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MEN OF SCIENCE IN NINETEENTH-CENTURY NEWCASTLE

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IN 1838 the citizens of Newcastle transformed their town into a conference centre, with all the related facilities for accommodation, catering, lecture halls, assembly areas and excursions to places of interest. The occasion was the visit of the British Association for the Advancement of Science. Founded in York in 1831, the Association had the declared object of promoting exchange of ideas among those who cultivated science. Subsequent meetings had been held in Oxford, Cambridge, Edinburgh, Dublin, Bristol and Liverpool.

There already existed in Newcastle an infrastructure of science. In 1802 the Literary and Philosophical Society had launched a programme of science education through its New Institution for Permanent Lectures; courses on chemical and physical topics were held, at first in the Society's library and later in the Long Room of the Turk's Head Hotel. Following a public meeting at which George Stephenson presided, the Literary, Scientific and Mechanical Institute was founded in 1825, membership at twelve shillings a year being open to persons of twenty years and older. And at a more professional level, eight Newcastle doctors combined under the leadership of John Fife to set up a School of Medicine in Bell's Court in 1832.

A deputation of local lovers of science attended the Liverpool meeting to invite the British Association to meet in Newcastle in 1838; among those who made the journey were the Rev. William Turner, secretary of the Literary and Philosophical Society, William Hutton the geologist, James Findlay Weir Johnston, reader in chemistry at Durham, and John Adamson, lawyer, typographer and naturalist. The invitation was endorsed at a public meeting in the Guildhall on 8th October 1837. The British Association was to visit Newcastle on three occasions during the nineteenth century, and the different patterns of the meetings throw much light on changes in the town and its scientific population.

Once the invitation had been accepted, the Corporation and the scientific fraternity realised the magnitude of the task that they had set themselves. For in 1838 the state of the town was far from stable. The redevelopment plan of Grainger, Dobson and Clayton was not completed, though Grey Street, Blackett Street and Eldon Square were finished, as were the major parts of Grainger Street and Clayton Street which embraced the New Markets; but all round the town building operations were still much in evidence. Local government, too, was in a transitional state, for the reformed Corporation brought into being in 1836 by the Municipal Reform Act had not yet completed two years of office.

First, beds had to be found for the visitors. The inns were quickly booked, and lodging-house accommodation largely proved unsatisfactory because, urged on by the panic of scarcity, many keepers of such establishments priced themselves out of the market. Recourse was therefore made to private hospitality: "Many gentlemen, including the Mayor and other distinguished and respectable individuals offered the use of beds, some of two, others of three, four and even five". To limit local demand, tickets ceased to be issued to citizens of Newcastle unless they became life members or offered to accommodate visitors. In the event, this enhanced the reputation of Newcastle enormously: "a most favourable impression has in consequence been diffused over the length and breadth of the land, of the open-heartedness and hospitable character of the inhabitants of Newcastle, which will long be remembered to the credit of their Northern Metropolis".¹

The next problem concerned catering. The Turk's Head Hotel agreed to provide breakfast from eight till ten o'clock each morning at a price of two shillings. The Committee felt that a number of communal dinners each day would enable members to continue discussions begun during the scientific sessions, and made enquiries accordingly. The hotels, however, were unwilling to commit themselves to a single fixed price and so the Committee decided to organise catering on its own behalf. The Riding School or Circus in the Forth, a large bare brick building, was converted into a dining hall for five hundred guests. The Committee engaged cooks and waiters, arranged the hire of crockery and cutlery and negotiated the purchase of food and wine from local dealers. Gentry living in the county promised to send in quantities of game and several deer. The dinner or "ordinary" cost seven shillings and sixpence including wine and service.

Lecture rooms were easily arranged because of the existence of several cultural and scientific societies, all sympathetic to the enterprise; indeed more rooms were offered than the planners required. Section meetings were arranged in the lecture room of the Lit. and Phil., the New Music Hall in Nelson Street, the magistrates' room in the County Court, the Academy of Arts in Blakett Street and Surgeons' Hall at Manors. Other societies, and many private business concerns, offered rooms for public exhibitions.

Large evening assemblies had become a popular feature of British Association meetings, and for these Newcastle was well found. The Green Market, which at that time contained two fountains, was specially decorated and prizes were offered to encourage stall-holders to embellish their premises. Modifications were also made to the Assembly Rooms in Westgate, and to the newly opened Central Exchange Newsroom. The official report of the meeting said that "in no town hitherto visited has the general accommodation for the Sectional and Evening meetings been provided on so magnificent a scale".

