and excursions to places of interest every second Saturday during the summer. Miss A. Strachan was elected Secretary and Treasurer, and members of Committee were: Dr. Adrian Lamb, Mr. Watt, and Mr. R. G. Thomson. Mr. Walmesley, President of the parent body, the Perthshire Society of Natural Science, kindly consented to be Honorary President.

During the spring and summer of 1948, the following sites in Perthshire were visited by members of the Section:—Fort on Moncreiffe Hill; Pitcur Earth House and Castle; Burial Tumulus at St. Martins; Stone Circle at Guildtown; Abernethy Round Tower; Castle Law Vitrified Fort at Abernethy; Standing Stones and Cairn at Fowlis Wester; Neolithic Cairn at Rottenreoch; Roman Signal Station at Innerpeffray; Denuded Cairn in Glen Cochill; Mediæval Hilltop Town and Cairn at Arnbathy; Stone Circles at Shianbank; Bronze Age Cairn at Pitcairngreen; Bertha Camp (Roman); Dunsinnane Hill Fort, and Bandirran Stone Circles.

On 14th January, 1949, Mr. William Arbuckle, of the Scottish Education Department, gave a most interesting lecture on the Gowrie House Conspiracy. This meeting was open to members of the Perthshire Society of Natural Science and friends. It was very well attended by a large and enthusiastic audience.

At the Annual General Meeting of the Section, held on 25th February, 1949, Dr. Adrian Lamb resigned, and his place on the Committee was taken by Mr. Butchart. Mr. Watt, who also resigned, was replaced by Mr. Young.

CHILDREN'S ESSAY COMPETITION

For the Charles MacIntosh Memorial Prizes

SUBJECTS :

1944—Perthshire Reptiles.

1945—Wild Fruits of Perthshire.

1946—Perthshire Moths and Butterflies.

1947—Perthshire Woodlands and their Value to the Community.

1948—Seed Dispersal among Wild Plants of Perthshire.

1949—A Perthshire Nature Diary for May or September.

OBITUARY.

William C. Burt.

By the death of Mr. William C. Burt, on 24th September, 1945, the Society lost a keen member and a highly respected and efficient Honorary Secretary.

Mr. Burt joined the Society in 1931, and was elected Hon. Secretary in 1935, in which office he served the Society faithfully for ten years, until his death. By profession he was a Solicitor, and from about 1912 until 1921, he was a partner of the firm of Douglas & Burt. In 1921, he joined the firm of Kippen, Campbell & Burt, and continued in practice there until he retired shortly before his death. His legal knowledge was of very great value to the Society, and his expert advice was always freely placed at the disposal of the Council.

Mr. Burt's interests were artistic rather than scientific, and one of his hobbies was the collection of pictures and other *objets d'art*. A keen lover of music, he was an accomplished performer on the flute.

Amongst other activities, Mr. Burt held the Clerkship of the Burgh of Perth Insurance Committee for 33 years, and served as Treasurer of St. Andrew's Parish Church and also as Treasurer of Lodge Scoon and Perth, No. 3.

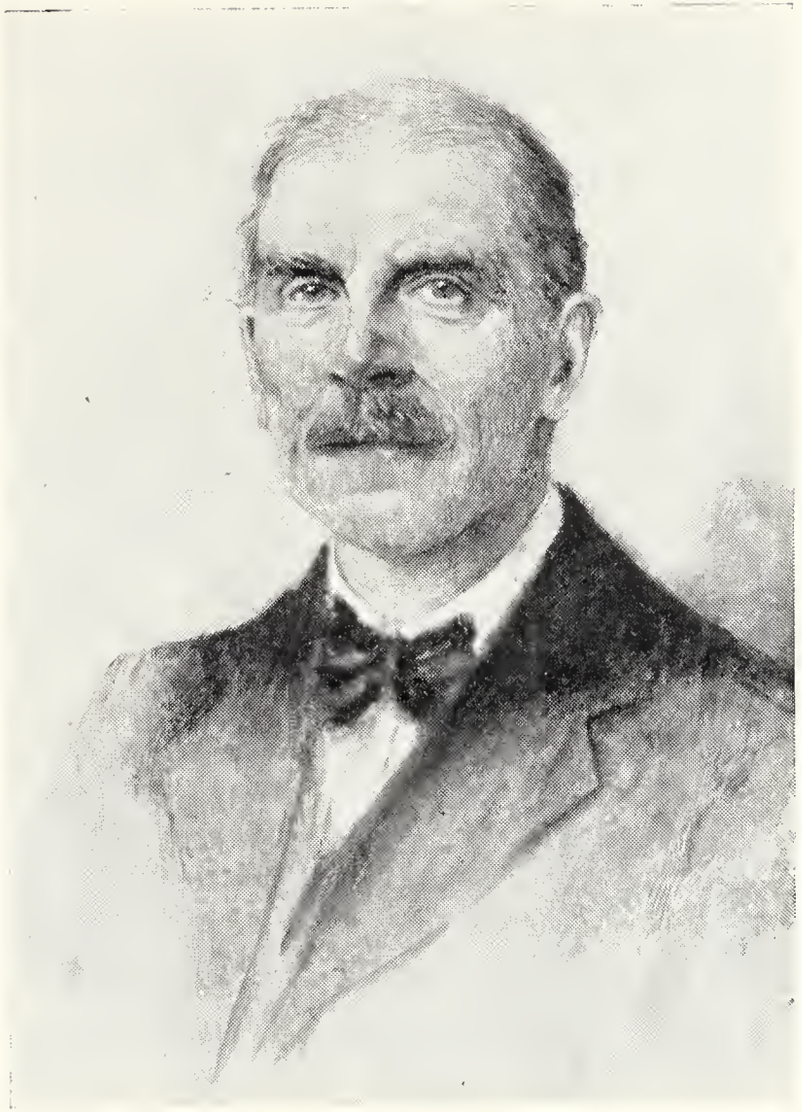
His wife, who was also a member of the Society, having been elected in 1935, survived him only a short time.

Thomas M'Laren (1873-1947).

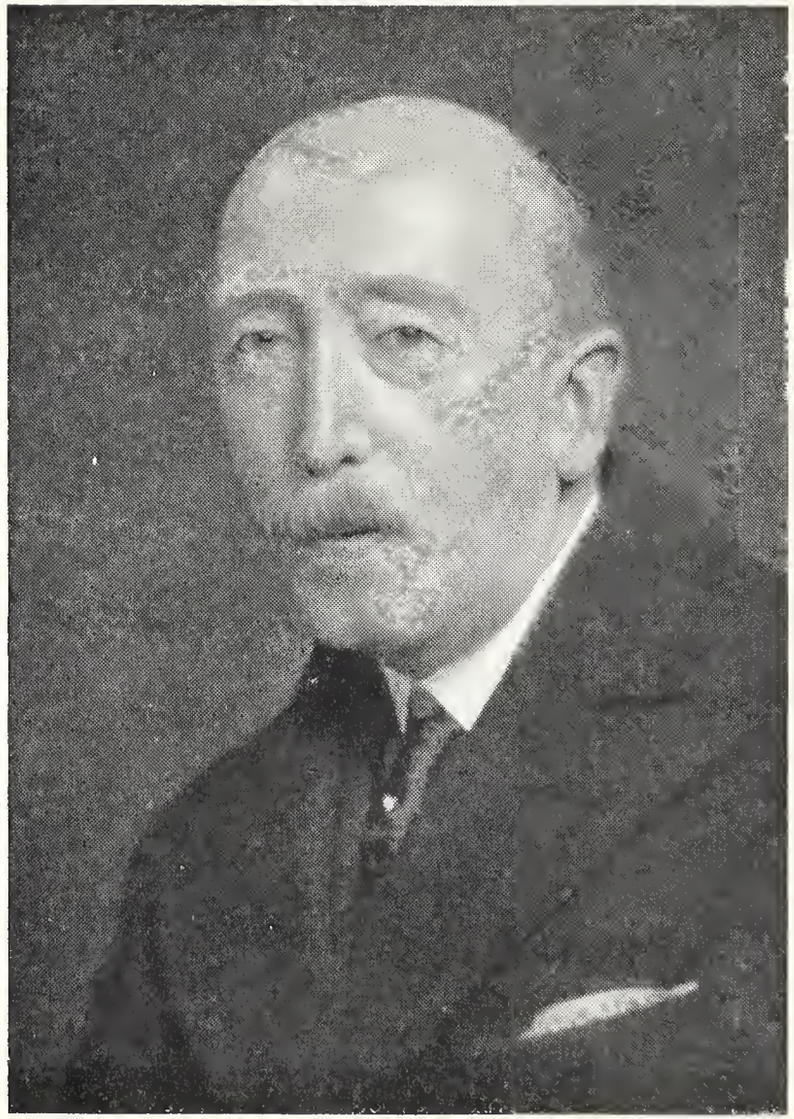
By the death, on 26th July, 1947, of Mr. Thomas M'Laren, the Society was deprived of one of its oldest and most respected members, one whose name was familiar to all interested in natural science and antiquarian research.

Mr. M'Laren was a native of the City of Perth, and lived within its borders all his life. He gave it a lifetime of public service as a Corporation official. For over 50 years he served under succeeding Town Councils, in his youth as a trainee and assistant to the Burgh Surveyor, thereafter for a long period as Deputy Burgh Surveyor, and finally for 18 years as Burgh Surveyor. Thus for over half a century he was concerned professionally with the growth and development of Perth. The City of to-day and its inhabitants owe much to his great skill and wise guidance.

Interested in antiquarian research from an early age, Mr. M'Laren acquired an unrivalled knowledge of the history of the City. This knowledge and his constant watchfulness secured the



Mr. William C. Burt, W.S.



Mr. Thomas McLaren, F.S.A.Scot.

finisher. From this employment he retired in December, 1943, after 48 years' service.

His only hobby was natural history, and to this he devoted all his spare time. He knew and had explored every corner of Perthshire. Botany, especially fungi, was his particular interest, and he found several fungi rarely seen in this country. In September, 1912, he discovered a new fungus which, being unknown either in London or Paris, was named after him, calycella menziesi boud.

He joined the Perthshire Society of Natural Science in 1896, and was President 1926-28. Much of his work for the Society was done in conjunction with the well-known naturalists, Dr. Buchanan White, Mr. Charles M'Intosh, Mr. Henry Coates, and Mr. William Barclay. He wrote many papers on different branches of botany for the Society, and the Cryptogramic Society of Scotland, of which he was one of the founders.

ABSTRACT OF ACCOUNTS for Year ending 28th Feb., 1949.

I.—GENERAL ACCOUNT.

	Income.	Expenditure.
To 142 Subscriptions from Members	£38 13 0	
,, Interest—Savings Bank and Defence Bonds	4 2 6	
,, Transfer from Photographic Section Account	0 19 10	
,, Credit Balance as at 28th February, 1948	143 4 6	
By Insurance and Lighting		£6 2 6
,, Subscriptions to other Societies		8 8 0
,, Books and Magazines		5 1 0
,, Printing and Advertising		9 18 0
,, Sundries		5 7 8
		£34 17 2
,, Credit Balance as at 28th February, 1949		152 2 8
	£186 19 10	£186 19 10

II.—PUBLICATION ENDOWMENT FUND.

To Funds as per last Account—£500 4% Consolidated Stock, at cost	£428 9 9	
Credit Balance—Savings Bank ...	127 13 6	
	£556 3 3	
,, Interest on £500 4% Consols, 1948 and 1949, *less* £9 Tax ...	11 0 0	
,, Income Tax Refunded	9 0 0	
,, Interest on Savings Bank Account	3 2 1	
By Funds as at 28th February, 1949—		
£500 4% Consolidated Stock, at cost		£428 9 9
Current Balance—Savings Bank ...		150 15 7
	£579 5 4	£579 5 4

III.—M'INTOSH MEMORIAL FUND.

To £130 3½% War Stock, at cost	£129 7 8	
,, Capital Balance—Savings Bank Account	0 12 4	
	£130 0 0	
,, Income Balance—Savings Bank Account	17 19 2	
,, Interest—Savings Bank and War Stock	5 0 1	
By Books		£2 7 0
,, Funds as at 28th February, 1949—		
£130 3½% War Stock, at cost		129 7 8
Capital Balance—Savings Bank Account ...		0 12 4
,, Savings Bank—Credit Balance		20 12 3
	£152 19 3	£152 19 3

IV.—PHOTOGRAPHIC SECTION ACCOUNT.

To Funds as per last Account—Savings Bank Account	£0 19 10	
By Transfer to General Account		£0 19 10
	£0 19 10	£0 19 10

K. M. M'ALPINE, *Treasurer.*

PERTH, 18th March, 1949.—Examined, compared with Vouchers, and found correct.

(Signed) P. M'G. JACKSON, C.A., *Auditor.*

SUMMARY OF ACCOUNTS for Year ending 28th February

I.—GENERAL ACCOUNT.

	1944	1945	1946	1947	1948	1949
Balance from last year	£63 6 10	£83 0 5	£105 13 4	£117 8 8	£133 2 6	£143 4 6
Subscriptions	30 7 6	36 11 6	31 16 0	37 0 0	36 9 0	38 13 0
Interest	3 18 11	4 11 4	3 8 8	3 2 10	3 10 3	4 2 6
From Photographic Fund	—	—	—	—	—	0 19 10
	£97 13 3	£124 3 3	£140 18 0	£157 11 6	£173 1 9	£186 19 10
Expenditure	£14 12 10	£18 9 11	£23 9 4	£24 9 0	£29 17 3	£34 17 2
Balance	83 0 5	105 13 4	117 8 8	133 2 6	143 4 6	152 2 8
	£97 13 3	£124 3 3	£140 18 0	£157 11 6	£173 1 9	£186 19 10

II.—PUBLICATION ENDOWMENT FUND.

Cost of Printing	£ —	£40 5 0	£ —	£ —	£ —	£ —
Balance at end of Year	510 18 8	490 13 8	496 14 4	524 12 10	556 3 3	579 5 4

III.—M'INTOSH MEMORIAL FUND.

Cost of Prizes and Printing	£4 0 8	£4 10 6	£2 2 0	£2 6 7	£6 11 5	£2 7 0
Balance at end of Year	144 2 9	144 3 3	146 16 9	149 9 7	147 19 2	150 12 3

IV.—PHOTOGRAPHIC SECTION ACCOUNT.

Balance at end of Year	£1 2 10	£1 2 10	£1 3 2	£0 19 9	£0 19 10	£ — Balance transferred to General A/c.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1943.

MONTHS.	BAROMETER.	AIR TEMPERATURE °F.								RAIN.						SUNSHINE.		
		Mean of		Mean of A and B.	Difference from Average. 1883-1948.	Absolute Maximum and Minimum.				Total Fall.		Difference from Average. 1883-1948.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	Total Amount in Hours.	Difference from Average. 1917-1948.	Number of Days.
		Maximum (A).	Minimum (B).			Maximum	Day of Month.	Minimum	Day of Month.									
	Inches.	°	°	°	°	°		°		ins.	mm.	ins.		ins.				
JAN.	29·51	42·0	33·3	37·7	+ ·5	51	27/28	24	5	3·85	97·7	+1·04	22	·76	20	24·4	−14·6	15
FEB.	29·91	‡49·5	37·3	*43·4	+5·4	56	27/28	29	7	1·77	45·0	− ·51	14	·50	11	102·4	+35·0	27
MAR.	30·05	51·5	37·5	44·5	+4·0	63	6	30	16	·83	21·1	−1·36	13	·26	25	103·9	+2·0	26
APRIL	29·89	57·5	*43·0	*50·3	+5·4	64	16/21	34	29	1·18	29·9	−0·57	10	·24	24	179·7	+32·7	30
MAY	30·03	58·8	42·6	50·7	+ ·5	70	17	30	10	3·04	77·1	+ ·91	18	·47	31	166·6	−2·8	27
JUNE	29·99	65·2	48·6	56·9	+1·0	78	29	42	17	2·87	72·9	+ ·89	20	·54	4	183·0	−13·8	28
JULY	29·96	68·5	50·6	59·6	+ ·7	83	31	40	10	2·78	70·6	− ·22	13	1·37	5	210·2	+45·2	30
AUG.	29·80	62·8	49·6	56·2	−1·6	73	1	37	27	4·83	122·6	+1·57	24	1·25	2	95·4	−49·9	23
SEPT.	29·90	61·0	49·2	55·1	+1·6	66	1/9/14	29	27	3·16	80·2	+ ·80	14	1·12	13	123·9	+1·2	27
OCT.	29·80	56·2	43·7	50·0	+2·9	60	1/12/15	31	14	5·02	127·6	+1·92	19	1·08	3	66·3	−19·6	24
NOV.	29·90	47·7	36·8	42·3	+1·1	59	3	27	27	1·00	25·4	−1·81	14	·22	4	70·6	+16·6	18
DEC.	30·07	41·9	32·7	37·3	− ·8	53	25/26	20	13	1·78	45·3	−1·20	14	·58	18	16·8	−16·6	11
Total or Average for Year.	29·90	55·2	42·1	48·7	+1·7	...	...	...	...	32·10	815·4	+1·45	195	...	...	1343·2	+15·4	286
Highest,						**83**	**31, vii.**							**1·37**	**5, vii.**			
Lowest,								**20**	**13, xii.**									

* Highest on Record. ‡ Equals Highest on Record.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1944.

MONTHS.	BAROMETER.	AIR TEMPERATURE °F.								RAIN.						SUNSHINE.		
		Mean of		Mean of A and B.	Difference from Average. 1883-1948.	Absolute Maximum and Minimum.				Total Fall		Difference from Average. 1883-1948.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	Total Amount in Hours.	Difference from Average. 1917-1948.	Number of Days.
		Maximum (A).	Minimum (B).			Maximum	Day of Month.	Minimum	Day of Month.									
	Inches.	°	°	°	°	°		°		ins.	mm.	ins.		ins.				
JAN.	29·84	46·4	35·6	41·0	+3·8	54	1/2	19	11	2·34	59·5	−·47	17	·49	20	30·3	−8·7	21
FEB.	30·08	49·0	32·5	40·8	+2·8	57	2	22	28	·87	22·0	−1·41	10	·35	2	89·5	+22·1	24
MAR.	30·06	50·6	35·3	43·0	+2·5	60	24/26/27	20	15	†·19	4·9	−2·00	9	·08	30	93·9	−8·0	22
APRIL	29·95	55·6	41·1	48·4	+3·5	65	26/29	22	1	2·09	53·2	+·34	16	·62	4	114·8	−32·2	23
MAY	30·10	58·5	43·1	50·8	+·6	74	29	31	21/22	1·93	49·1	−·20	18	·53	18	129·6	−39·8	27
JUNE	29·83	64·2	*50·7	57·5	+1·6	74	21	40	17	2·54	64·4	+·56	19	·46	26	143·4	−53·4	27
JULY	29·89	67·8	49·9	58·9	+·0	74	17/27	42	22	2·03	51·6	−·97	14	·71	2	119·1	−45·9	26
AUG.	29·97	67·4	52·6	60·0	+2·2	76	4/7	34	22	2·36	59·9	−·90	15	·85	27	126·1	−19·2	28
SEPT.	29·98	60·4	43·9	52·2	−1·3	69	18	32	10	2·90	73·7	+·54	17	1·09	4	99·1	−23·6	25
OCT.	29·77	53·8	43·3	48·6	+1·5	61	6/9	28	30	2·76	70·0	−·34	19	·82	20	73·7	−12·2	23
NOV.	29·63	46·1	33·5	39·8	−1·4	55	4	18	27	4·85	123·3	+2·04	19	·80	4	55·0	+1·0	20
DEC.	29·79	43·4	33·5	38·5	+·4	52	1	23	13	2·67	67·8	−·31	14	·64	14	35·8	+2·4	16
Total or Average for Year.	29·91	55·3	41·3	48·3	+1·3	...	...	...	...	27·53	699·4	−3·12	187	...	...	1110·2	−217·5	282
Highest,						**76**	**4/7, vii i.**							**1·09**	**4, ix.**			
Lowest,								**18**	**27, xi.**									

* Highest on Record.

† Lowest on Record.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1945.