The meeting opened on 18th August and ran for a week, but the reception room was open from 16th August in the Savings Bank (then in the Royal Arcade). Here lists of lodgings, tickets for excursions, programmes and other help were available; members of the reception committee wore red ribbons in their buttonholes. Section meetings were held in the mornings, works visits and other excursions in the afternoons, with

dinner at five and general assemblies at eight in the evenings.

The Mayor gave a ball in the Assembly Rooms at which 1,200 were present, and three hundred distinguished guests were entertained to a *fête champêtre* at Ravensworth Castle. But the most popular evening events were the soirées and promenades in the New Markets which attracted 3,500 people.

A new feature introduced at the Newcastle meeting was an exhibition of models and products of industry. Large numbers of plans and architectural and geological models were contributed by the architects John and Benjamin Green and Thomas Sopwith, civil engineer and mine surveyor.

Most of the speakers at the scientific sessions came from outside the area. The chief local contributors were J. F. W. Johnston (6 papers), and Thomas Sopwith (6 papers). John Buddle and Nicholas Wood made observations on mining, Benjamin Green described the construction of the timber viaduct over the Ouseburn and Hugh Lee Pattinson outlined his new process for recovering silver from lead. Similarly the presidents of the sections were drawn from the distinguished visitors, with one exception: the Medical Sciences Section had chosen for its president Dr. Thomas Emerson Headlam, Mayor of Newcastle. In fact the British Association was indirectly responsible for Headlam's election to the Mayoralty, for it was felt in the Corporation that the occasion demanded a man of culture, distinction and scientific knowledge. His success in 1838 led to his election again in 1845 when the Royal Agricultural Society visited the town.

Eighteen factories, together with a number of collieries, opened their doors to the visitors; there were also geological excursions. The Society of Antiquaries announced that their Librarian would be available in the evenings to explain the collection of Roman antiquities, whilst the Lit. and Phil. boasted that their rooms would be lit by gas in the evenings.

A small profit was made on the whole undertaking, largely because most of the lecture rooms were lent without charge. The Committee was able to report: "But to one individual—the renovator and beautifier of Newcastle—the British Association owes a larger debt of gratitude than she has ever had occasion to express before to one person, at any of her annual assemblies". Mr. Grainger had refused payment for the use of his suite of rooms in the Central Exchange, specially altered for the meetings, or for his New Music Hall and Lecture Room. It is fortunate that he did, for two parts of the organization had made losses. The "ordinary" in the Riding School lost £270 on 2,400 meals, due simply to undercharging by the Committee which was inexperienced in these matters. The evening promenades in the New Markets also lost money due to a combination of over-lavish provision of refreshments (tea, coffee, ices, fruit, negus etc.), and a human factor hinted at in the report: "It afforded considerable occasion for ridicule and censure . . . of the behaviour of parties whom it is impossible to exclude from so large and promiscuous an assemblage".

We cannot be certain about the extent to which scientific life in the town benefited from the Association's visit. It seems likely that the very popular Polytechnic Exhibition of 1840, also held in the New Music Hall, enjoyed a fillip from the "wise week"; such, at least, is implied in Thomas Wilson's poem "A Glance at Polly

Tecknic".² It is also likely that the founding of the North of England Mining Institute in 1852 was connected with Thomas Sopwith's call for the preservation and collection of mining surveys and records, made before the Geological Section.

Twenty-five years elapsed before the British Association returned to Newcastle and during that period several significant scientific and technological changes took place. The chemical industry grew in importance until Tyneside had become the major chemical producing area in the country, and many innovations of national and international importance originated locally. The Medical School was incorporated into the University of Durham in 1852, bringing university teaching of science to the town.³ The reader in chemistry was Dr. Thomas Richardson, a pupil of Liebig, founder of the Blaydon Chemical and Manure Works, and a consulting chemist with an analytical practice in Portland Place. Thus the earliest academic teaching was linked with commerce and industry. Pharmacy was taught at the Medical School by Barnard Proctor, a nephew of Michael Faraday and the first Newcastle pharmacist to qualify as M.P.S. by examination in 1853. The pharmaceutical community in the town had been greatly strengthened by the partnership between John Mawson and Joseph Wilson Swan, started in 1846. And in 1847 William George Armstrong had launched the engineering business at Elswick in which his inventive genius was to find apparently limitless scope.

By 1863 therefore Newcastle had a well-developed scientific life, intimately linked with the industries of the region. But two other factors were to contribute to the extraordinary success of the 1863 meeting. The Mayor of Newcastle for that year was Isaac Lowthian Bell F.R.S., a manager in the chemical industry and the leading authority on the science of iron-making. This circumstance ensured an identity of interest between the scientific community and the management of the town; and Bell led the Chemical Section at which he was also a prominent speaker. The rarity of the situation was alluded to in a speech by Sir Roderick Impey Murchison (director-general of the Geological Survey) at the close of the meeting: "It is very remarkable that we should come to so enlightened a town that the Mayor of it should be capable of presiding over the Chemical Section". The second important factor was that the British Association had chosen for its President Sir W. G. Armstrong.