MONTHS.	BAROMETER.	AIR TEMPERATURE °F.								RAIN.						SUNSHINE.		
		Mean of		Mean of A and B.	Difference from Average. 1883-1948.	Absolute Maximum and Minimum.				Total Fall.		Difference from Average. 1883-1948.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	Total Amount in Hours.	Difference from Average. 1917-1948.	Number of Days.
		Maximum (A).	Minimum (B).			Maximum	Day of Month.	Minimum	Day of Month.									
	Inches	°	°	°	°	°		°		ins.	mm.	ins.		ins.				
JAN.	29·90	37·0	†23·5	30·3	−6·9	51	2	0	27	3·35	85·0	+·54	12	·99	31	37·0	−2·0	18
FEB.	29·82	48·4	*37·4	42·9	+4·9	57	26	24	3/4	3·28	83·4	+1·00	19	·57	6	77·6	+10·2	19
MAR.	30·17	53·9	39·6	46·8	+6·3	67	23	28	3	1·30	33·0	−·89	12	·27	30	100·4	−1·5	29
APRIL	29·99	56·0	39·8	47·9	+3·0	72	19	29	28/30	1·30	33·1	−·45	12	·36	11	164·8	+17·8	24
MAY	29·78	60·2	42·5	51·3	+1·1	74	12	27	3	4·09	106	+1·96	20	·60	5	122·2	−47·2	29
JUNE	29·89	64·3	48·2	56·3	+·4	75	22	39	4	2·78	71	+·80	18	·46	7	230·3	+33·5	29
JULY	29·95	69·9	52·5	61·2	+2·3	77	31	43	26	2·41	61	−·59	14	·50	9	146·5	−18·5	28
AUG.	29·92	67·6	50·6	59·1	+1·3	80	1	45	8/10/11	2·39	61	−·87	8	·91	15	151·3	+6·0	28
SEPT.	29·96	65·0	48·7	56·9	+3·4	74	3	39	20	3·67	93	+1·29	15	1·13	16	88·1	−34·6	27
OCT.	29·89	57·7	41·9	49·8	+2·7	68	6	30	13	4·33	110	+1·23	15	1·00	28	86·1	+0·2	24
NOV.	30·09	49·3	39·2	44·3	+3·1	57	6/7	24	13	·80	20	−2·01	12	·17	3	†31·8	−22·2	14
DEC.	29·62	44·7	34·6	39·7	+1·6	54	1	24	31	4·26	108	+1·28	15	1·07	24	28·8	−4·6	15
Total or Average for Year	29·92	56·2	41·5	48·9	+1·9	...	...	...	...	33·96	865	+3·29	172	...	...	1264·9	−62·9	284
Highest,						**80**	**1, viii.**							**1·13**	**16, ix.**			
Lowest,								**0**	**27, i.**									

* Highest on Record.

† Lowest on Record.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1946.

MONTHS.	BAROMETER.	AIR TEMPERATURE °F.								RAIN.						SUNSHINE.		
		Mean of		Mean of A and B.	Difference from Average. 1883-1948.	Absolute Maximum and Minimum.				Total Fall		Difference from Average. 1883-1948.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	Total Amount in Hours.	Difference from Average. 1917-1948.	Number of Days.
		Maximum (A).	Minimum (B).			Maximum	Day of Month.	Minimum	Day of Month.									
	Inches.	°	°	°	°	°		°		ins.	mm.	ins.		ins.				
JAN.	29·90	41·1	28·3	34·7	−2·5	51	4	12	17	2·96	75	+·15	16	·65	25	24·8	−14·2	13
FEB.	29·80	47·1	33·4	40·3	+2·3	55	18	17	26	1·50	38	−·78	11	·31	3	*106·5	+39·1	25
MAR.	29·97	47·8	33·5	40·7	+·2	65	28	17	1	2·17	55	−·02	18	·46	4	79·4	−22·5	25
APRIL	30·02	57·9	38·0	47·9	+3·0	68	1/3	25	10	·39	10	−1·36	5	·32	16	174·6	+27·6	30
MAY	30·07	60·5	39·5	50·0	−·2	67	29	28	9/14	1·41	36	−·72	11	·41	31	204·8	+35·4	30
JUNE	29·85	62·8	46·2	54·5	−1·4	79	22	36	20	2·31	59	+·33	18	·34	18	157·3	−39·5	27
JULY	29·89	66·7	51·2	58·9	+·0	77	12	42	1	3·08	78	+·08	17	·64	3	138·9	−26·1	30
AUG.	29·75	64·4	47·4	55·9	−1·9	70	5	38	16	3·56	91	+·30	24	·70	28	122·3	−23·0	30
SEPT.	29·70	61·0	48·9	54·9	+1·4	70	28	41	9/12	4·28	109	+1·92	19	1·25	1	†76·2	−46·4	25
OCT.	30·16	53·0	39·0	46·0	−1·1	63	3	25	29	†·31	8	−2·79	7	·11	1	76·3	−9·6	21
NOV.	29·64	49·7	37·3	43·5	+2·3	63	4	22	15	5·26	134	+2·45	23	1·29	20	45·4	−8·6	17
DEC.	29·80	41·6	29·1	35·3	−2·8	50	22/25	22	19/24	3·17	81	+·19	19	·58	25	41·8	+8·4	15
Total or Average for Year	29·88	54·5	39·3	46·9	−·1	...	...	...	...	30·39	772	−·26	188	...	...	1248·3	−79·4	288
Highest,						**79**	**22, vi.**							**1·29**	**20, xi.**			
Lowest,								**12**	**17, i.**									

* Highest on Record.

† Lowest on Record.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1947.

MONTHS.	BAROMETER	AIR TEMPERATURE °F.								RAIN.						SUNSHINE.		
		Mean of		Mean of A and B.	Difference from Average. 1883-1948.	Absolute Maximum and Minimum.				Total Fall		Difference from Average. 1883-1948.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	Total Amount in Hours.	Difference from Average. 1917-1948.	Number of Days.
		Maximum (A).	Minimum (B).			Maximum	Day of Month.	Minimum	Day of Month.									
	Inches.	°	°	°	°	°		°		ins.	mm.	ins.		ins.				
JAN.	29·89	40·4	31·7	36·1	−1·1	54	14	12	31	3·50	89	+·69	22	·56	8	30·5	−8·5	13
FEB.	29·90	†34·7	22·3	28·5	−9·5	39	24	3	23	2·12	54	−·16	18	·59	9	51·2	−16·2	15
MAR.	29·59	†40·2	†24·7	†32·5	−8·0	48	17/25	†4	4/6/8	3·78	96	+1·59	18	·45	21	102·2	+0·3	17
APRIL	29·80	51·9	39·0	45·5	+·6	59	15	26	3	3·61	92	+1·86	19	1·07	5	113·2	−33·8	26
MAY	30·02	59·0	43·6	51·3	+1·1	71	28	36	4/16	4·23	107	+2·10	19	·83	30	132·0	−37·4	26
JUNE	29·86	63·9	49·8	56·9	+1·0	77	2	39	16	3·02	77	+1·04	21	·48	21	†121·7	−75·1	25
JULY	29·88	66·5	51·9	59·2	+·3	74	13/15/31	43	10	3·81	97	+·81	13	1·21	16	146·2	−18·8	27
AUG.	30·23	*73·5	52·7	*63·1	+5·3	‡84	16	42	8	†·09	2	−3·17	†1	·09	†2	*221·7	+76·4	31
SEPT.	29·97	62·9	47·7	55·3	+2·0	74	2	32	30	2·96	75	+·60	17	1·09	19	106·9	−15·8	28
OCT.	30·17	56·6	43·4	50·0	+2·9	68	4	33	21	2·05	52	−1·05	17	·68	12	66·5	−19·4	19
NOV.	29·71	48·2	35·7	41·9	+·7	60	20/21	14	19	2·51	64	−·30	16	·44	2	*88·5	+34·5	22
DEC.	29·90	44·2	33·0	38·6	+·5	54	12/20/22	13	3	1·68	43	−1·30	13	·39	5	28·1	−5·3	14
Total or Average for Year.	29·91	53·5	39·6	46·5	−·5	...	...	...	...	33·36	847	+2·71	194	...	...	1208·7	−119·1	263
Highest,						**84**	**16,viii**							**1·21**	**16, vii.**			
Lowest,								**3**	**23, ii.**									

* Highest on Record. ‡ Equals Highest on Record. †Lowest on Record.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1948.

MONTHS.	BAROMETER.	AIR TEMPERATURE °F.								RAIN.						SUNSHINE.		
		Mean of		Mean of A and B.	Difference from Average. 1883-1948.	Absolute Maximum and Minimum.				Total Fall.		Difference from Average. 1883-1948.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	Total Amount in Hours.	Difference from Average. 1917-1948.	Number of Days.
		Maximum (A).	Minimum (B).			Maximum.	Day of Month.	Minimum.	Day of Month.									
	Inches.	°	°	°	°	°		°		ins.	mm.	ins.		ins.				
JAN.	29·33	41·5	31·4	36·5	−·7	53	2	22	16	4·37	111	+1·56	27	·66	10	18·7	−20·3	13
FEB.	30·03	44·6	34·1	39·3	+1·3	52	1/8	27	24	3·20	81	+·92	18	·50	8	60·7	−6·7	17
MAR.	30·18	51·7	36·7	44·2	+3·7	66	26	29	7/18	1·06	27	−1·13	16	·27	31	103·7	+1·8	23
APRIL	29·83	54·9	38·2	46·5	+1·6	63	24	29	5	1·28	33	−·47	11	·43	27	164·3	+17·3	27
MAY	29·95	59·6	40·0	49·8	−·4	77	21	29	1/25	2·86	73	+·73	18	·61	28	206·4	+37·0	30
JUNE	29·78	62·8	47·2	55·0	−·9	76	14	42	9/13/20	3·56	90	+1·58	18	1·15	6	164·8	−32·0	28
JULY	29·91	67·4	50·3	58·9	+·0	80	30/31	42	24	4·44	113	+1·44	11	1·82	31	192·6	+27·6	30
AUG.	29·81	63·1	50·2	56·7	−1·1	77	1	37	21	*7·86	200	+4·60	22	·96	25	92·3	−53·0	22
SEPT.	29·89	60·6	47·3	53·9	+·4	66	10	37	21/23	2·98	76	+·62	18	1·26	14	139·0	+16·3	26
OCT.	29·86	54·5	41·3	47·9	+·8	63	1/2	25	27	3·47	88	+·37	18	·54	24	99·7	+13·8	23
NOV.	30·02	49·3	37·1	43·2	+2·0	58	12/14/19	22	25	1·61	41	−1·20	16	·38	2	50·7	−3·3	16
DEC.	29·79	45·6	34·4	40·0	+1·9	58	2	19	27	4·84	123	+1·86	20	·78	11	34·5	+1·1	16
Total or Average Year.	29·87	54·6	40·7	47·7	+·7	...	...	...	...	41·53	1056	+10·88	213	...	...	1327·4	−0·4	271
Highest,						**80**	**30/31 vii.**	**19**	**27, xii.**					**1·82**	**31, vii.**			
Lowest,																		

* Highest on Record.

BRITISH MUSEUM (NATURAL HISTORY) 21 JUL 1958

PROCEEDINGS

Page references herein are to this Part and the two previous Parts.

11th November, 1938. "Human Physiology as a Natural Science"—Professor R. C. Garry, University College, Dundee.

9th December, 1938. "Vitrified Forts"*—Professor V. Gordon Childe, Edinburgh University.

10th February, 1939. Members' Night. "Note on a Mould found at Dunkeld"—Mr. John Ritchie. "On the Lighthouse"* —Mr. P. K. M'Laren. "Excavation of a Stone Circle at Monzie"* —Mrs. Margaret E. C. Stewart. "Records of Flints found near Dunsinane Hill"—Mr. J. M. D. Mackenzie.

17th March, 1939. 72nd Annual General Meeting. Report of Council (see p. ii). Office-Bearers for 1939-40 appointed:—President—Cyril Walmesley, A.M.I.C.E., M.I.W.E. Vice-Presidents —John A. Stewart, W.S.; Andrew Wilson; J. J. Robertson; P. K. M'Laren. Editor—D. J. S. Sutherland, M.A., B.Sc., Ph.D., A.I.C. Librarian—John Ritchie, F.R.A.I. Secretary—William C. Burt, W.S. Treasurer—J. F. Cumming. Members of Council—Fred. J. Simpson; James Aitken; George C. Smith; Major Baillie; R. Gloag Thomson; Kenneth M. MacAlpine, M.A. Trustees—Earl of Mansfield, B.A., F.Z.S., M.B.O.U.; Melville Gray; Sir Francis Norie-Miller, Bart.; Robert Hunter.

Mr. Walmesley delivered his Presidential Address: "Evolution of the Stars."

22nd March, 1940. 73rd Annual General Meeting, and Members' Night. Report of Council (see p. ii). Office-Bearers were re-appointed, except that Messrs. Stewart and Wilson resigned in terms of the Constitution; Messrs. Simpson and Aitken became Vice-Presidents; and Messrs. Wm. Malloch and John W. Couston became members of Council.

"The Tolbooth of Perth"*—Mr. Thomas M'Laren, F.S.A.Scot. "Local Archæological Finds at Ballinluig and Madderty"—Mr. John Ritchie.

28th March, 1941. 74th Annual General Meeting. Report of Council (see p. iii). Office-bearers were re-appointed, except that Mr. James Wood became Librarian, and Mr. Gilbert Malloch a

* Illustrated by Lantern Slides, etc.

Trustee in place of Messrs. Ritchie and Hunter (both deceased) respectively.

" Wayside Gardens "*—Mr. A. W. Brown.

27th March, 1942. 75th Annual General Meeting. Report of Council (see p. iii). Office-Bearers were re-appointed.

26th March, 1943. 76th Annual General Meeting. Report of Council (see p. iv). Office-Bearers were appointed as printed on p. i.

24th March, 1944. 77th Annual General Meeting. The Council reported that war conditions still made lectures or excursions impossible, but that fuller use was got of the Library than in recent years, and there were facilities for weekly meetings of Photographic, Microscopic, and other sections. Three meetings of the Council had been held. No new members were admitted. The membership of 192 (11 less than in previous year) comprised 1 associate, 7 associate members, 12 life members, 163 ordinary members, 4 honorary members, and 5 corresponding members. 5 members died.

The Office-Bearers were re-appointed.

" Egypt and the Sudan "*—Major Baillie.

At a Council Meeting on 23rd February, 1945, Mr. Fred. J. Simpson was appointed Interim Secretary during the illness of Mr. Burt.

23rd March, 1945. 78th Annual General Meeting. The Council reported that war conditions still prohibited lectures and excursions, but that the Library was open. Two meetings of Council had been held. One new member had been admitted. The membership was 184—8 ordinary members fewer than in previous year. 6 members had died—Messrs. A. G. Cumming, Duncan Macnab, William Moncreiffe, James Richardson, Mrs. A. E. Pullar and Miss Isabella Robertson.

Office-Bearers appointed :— President — Cyril Walmesley, A.M.I.C.E., M.I.W.E. Vice-Presidents—J. J. Robertson; Peter K. M'Laren; F. J. Simpson; James Aitken. Editor—D. J. S. Sutherland, M.A., B.Sc., Ph.D., A.I.C. Librarian—James Wood. Secretary—William C. Burt, W.S. Interim Secretary (during Mr. Burt's illness)—F. J. Simpson. Treasurer—J. F. Cumming. Members of Council—Major Baillie; R. Gloag Thomson; Kenneth M. MacAlpine, M.A., Wm. Malloch, B.Sc.; Andrew Wilson; Wm. Wotherspoon. Trustees—Earl of Mansfield, B.A., F.Z.S., M.B.O.U.; Melville Gray; Sir Francis Norie-Miller, Bart.; Gilbert Malloch.

Mr. T. D. Frew gave an illustrated talk on his tour to and in South Africa.

At a Council Meeting on 24th August, 1945, the resignation of Mr. Burt as Secretary was intimated, his health not permitting him

to continue. Mr. Simpson agreed to continue as Interim Secretary. Mr. K. M. MacAlpine consented to act as Treasurer, Mr. Cumming having resigned on his leaving Perth.

11th January, 1946. First monthly lecture meeting since outbreak of war in 1939. " Recent Discoveries in the Atomic Structure of Matter "*—Dr. C. A. Beevers, Edinburgh University.

15th February, 1946. Members' Night. " Camera Studies of Animals "*—Mr. P. K. M'Laren. " Science in the Home "—Mr. R. Gloag Thomson. " Beauty Spots Affected by the Hydro Electric Schemes "—Mr. Wm. Malloch.

22nd March, 1946. 79th Annual General Meeting. The Council reported that the year had seen the revival of the Society from the dormant condition imposed by war. The number of subscribing members was about 130. 6 new members had been admitted, and 10 further applications were submitted. Members who had died were Mr. James Menzies (elected 1896; President, 1926-8), Mr. Wm. C. Burt (Secretary, 1935-45), and Mrs. Burt. The Junior Section had been revived. Informal club-night meetings had been held on Fridays.

Office-Bearers appointed :— President — Cyril Walmesley, A.M.I.C.E., M.I.W.E. Vice-Presidents—Fred. J. Simpson; James Aitken; R. Gloag Thomson; Wm. Malloch, B.Sc. Editor—D. J. S. Sutherland, M.A., B.Sc., Ph.D., A.I.C. Librarian—James Wood. Secretary—Charles D. Rogers, M.A., B.Sc. Treasurer—Kenneth M. MacAlpine, M.A. Members of Council—Andrew Wilson; John W. Couston; Major Eric Annandale, B.A.; John J. Robertson; Peter K. M'Laren; John Gilchrist. Trustees—Earl of Mansfield, B.A., F.Z.S., M.B.O.U.; Sir Francis Norie-Miller, Bart., F.E.I.S., J.P.; Gilbert Malloch; Melville Gray.

Mr. Walmesley delivered his Presidential Address on the History of the Society: " Looking Back." (See *Transactions*, p. 23.)

8th November, 1946. " Colour with the Camera "*—Mr. Wm. L. Weir, Dundee.

20th December, 1946. " Light and Colour in the Open Air "*—Mr. James Paton, M.A., B.Sc., Edinburgh University.

10th January, 1947. " Recent Developments in Scottish Prehistory "—Mrs. Margaret E. C. Stewart, M.A., Ph.D., F.S.A.Scot. (See *Transactions*, p. 35.)

7th February, 1947. Members' Night. " With the Scarabs and Arabs in Egypt "—Mr. J. Couston. Mr. K. M. MacAlpine exhibited and commented on a series of lantern slides of Perth.

28th March, 1947. 80th Annual General Meeting. The Council reported that during the year 15 new members had been admitted,

and 5 members had died—Messrs. James Cameron, Melville Gray, James M'Rae, W. J. Wood, Dr. G. F. Barbour. The membership at date was 153—2 associates, 1 associate member, 6 life members, 137 ordinary members, 2 junior members, 1 honorary member, and 4 corresponding members. The Photographic Section had held well-attended weekly meetings, and the Federation portfolio had been available. Attendance at the Friday evening club meetings had been disappointing. The Council had met on four occasions. Eighteen members had attended the first summer excursion, to the scene of the Hydro Electric Constructional Scheme at Pitlochry, but other two excursions had had to be cancelled.

Office-Bearers appointed :— President — Cyril Walmesley, A.M.I.C.E., M.I.W.E. Vice-Presidents—R. Gloag Thomson; Andrew Wilson; Wm. Malloch, B.Sc., John W. Couston. Editor—D. J. S. Sutherland, M.A., B.Sc., Ph.D., A.I.C. Librarian—James Wood. Secretary—Charles D. Rogers, M.A., B.Sc. Treasurer—Kenneth M. MacAlpine, M.A. Members of Council—Major Eric Annandale, T.D., B.A.; John J. Robertson; P. K. M'Laren; John Gilchrist; Mrs. Margaret E. C. Stewart, M.A., Ph.D., F.S.A.Scot.; John M. Munro, M.A., B.Sc. Trustees—Earl of Mansfield, B.A., F.Z.S., M.B.O.U.,; Sir Francis Norie-Biller, Bart.; Gilbert Malloch.

Mr. Walmesley delivered his Presidential Address: " The Biology of Waterworks." (See *Transactions*, p. 39.)

7th November, 1947. " Origin of the Mariner's Compass "*—A. Crichton Mitchell, D.Sc., Edinburgh.

28th November, 1947. " Photography at Random "*—Mr. J. T. Knight, F.R.P.S.

12th December, 1947. " X-Ray Analysis of Crystals "*—G. L. Rogers, M.A., Ph.D., University College, Dundee.

30th January, 1948. " Speedlight Photography "*—Mr. P. K. M'Laren, F.I.B.P., A.R.P.S. Slides of the Scottish Photographic Federation were also shown.

20th February, 1948. Members' Night. " Owls in Perthshire," illustrated by epidiascope and films—Mr. Robert Couston. A " question-and-answer " period followed.

19th March, 1948. 81st Annual General Meeting. The Council reported that 13 members had been admitted and 3 had died. The membership at date comprised 2 associates, 1 associate member, 6 life members, 147 ordinary members, 2 junior members, 1 honorary member, and 4 corresponding members. A scheme to reorganise the Junior Section, submitted by Mr. Robert Couston, had been approved. An Archæological Section had been formed, under the leadership of Mrs. Margaret E. C. Stewart. An excursion to Comrie,

arranged for August, had had to be cancelled. The Council had met seven times.

Office-Bearers appointed :— President — Cyril Walmesley, A.M.I.C.E., M.I.W.E. Vice-Presidents—Wm. Malloch, B.Sc.; John W. Couston; Major Eric Annandale, T.D., B.A.; Peter K. M'Laren, F.I.B.P., A.R.P.S. Editor—D. J. S. Sutherland, M.A., B.Sc., Ph.D., A.I.C. Librarian—James Wood. Secretary—Charles D. Rogers, M.A., B.Sc. Treasurer—Kenneth M. MacAlpine, M.A.; Members of Council—John Gilchrist; Mrs. Margaret E. C. Stewart, M.A., Ph.D., F.S.A.Scot.; John M. Munro, M.A., B.Sc.; James Aitken; R. Gloag Thomson; Andrew Wilson. Trustees—Earl of Mansfield, B.A., F.Z.S., M.B.O.U.; Gilbert Malloch.

Mr. Walmesley delivered his Presidential Address: " Is the Earth the only abode of Life? "

22nd October, 1948. " The Electrical Activity of the Brain "—C. A. Beevers, D.Sc., F.Inst.P., F.R.S.E.

12th November, 1948. " Geology of Central Perthshire "*—Professor Donald E. Innes, M.C., M.A., St. Andrew's University.

10th December, 1948. " Perthshire Roads—Old and New "—Mr. Angus MacLeod, F.S.A.Scot., County Road Surveyor.

14th January, 1949. " The Gowrie House Conspiracy "—Mr. W. F. Arbuckle, M.A., F.S.A.Scot., Edinburgh.

18th February, 1949. Members' Night. Mr. Walmesley showed a lantern slide of a sunspot and explained some of the special points. Mrs. Stewart gave a talk on " A Crooked Stick." Mr. Wm. Malloch explained the process of colour photography.* Mr. P. K. M'Laren spoke " On Going over to $2\frac{1}{4}$-inch square."*

18th March, 1949. 82nd Annual General Meeting. The Council reported that the membership was 146—1 associate, 2 associate members, 2 life members, 139 ordinary members, and 2 junior members. The Council had met five times. A hill walk, over the Wicks of Baiglie, arranged as a summer excursion, had been cancelled owing to lack of support.

Three meetings of the Junior Section were held in the Museum in June, 1948, and in July there was an excursion to Mundie Loch. The membership of the Section was approximately 20. Difficulties of accommodation had made its winter meetings impossible: the Council were endeavouring to obtain extended facilities at the Museum therefor.

The Archæological Section had developed into a very active and enthusiastic body.

Office-Bearers were appointed as printed on p. xvii.

Mr. Walmesley delivered his Presidential Address on: " The Story of the 200-inch Telescope."*

14th October, 1949. " The Aurora Borealis, and Luminous Night Clouds "*—Mr. J. Paton, M.A., B.Sc., F.R.S.E., Edinburgh University.

18th November, 1949. " The Roman Fort at Bochastle, Callander "*—Mr. W. A. Anderson, M.A., F.S.A.Scot., Paisley.

9th December, 1949. " Birds in Winter "*—Mr. James Anton, M.B.O.U., Bridge of Cally.

6th January, 1950. " Some Scottish Medieval Castles "*—Mr. W. Douglas Simpson, M.A., D.Litt., F.S.A.Scot., Aberdeen University.

10th February, 1950. Members' Night. Mrs. Stewart described the Achæological Section's excavation of the Bronze-Age Cairn Bane in Glen Cochill. Mr. Wm. Malloch spoke on " River Pollution," and Mr. Munro on " Soil Erosion."*

24th March, 1950. 83rd Annual General Meeting. The Council reported that 17 new members had been admitted; 5 members had died—Dr. P. O. Moffat, Messrs. T. B. Marshall, Andrew Wilson, William Wotherspoon, John Moncrieff; and 4 had resigned. The membership comprised 1 associate member, 134 ordinary members, and 1 junior member. The Council had met five times. In the summer, by kind permission of the Earl of Mansfield, Scone Palace and grounds had been visited, with Miss Ross, Principal of Craigmount School (in occupation of the Palace), as guide. On 11th January, a Children's Lecture, " Chemistry and the Community," had been given by Mr. Robert Roger, University College, Dundee.

The Archæological Section had excavated the partly-denuded Cairn Bane in Glen Cochill. The Section had visited Cairnpapple, West Lothian; Balmanno Hill; Balvaird Castle (twice—once with Dr. W. Douglas Simpson); Elcho Castle; the Stone Circle and Standing Stone near Moncreiffe House; the Old Bridge of Earn; Balthayock Tower; Evelick Castle (along with Dr. W. Douglas Simpson); Inchtuthill Roman Camp, Delvine; Tofthill; Pole Hill; Ardargie; Glen Cochill (with Mr. Cruden, H.M. Inspector of Ancient Monuments); Bochastle Roman Camp (conducted by Mr. W. A. Anderson, Paisley); Carpow Roman Camp (with Mr. Anderson); Torwood Broch and Rough Castle Roman Camp (conducted by the Falkirk Society); Culross (jointly with the Falkirk Society—conducted by Mr. W. F. Arbuckle, Edinburgh). On 7th February, 1950, Lt.-Col. R. L. Hunter, F.S.A.Scot., gave a public lecture, under the auspices of the Section, on " The Scottish Brochs."*

Office-Bearers appointed :— President — Cyril Walmesley,

A.M.I.C.E., M.I.W.E. Vice-Presidents—P. K. M'Laren, F.I.B.P., A.R.P.S.; Mrs. Margaret E. C. Stewart, M.A., Ph.D., F.S.A.Scot.; John M. Munro, M.A., B.Sc.; R. Gloag Thomson. Secretary and Librarian—James Wood. Treasurer—K. M. MacAlpine, M.A. Members of Council—Miss Catherine H. Mailer, M.A., F.S.A.Scot; Robert Butchart, A.M.I.Mech.E; James Kelman, M.D., D.P.H.; James Aitken; Miss Barclay, M.A., B.Sc.; Allan Grant, B.Sc., M.I.E.E. Trustees—Earl of Mansfield, B.A., F.Z.S., M.B.O.U.; Gilbert Malloch; William Malloch, B.Sc.; A. C. Campbell.

The President intimated that Dr. Sutherland wished to be relieved of his duties as Editor, and it was remitted to the Council to appoint a successor. (On 12th April, the Council resolved to ask Mr. James Young to accept the office.)

Mr. Walmesley gave his Presidential Address: " The Nearest Star."

27th October, 1950. " Jarlshof "*—Mr. J. R. C. Hamilton, M.A., F.S.A.Scot., H.M. Assistant Inspector of Ancient Monuments.

17th November, 1950. " The Geology and Scenery of Perthshire "*—Charles D. Waterston, B.Sc., Ph.D., F.G.S.

8th December, 1950. " The Work of the Brown Trout Research Laboratory "—Mr. K. A. Pyefinch, Pitlochry.

26th January, 1951. " The Work of the Ancient Monuments Commission "*—Mr. Stewart H. Cruden, A.R.I.B.A., F.S.A., F.S.A.Scot., H.M. Inspector of Ancient Monuments.

9th February, 1951. Members' Night. " Photography "*—Mr. P. K. M'Laren. " Salmon Problems "*—Mr. Wm. Malloch.

9th March, 1951. " Earth Houses at Ardestie and Carlungie "*—F. T. Wainwright, B.A., Ph.D., F.S.A., F.S.A.Scot., University College, Dundee.

23rd March, 1951. 84th Annual General Meeting. The Council reported that 18 new members had been admitted. The membership comprised 6 life members, 1 honorary member, 141 ordinary members, and 2 junior members. 4 members had died—Major H. S. Pullar and Mr. Edward Campbell (the Society's two oldest members—admitted in 1887 and 1889 respectively), Mr. David Mackenzie, and Mr. W. M. Watson. The Council had met on four occasions. There had been successful summer excursions to Kinnoull Hill; Kinclaven Castle, Stobhall, and Evelick Castle (conducted by Dr. W. Douglas Simpson); Drummond Castle; Doune Castle; Perth Water Works; Albert Place Observatory. A Children's Christmas Lecture had been given by Mr. James Paton, Abernethy.

A few members of the Photographic Section continued to use the dark room and equipment.

The Archæological Section membership was 34. Their subject for winter study had been: " The Origin of the Chambered Tombs in Europe." The Section had visited sites in Dunkeld and Caputh districts; also Glasclune Castle, Ardargie Earthworks, and Jackschairs Fort. Excavation work had been begun on a hut circle site at Arnbathie, near Scone. Representatives had attended meetings in Edinburgh of the Scottish Regional Council for British Archæology.

Office-Bearers appointed :— President — Cyril Walmesley, A.M.I.C.E., M.I.W.E. Vice-Presidents—John M. Munro, M.A., B.Sc.; R. Gloag Thomson; Miss C. H. Mailer, M.A., F.S.A.Scot.; R. Butchart, A.M.I.Mech,E. Editor—James Young, F.S.A.Scot. Librarian—William Davidson. Secretary—James Wood. Treasurer —K. M. MacAlpine, M.A. Members of Council—James Kelman, M.D., D.P.H.; Miss Barclay, M.A., B.Sc.; Mrs. Margaret E. C. Stewart, M.A., Ph.D., F.S.A.Scot.; James Aitken; Allan Grant, B.Sc., M.I.E.E.; Captain N. M. S. Langlands, M.A., D.Sc., R.N. (Retired). Trustees—Earl of Mansfield, B.A., F.Z.S., M.B.O.U.; Gilbert Malloch; William Malloch, B.Sc.

The President referred to the recent retirement of the Hon. Secretary, Mr. James Wood, from the Curatorship of the Art Gallery and Museum, and to his manifold services to the Society. On behalf of the members, and in token of their esteem, he asked Mr. Wood to accept a pen and pencil set, with a cheque. Mr Wood, in returning thanks, spoke of his pleasure in assisting in the work of the Society, and acknowledged the help he had received from members in his official work as Curator.

The President then delivered his Address: " The Treatment of Water for Public Supplies."

12th October, 1951. " Wild Flowers in the Highlands "*—Miss M. S. Campbell, F.L.S.

9th November, 1951. " The Golden Eagle "*—Mr. C. Eric Palmar, Glasgow.

7th December, 1951. " Modern Development of the Microscope "—Captain N. M. S. Langlands, M.A., D.Sc., R.N. (Retired).

14th December, 1951. " The Romans in Scotland "*—Mr. R. W. Feachem, M.A., M.Sc., F.S.A., F.S.A.Scot., Edinburgh.

18th January, 1952. " Chapters in Perthshire Church History " —Gordon Donaldson, M.A., Ph.D., F.R.Hist.S., F.S.A.Scot., Edinburgh University. (See *Transactions*, p. 72.)

8th February, 1952. Members' Night. Dr. Kelman described an outdoor epidemic of fleas in Scone, and the discovery of a basking

shark stranded at Longforgan. Mr. Aitken illustrated his talk on a botanizing holiday in Switzerland with film strips. Mr. M'Laren showed colour slides and described his methods of exposure and the types of film used. Mr. Wm. Malloch showed colour slides and commented thereon.

22nd February, 1952. " Excavations at Dundarg Castle "*—W. Douglas Simpson, M.A., D.Litt., F.S.A., F.S.A.Scot., Aberdeen University.

7th March, 1952. " The Work of the Forestry Commission in Scotland "—Mr. D. A. Woodburn, District Officer of the Commission.

21st March, 1952. 85th Annual General Meeting. The Council reported that 8 new members had been admitted. The membership was 151, comprising 5 life members, 1 honorary member, and 145 ordinary members. 4 members—Messrs. A. C. Campbell, F. J. Simpson, John Henderson, and Thomas C. Davidson—had died. The Council had met four times. Two of the summer excursions arranged had to be cancelled owing to insufficient support, but the evening visit, on 22nd August, to St. John's Kirk, and the afternoon excursion, on 25th August, to Pitlochry Dam and the Brown Trout Research Laboratory, had been well attended and successful. A Children's Christmas Lecture, " The Birds of Perthshire," had been given by Dr. James Campbell. A few members of the Photographic Section had continued to use the dark room.

The Archæological Section reported that a successful joint excursion had been made to Roman sites along the Gask Road, and to Innerpeffray Library, Chapel, and Castle, with the Abertay History Society, Dundee. Several prehistoric sites in the Killin area likely to be affected by the operations of the North of Scotland Hydro Electric Board, and the earth houses at Carlungie and Ardestie (near Monifieth), had been visited. With Mr. Feachem, of the Ancient Monuments Commission, visits had also been made to Pitcairngreen, Inchtuthill, Fortingall, and Glen Lyon, and to a newly-discovered short cist at Doune. Professor Piggott, of Edinburgh University, had accompanied members to Pitcairngreen, Colen, Bandirran, Fowlis Wester, Auchnafree, Fortingall, and Croftmoraig. The Excavations at Arnbathie had been continued in the summer. Meetings had been held in the Museum Library, as usual, fortnightly throughout the winter.

Office-Bearers appointed :— President — Cyril Walmesley, A.M.I.C.E., M.I.W.E., F.R.A.S. Vice-Presidents—Miss C. H. Mailer, M.A., F.S.A.Scot.; Robert Butchart, A.M.I.Mech.E.; James Kelman, M.D., D.P.H.; Mrs. Margaret E. C. Stewart, M.A., Ph.D., F.S.A.Scot. Editor—James Young, F.S.A.Scot. Librarian—

William Davidson. Secretary—James Wood. Treasurer— K. M. MacAlpine, M.A. Members of Council—James Aitken; Captain N. M. S. Langlands, M.A., D.Sc., R.N. (Retired); Miss B. Ferguson, M.A.; W. Findlay, M.D.; Allan Grant, B.Sc., M.I.E.E.; P. K. M'Laren, F.I.B.P., A.R.P.S. Trustees—Earl of Mansfield, B.A., F.Z.S., M.B.O.U.; Gilbert Malloch; Wm. Malloch, B.Sc.; Major Eric Annandale, T.D., B.A.

Mr. Walmesley, in his Presidential Address, gave an outline of the electro-magnetic spectrum, and the new development of Radio Astronomy.

17th October, 1952. " The National Museum of Antiquities of Scotland—Past, Present, and Ideal "*—Mr. R. B. K. Stevenson, M.A., F.S.A.Scot., Keeper of the National Museum of Antiquities, Edinburgh.

14th November, 1952. " A Nature Sketch-Book "—Mr. Len. Fullerton, Dundee.

12th December, 1952. Film Night. The following sound films were shown:—" Harnessing the Hills " (North of Scotland Hydro Electric Board), " Hare and Tortoise," " How Television Works," " The Chameleon " (Central Film Library), " The Gyl of Green " (American Soil Preservation Society), " Grangemouth Project " (Petroleum Board).

The meeting arranged for 16th January, 1953, had to be cancelled at short notice owing to the illness of Mr. Ian Findlay, Edinburgh, who was to have given an illustrated lecture on " Scottish Silver."

13th February, 1953. Members' Night. Mrs. Stewart outlined work being done by the Archæological Section for the Ordnance Survey in plotting on 6-inch O.S. Maps sites of archæological and historical interest in Perthshire not previously marked. Mr. Davidson commented on a large number of lantern slides from the Society's collection, showing old parts of Perth long demolished, and some characters of the city. Miss Ferguson illustrated her talk on Cactus Plants with several coloured plates. Dr. Findlay showed colour film slides he had taken in the Carse of Gowrie and Comrie districts. Mr. Malloch's slides included some taken during the Society's excursions, and others taken in Nigeria by his son-in-law.

27th February, 1953. " The Agricolan and Antonine Occupations of Scotland "*—Miss Anne S. Robertson, M.A., F.S.A.Scot., Curator of the Hunterian Museum, Glasgow.

14th March, 1953. Joint Meeting of the Society of Antiquaries of Scotland and the Archæological Section. The paper read on behalf of Professor Stuart Piggott on his excavation of the cairn at Corriemony, and that of Mr. W. F. Arbuckle on the Gowrie Con-

spiracy, are expected to be printed in the *Proceedings* of the Society of Antiquaries of Scotland.

27th March, 1953. 86th Annual General Meeting. The Council reported that 3 new members had been admitted. The membership was 146—5 life members, 1 honorary member, and 140 ordinary members. 3 had died—Sir Thomas Hunter, and Messrs. J. Marshall Farquhar and Jas. G. Gilmour. The Council had met four times. Summer excursions had taken place to Glen Turret and Glen Lednock on the afternoon of 21st June, in inclement weather; and to Ben Voirlich on 21st August, when the weather was fine and the day enjoyable. An evening visit to the printing works of the *Perthshire Advertiser* had been well attended and enjoyed by all. The Children's Christmas Lecture, " Alice in a New Wonderland," had been given by Professor D. H. Everett, University College, Dundee. The small Photographic Section still made use of the dark room.

The Archæological Section reported having had regular fortnightly meetings throughout the winter, when the chambered tombs of France, the Channel Islands, and South-West England were studied. A joint excursion, conducted by Mr. W. F. Arbuckle, Edinburgh, had been made in summer to Castle Campbell, Dollar, with the Abertay Society, Dundee. The Section act as local correspondents for the Archæological Office of the Ordnance Survey, marking new discoveries and checking existing data on the Survey's large-scale maps. The sheets are sent first to the Royal Commission on Ancient Monuments, and later to the office of the Ordnance Survey, so that the information marked thereon may be placed on permanent record. The sheets then return to the Section for further work.

Office-Bearers appointed :— President — Cyril Walmesley, A.M.I.C.E., M.I.W.E., F.R.A.S. Vice-Presidents—James Kelman, M.D., D.P.H.; Mrs. Margaret E. C. Stewart, M.A., Ph.D., F.S.A.Scot.; James Aitken; Captain N. M. S. Langlands, M.A., D.Sc., R.N. (Retired). Editor—James Young, F.S.A.Scot. Secretary —James Wood. Treasurer—Kenneth M. MacAlpine, M.A. Librarian—William Davidson. Members of Council—Miss B. Ferguson, M.A.; W. Findlay, M.D.; Allan Grant, B.Sc., M.I.E.E.; P. K. M'Laren, F.I.B.P., A.R.P.S.; Albert Anderson, M.A., B.Sc.; William Garvie, F.S.A.Scot. Trustees—Earl of Mansfield, B.A., F.Z.S., M.B.O.U.; Gilbert Malloch; William Malloch, B.Sc.; Major Eric Annandale, T.D., B.A.

The Presidential address was delivered by Mr. Walmesley, on " A History of Perth's Water Supply, 1751-1830." (See *Transactions*, p. 51.)

16th September, 1953. " Butterflies and other Insects "*— Mr. Donald Allan, F.R.P.S., F.R.S.A., F.R.E.S. (Ilfords, Ltd.). Mr.

Allan described the methods of photographing some of the rare specimens shown.

23rd October, 1953. "Bird Ringing"—Mr. Alex. Cross, M.B.O.U., Secretary of Dundee Naturalist Society.

13th November, 1953. "Wild Flowers"*—Mr. W. M'Cormac, Dunfermline Naturalist Society.

18th December, 1953. "Some Further Notes on Brown Trout Research"—Mr. K. A. Pyefinch, M.A., Principal Scientific Officer, Brown Trout Research Laboratory, Pitlochry.

22nd January, 1954. "The Nutrition of Plants"—Dr. L. W. Poel, Lecturer in Botany, University of St. Andrews.

19th February, 1954. Members' Night. Miss B. Ferguson, M.A., gave an interesting account of a visit she had paid to the Bass Rock, describing the Bird Life, Flora, and Historical Association of the Rock. Mr. A. Anderson, M.A., talking on "The Measurement of Radiation Hazards," described the dangerous emissions from radio-active substances, explained methods of detecting and measuring radiation, and demonstrated certain instruments which were available for this purpose. Mr. Wm. Malloch, B.Sc., gave a brief account of researches he was carrying out in connection with the movement of Salmon, and explained the method of marking salmon by means of identification labels attached to the dorsal fin.

26th March, 1954. 87th Annual General Meeting. The Council reported that the membership was 163, comprising 1 honorary member, 1 life member, and 161 ordinary members. 2 members had died—Mr. James Young, F.S.A.Scot., who was Hon. Editor to the Society, and Mr. Henderson. There were four Council meetings held during the session. Summer excursions—two afternoons with Dundee Naturalists, and one day at Ben Lawers (marred by inclement weather).

The Archæological Section reported a series of fortnightly meetings throughout the session, when "The Romans in Britain" were studied. A joint meeting with the Society of Antiquaries in Scotland was held on 16th March, 1953, when papers were read by Professor Stuart Piggott, on "The Chambered Cairns of Corriemony," and by Mr. W. F. Arbuckle, on "The Gowrie House Conspiracy." Two members attended the Scottish School of Archæology at Dumfries, two members assisted with excavations at Plean, near Stirling, and visits were made to Dunkeld, Inverbervie, Stanley, Burleigh Castle and Loch Leven, Balmerino Abbey, and to Inchtuthil, where a party of 15 was shown around recent excavations by Dr. Richmond. The Ministry of Works has asked that

members should visit scheduled ancient monuments periodically, and report on their condition. There were 21 members in the Section.

The Photographic Section had been strengthened by the influx of 16 members of the former Camera Club. Fourteen meetings were held during the session, talks and demonstrations being given on a variety of subjects. Membership of the Section stood at 34.

Office-Bearers for 1954-55 appointed:—President—Mr. Cyril Walmesley, A.M.I.C.E., M.I.W.E., F.R.A.S. Vice-Presidents—James Aitken; Captain N. M. S. Langlands, M.A., D.Sc., R.N. (Retired); Miss B. Ferguson, M.A.; Dr. W. Findlay, M.D. Editor—No nomination. Secretary—R. H. Foston, M.Inst. Gas E. Treasurer—K. M. MacAlpine, M.A. Librarian—William Davidson. Members of Council—Allan Grant, B.Sc., M.I.E.E.; P. K. M'Laren, F.I.B.P., A.R.P.S.; A. Anderson, M.A., B.Sc.; Wm. Garvie, F.S.A.Scot.; Miss C. Mailer, M.A.; J. Wood. Trustees—Earl of Mansfield, B.A., F.Z.S., M.B.O.U.; Wm. Malloch, B.Sc.; G. Malloch; Major Eric Annandale, T.D., B.A.

The Presidential Address was delivered by Mr. Walmesley, his subject being: " The History of Perth's Water Supply, 1870-1930." (See *Transactions*, p. 59.)

CHILDREN'S ESSAY COMPETITION

For the Charles MacIntosh Memorial Prizes

SUBJECTS :

1950—" Personal Observations on the Growth of a Plant."
1951—" A Study of a Perthshire Stream."
1952—" Personal Observations of Migrant Birds in Perthshire."
1953—" Nature Notes around my own Home."

ABSTRACT OF ACCOUNTS for Year ending 28th Feb., 1953.

I.—GENERAL ACCOUNT.

	Income.	Expenditure.
To 126 Subscriptions from Members	£34 13 0	
,, Interest—Savings Bank and Defence Bonds	3 18 8	
,, *Transactions*, etc., sold	1 14 0	
,, Credit Balance as at 28th February, 1952	171 6 10	
By Insurance and Lighting		£6 2 6
,, Subscriptions to other Societies		3 2 0
,, Books and Magazines		1 5 0
,, Printing and Advertising		15 15 6
,, Sundries		7 10 1
		£33 15 1
,, Credit Balance as at 28th February, 1953		177 17 5
	£211 12 6	£211 12 6

II.—PUBLICATION ENDOWMENT FUND.

To Funds as per last Account—£500 4% Consolidated Stock, at cost	£428 9 9	
Credit Balance—Savings Bank	148 8 4	
	£576 18 1	
,, Interest on £500 4% Consols, 1/8/52 and 1/2/53, *less* Tax	10 10 0	
,, Income Tax Refunded	9 10 0	
,, Interest on Savings Bank Account	3 7 3	
By Funds as at 28th February, 1953—		
£500 4% Consolidated Stock, at cost		£428 9 9
Current Balance—Savings Bank		171 15 7
	£600 5 4	£600 5 4

III.—MacINTOSH MEMORIAL FUND.

To £130 3½% War Stock, at cost	£129 7 8	
,, Capital Balance—Savings Bank Account	0 12 4	
	£130 0 0	
,, Income Balance—Savings Bank Account	27 3 9	
,, Interest—Savings Bank and War Stock	5 4 10	
By Books		£5 11 6
,, Funds as at 28th February, 1953—		
£130 3½% War Stock, at cost		129 7 8
Capital Balance—Savings Bank Account		0 12 4
,, Savings Bank—Credit Balance		26 17 1
	£162 8 7	£162 8 7

K. M. MacALPINE, *Treasurer.*

PERTH, 24th March, 1953.—Examined, compared with the Vouchers, and found correct.

(Signed) P. M. JACKSON, C.A., *Auditor.*

SUMMARY OF ACCOUNTS for Year ending 28th February

I.—GENERAL ACCOUNT.

	1950	1951	1952	1953
Balance from last year	£152 2 8	£166 18 11	£179 12 7	£171 6 10
Subscriptions	38 16 0	37 2 6	38 12 6	34 13 0
Publications sold ...	4 15 9	0 7 0	0 15 6	1 14 0
Interest	3 9 0	3 17 2	3 18 8	3 18 8
	£199 3 5	£208 5 7	£222 19 3	£211 12 6
Expenditure	£32 4 6	£28 13 0	£51 12 5	£33 15 1
Balance at end of year	166 18 11	179 12 7	171 6 10	177 17 5
	£199 3 5	£208 5 7	£222 19 3	£211 12 6

II.—PUBLICATION ENDOWMENT FUND.

	1950	1951	1952	1953
Cost of Printing and Blockmaking ...	£71 2 4	£ —	£ —	£ —
Balance at end of year	531 7 4	553 17 3	576 18 1	600 5 4

III.—MacINTOSH MEMORIAL FUND.

	1950	1951	1952	1953
Cost of Prizes ...	£2 15 0	£5 7 0	£0 13 6	£5 11 6
Balance at end of year	152 18 9	152 14 5	157 3 9	156 17 1

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1949.

MONTHS.	BAROMETER.	AIR TEMPERATURE °F.								RAIN.						SUNSHINE.		
		Mean of		Mean of A and B.	Difference from Average. 1883-1953.	Absolute Maximum and Minimum.				Total Fall.		Difference from Average. 1883-1953.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	Total Amount in Hours.	Difference from Average. 1917-1953.	Number of Days.
		Maximum (A).	Minimum (B).			Maximum.	Day of Month.	Minimum.	Day of Month.									
	Inches.	°	°	°	°	°		°		ins.	mm.	ins.		ins.				
JAN.	29·90	46·7	33·0	39·9	+2·7	53	17/18/27	14	5	1·98	50·2	−0·82	16	·46	6	51·2	+12·2	23
FEB.	30·04	47·3	34·9	41·1	+3·1	55	13	22	2/5	1·90	48·3	−0·39	16	·54	19	93·3	+24·7	24
MAR.	30·11	47·8	34·0	40·9	+0·4	58	22	24	11	1·44	36·5	−0·73	12	·37	5	132·5	+29·8	27
APRIL	29·83	55·4	40·7	48·1	+3·2	67	17	30	6	1·38	35·0	−0·38	16	·41	20	153·3	+ 5·4	27
MAY	29·90	60·3	42·2	51·3	+1·1	71	10/11	34	6/27	2·09	53·1	−0·03	15	·69	17	195·6	+24·5	29
JUNE	30·10	66·3	47·5	56·9	+1·0	79	27	36	18	1·80	45·8	−0·17	13	·63	1	242·9	+44·8	29
JULY	30·11	69·3	52·1	60·7	+1·8	81	11/12	41	7	2·13	54·0	−0·87	10	·76	4	192·0	+25·6	29
AUG.	30·01	65·3	51·7	58·5	+0·7	80	19	39	17	2·57	65·4	−0·69	14	1·45	7	137·4	− 6·3	29
SEPT.	30·04	65·6	49·5	57·6	+4·1	75	5	37	18	1·16	29·5	−1·25	15	·32	4	133·2	+10·1	27
OCT.	29·87	56·7	44·5	50·6	+3·4	72	5	26	28	3·91	99·4	+0·85	20	1·19	25	81·5	− 3·7	21
NOV.	29·63	47·8	35·6	41·7	+0·5	55	4	25	7	2·49	63·2	−0·37	21	·43	9	42·3	−11·2	17
DEC.	29·64	44·8	34·9	39·9	+1·9	53	7	24	11	3·50	88·8	+0·54	27	·58	18	40·5	+ 6·6	17
Total or Average for Year	29·93	56·1	41·7	48·9	+2·0	...	...	...	...	26·35	669·2	−4·31	195	...	...	1495·7	+162·5	299
Highest,						**81**	**11/12/7, vii**							**1·45**	**7/8 viii**			
Lowest,								**14**	**5/1**									

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1950.

MONTHS.	BAROMETER.	AIR TEMPERATURE °F.								RAIN.						SUNSHINE.		
		Mean of		Mean of A and B.	Difference from Average. 1883-1953.	Absolute Maximum and Minimum.				Total Fall.		Difference from Average. 1883-1953.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	Total Amount in Hours.	Difference from Average. 1917-1953.	Number of Days.
		Maximum (A).	Minimum (B).			Maximum.	Day of Month.	Minimum.	Day of Month.									
	Inches.	°	°	°	°	°		°		ins.	mm.	ins.		ins.				
JAN.	30·15	43·2	30·5	36·9	− 0·3	55	11	21	23	2·26	57·4	− 0·54	19	·23	14	23·5	− 15·5	14
FEB.	29·52	43·7	31·6	37·7	− 0·3	55	16	19	27	2·69	67·9	+ 0·40	18	·42	10	85·2	+ 16·6	22
MAR.	29·95	49·8	37·5	43·7	+ 3·2	63	26	21	14	2·03	51·6	− 0·14	13	1·03	18	123·3	+ 20·6	27
APRIL	29·64	51·2	34·7	43·0	− 1·9	59	23	24	25	2·16	55·7	+ 0·40	19	·52	8	147·3	− 0·6	28
MAY	29·91	58·9	42·1	50·5	+ 0·3	71	12	30	16	1·58	40·1	− 0·54	13	·65	17	170·7	− 0·4	27
JUNE	29·91	68·1	48·6	58·4	+ 2·5	83	6	39	15	1·56	39·6	− 0·41	15	·31	28	212·7	+ 14·6	29
JULY	29·85	65·8	49·8	57·8	− 1·1	71	20	40	6	4·06	103·0	+ 1·06	23	·61	10	180·1	+ 13·7	28
AUG.	29·74	64·7	50·2	57·5	− 0·3	74	3	41	22	3·60	91·4	+ 0·34	22	·52	26	134·8	− 8·9	29
SEPT.	29·65	58·0	45·9	52·0	− 1·5	64	4	37	27	*6·73	170·8	+ 4·32	26	1·53	24	114·9	− 8·2	22
OCT.	29·90	53·2	41·6	47·4	+ 0·2	64	5	24	29	1·57	40·0	− 1·49	20	·30	9	80·2	− 5·0	25
NOV.	29·63	45·3	30·9	38·1	− 3·1	51	6	22	14/25/26	2·87	73·0	+ 0·1	19	·59	21	52·8	− 0·7	22
DEC.	29·72	37·8	26·7	32·3	− 5·7	50	9	17	30/31	1·30	33·1	− 1·66	15	·28	19	34·0	+ 0·1	15
Total or Average for Year.	29·80	53·3	39·2	46·3	− 0·6	...	...	...	...	32·41	823·6	+ 1·75	222	...	...	1359·5	+ 26·3	288
Highest,						**83**	**6/vi**							**1·53**	**24·ix**			
Lowest,								**17**	**30/31/xii**									

* Highest on Record.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1951.

MONTHS.	BAROMETER.	AIR TEMPERATURE °F.								RAIN.						SUNSHINE.		
		Mean of		Mean of A and B.	Difference from Average. 1883-1953.	Absolute Maximum and Minimum.				Total Fall.		Difference from Average. 1883-1953.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	Total Amount in Hours.	Difference from Average. 1917-1953.	Number of Days.
		Maximum (A).	Minimum (B).			Maximum.	Day of Month.	Minimum.	Day of Month.									
	Inches.	°	°	°	°	°		°		ins.	mm.	ins.		ins.				
JAN.	29·54	41·8	29·7	35·8	− 1·4	49	24/25/27/30/31	18	29	3·48	88·4	+0·68	21	·96	9	42·3	+ 3·3	17
FEB.	29·40	41·6	31·4	36·5	− 1·5	49	28	23	4	3·28	83·4	+0·99	21	·80	4	64·6	− 4·0	21
MAR.	29·68	44·0	32·5	38·3	− 2·2	52	15/22/23	23	27	1·65	41·8	− 0·52	22	·17	30	76·2	− 26·5	16
APRIL	29·81	49·5	34·5	42·0	− 2·9	60	25	26	9/22	2·03	51·5	+0·27	15	·48	30	173·9	+26·0	27
MAY	30·07	56·6	38·9	47·8	− 2·4	67	14	27	11	1·74	44·2	− 0·38	12	·59	20	199·7	+28·6	24
JUNE	29·97	63·3	45·2	54·3	− 1·6	74	5	36	1	2·21	56·1	+0·24	13	·44	17	180·9	− 17·2	30
JULY	29·98	67·4	51·1	59·3	+ 0·4	74	20/21	40	14	2·99	75·9	− 0·01	13	1·36	22	171·9	+ 5·5	30
AUG.	29·69	63·0	48·9	56·0	− 1·8	75	5	39	14	4·08	103·5	+0·82	25	·55	6	106·7	− 37·0	25
SEPT.	29·85	61·4	46·7	54·1	+ 0·6	69	4	36	20	2·29	58·1	− 0·12	14	·51	14	132·8	+ 9·7	26
OCT.	30·06	56·5	43·2	49·8	+ 2·6	64	9	26	23	0·70	17·7	− 2·36	13	·24	20	71·9	− 13·3	23
NOV.	29·44	50·2	38·6	44·4	+ 3·2	54	6/15/27/29	26	23	*6·87	174·6	+4·01	28	1·53	4	49·2	− 4·3	22
DEC.	29·61	46·3	34·1	40·2	+ 2·2	56	3	19	11/12	2·89	73·3	− 0·07	25	·52	19	44·8	+ 10·9	19
Total or Average for Year.	29·76	53·5	39·6	46·5	− 0·4	...	...	...	...	34·22	868·5	+3·46	222	...	...	1314·9	− 18·3	280
Highest,						**75**	**5/viii**							**1·53**	**4/xi**			
Lowest,								**18**	**29/1**									

* Highest on Record.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1952.

MONTHS.	BAROMETER.	AIR TEMPERATURE °F.								RAIN.						SUNSHINE.		
		Mean of		Mean of A and B.	Difference from Average. 1883-1953.	Absolute Maximum and Minimum.				Total Fall.		Difference from Average. 1883-1953.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	Total Amount in Hours.	Difference from Average. 1917-1953.	Number of Days.
		Maximum (A).	Minimum (B).			Maximum.	Day of Month.	Minimum.	Day of Month.									
	Inches.	°	°	°	°	°		°		ins.	mm.	ins.		ins.				
JAN.	29·65	40·0	27·2	33·6	−3·6	55	6	11	30	2·08	52·9	−0·72	15	·47	8	51·7	+12·7	18
FEB.	29·99	44·5	31·2	37·9	−0·1	54	18/23	17	12/13	0·51	12·9	−1·78	9	·26	29	98·5	+29·9	23
MAR.	29·79	48·6	36·1	42·4	+1·9	59	24	25	15	1·80	45·8	−0·37	18	·48	7	85·1	−17·6	20
APRIL	29·90	55·9	39·1	47·5	+2·6	66	18	31	2	1·50	38·2	−0·26	12	·84	21	173·1	+25·2	29
MAY	29·96	62·0	45·3	53·7	+3·5	77	17	35	8	2·35	59·6	+0·23	11	·99	11	170·3	− 0·8	28
JUNE	29·91	63·5	47·1	55·3	−0·6	78	12	37	6	2·35	59·6	+0·38	16	·53	18	172·7	−25·4	29
JULY	30·04	68·9	49·7	59·3	+0·4	80	1	39	17	2·21	56·2	−0·79	14	·55	1/31	238·3	+71·9	31
AUG.	29·79	65·0	50·2	57·6	−0·2	72	22	39	26	2·74	69·7	−0·52	14	·79	7	133·8	− 9·9	27
SEPT.	29·90	59·4	41·5	50·5	−3·0	67	13/14	31	6/28	0·90	22·8	−1·51	15	·33	24	127·1	+ 4·0	27
OCT.	29·73	53·4	39·2	46·3	−0·9	66	2	24	11	2·45	62·1	−0·61	23	·53	22	103·9	+18·7	26
NOV.	29·95	44·0	31·5	37·8	−3·4	55	1	14	30	1·61	40·9	−1·25	18	·32	20	51·3	− 2·2	19
DEC.	29·71	40·9	30·0	35·5	−2·5	51	9	15	1	2·45	62·2	−0·51	22	·28	20	33·2	− 0·7	15
Total or Average for Year.	29·86	53·8	39·0	46·5	−0·4	...	...	...	...	22·95	582·9	−7·71	187	...	...	1439·0	+105·8	292
Highest,						**80**	**1/vii**							**·99**	**11/v**			
Lowest,								**11**	**30/1**									

ABSTRACT OF METEOROLOGICAL OBSERVATIONS, PERTH, 1953.

MONTHS.	BAROMETER.	AIR TEMPERATURE °F.								RAIN.						SUNSHINE.		
		Mean of		Mean of A and B.	Difference from Average. 1883-1953.	Absolute Maximum and Minimum.				Total Fall.		Difference from Average. 1883-1953.	Number of Days.	Greatest Fall in 24 Hours.	Day of Month.	Total Amount in Hours.	Difference from Average. 1917-1953.	Number of Days.
		Maximum (A).	Minimum (B).			Maximum.	Day of Month.	Minimum.	Day of Month.									
	Inches.	°	°	°	°	°		°		ins.	mm.	ins.		ins.				
JAN.	30·01	45·0	32·5	38·8	+1·6	57	28/29	18	4/5	·55	14·0	−2·21	12	·25	30	*64·6	+25·6	22
FEB.	29·99	47·1	34·4	40·8	+2·8	58	17	21	3	·80	20·4	−1·45	18	·18	13	87·9	+19·3	23
MAR.	30·32	52·0	33·2	42·6	+2·1	62	22	24	5	·72	18·2	−1·42	7	·28	28	158·8	+56·1	29
APRIL	29·80	50·9	34·6	42·8	−2·1	65	23	25	10	2·03	51·5	+0·27	19	·33	8	154·8	+ 6·9	27
MAY	30·02	62·1	44·9	53·5	+3·3	76	5	34	2	1·67	42·5	−0·45	16	·31	25	157·6	−13·5	27
JUNE	29·99	65·2	48·8	57·0	+1·1	78	25	35	5/6	1·82	46·2	−0·16	19	·32	26	169·2	−28·9	24
JULY	29·73	66·3	51·5	58·9	—	74	1	45	11	3·98	101·1	+0·97	24	·98	16	117·8	−48·6	28
AUG.	29·92	67·4	50·5	59·0	+1·2	73	7/8/12	43	22	1·67	42·4	−1·59	21	·48	20	123·7	−20·0	28
SEPT.	29·80	63·8	49·8	56·8	+3·3	75	7	43	14	2·54	64·6	+0·15	19	·52	17	103·4	−19·7	21
OCT.	29·99	55·4	41·7	48·6	+1·4	65	2	27	29	1·16	29·5	−1·86	19	·26	23	68·1	−17·1	18
NOV.	29·83	50·8	39·3	45·1	+3·9	57	15	30	3	3·67	93·3	+0·81	26	·70	12	37·2	−16·3	19
DEC.	29·99	46·8	35·8	41·3	+3·3	55	2/3	23	16	3·67	93·1	+0·71	27	·99	3	32·1	− 1·8	13
Total or Average for Year.	29·95	56·1	41·4	48·8	+1·8	...	...	...	...	24·28	616·8	−6·23	227	...	...	1275·2	−58·0	279
Highest,						**78**	**25/vi**							**·99**	**3/xii**			
Lowest,								**18**	**4/5/1**									

* Highest on Record.

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