These circumstances mark the major difference between the 1838 and 1863 meetings. In 1838 eminent scientists came to Newcastle to share their knowledge with local folk. In 1863 the visitors came to sit at the feet of Newcastle men who were the acknowledged leaders in their respective fields. Apart from the pure science content, the meeting was an industrial seminar of the highest quality, with Joseph Cowen speaking on fireclay, C. T. Maling on pottery, Spencer on steel, Swinburne (whose firm at South Shields made half the glass for the Crystal Palace) on glass, Lowthian Bell on iron, Sopwith on lead, Nicholas Wood on mining, Richardson on chemicals and Palmer on shipbuilding. Members were able on the one hand to hear Palmer's account of Admiralty trials on iron-clad ships, and on the other to witness Armstrong's experiments on guns for piercing that same armour plate.⁴

But the major scientific contribution was Armstrong's Presidential Address, majestic in its broad sweep and fascinating in its detail. Touching upon safety in mines,

smoke control, shorthand, the decimal system, the centigrade temperature scale, Darwinian evolution, spectrum analysis, exploration, meteorology and transport, the address dealt mainly with energy sources. Armstrong brilliantly stated a fundamental scientific truth in simple language which needs no alteration today: "That small pencil of solar radiation which is arrested by our planet, and which constitutes less than the 2,000-millionth part of the total energy sent forth from the sun, must be regarded as the power which enabled the plants of the carboniferous period to wrest the carbon they required from the oxygen with which it is combined, and eventually to deposit it as the solid material of coal. In our day, the reunion of that carbon with oxygen restores the energy expended in the former process, and thus we are enabled to utilize the power originally derived from the luminous centre of our planetary system".⁵

On the duration of coal supplies he said: "The question is not how long our coal will endure before absolute exhaustion is effected, but how long will those particular coal seams last which yield coal of a quality and price to enable this country to maintain her present supremacy in manufacturing industry". In consequence of this speech, the British Association set up a committee to examine the probable duration of the high quality seams.

An exhibition of industrial products was once more staged in the Central Exchange. Among the items on show were an Armstrong gun and a block of silver worth £8,000 recovered from lead at the Elswick Lead Works, using Pattinson's process which he had revealed to the 1838 meeting. Other marvels were displayed to the town at large. A telegraphic relay enabled the clock in Edinburgh Observatory to fire a time gun on the roof of the Castle each day at one o'clock, and simultaneously to release an iron ball over the clock dial outside Messrs Reids' shop in Grey Street. The Society of Antiquaries was unhappy about the presence of the gun, and a councillor complained that it kept bad time.⁶

A *soirée musicale* was held in the new Town Hall at which Mr. Charles Santley sang and Dr. William Reay, the municipal organist, played variations on "God Save the Queen". There was also a very popular microscopical evening in the Central Exchange for which several local enthusiasts lent their slides. A public lecture by Professor A. W. Williamson of University College, London, on the chemistry of a battery drew a crowd which filled the room to an uncomfortable degree.

The reception room was again in the Savings Bank, by then established on its present site in Grainger Street. Copies of the *Newcastle Journal*, carrying announcements of each day's arrangements, were distributed free to members. For the excursions the railway companies issued return tickets at single prices.

The scale of works visits was much increased. Eleven chemical works, ten glass and pottery works, nine shipyards, eight engine and iron works, three firebrick yards, two roperies, two lead works, two papermills, two quarries, a gas works and a steel works were open, in most cases without prior appointment. Advice on travel to the works included the direction "steamer to Walker". On the Sunday, ordained members of the British Association preached in most of the larger town churches.

It is a measure of the importance of the meeting in the life of the town that the Mayor proclaimed a half holiday on Monday 30th August, and business generally was

suspended. At six in the evening Mr. Coxwell made a balloon ascent from the Cricket Ground in Northumberland Road. At the closing gathering in the Town Hall it was reported that 3,356 tickets had been sold for the meeting which was the most successful that the Association had ever held.

The third British Association meeting in Newcastle took place in 1889. During the preceding quarter of a century several local industries had passed their peak of development and had experienced depression and decline. But it was also a period of advance in the dissemination of scientific knowledge. In 1868 the Newcastle Chemical Society was formed to foster an exchange of ideas between those engaged in the chemical industry. Its membership was wider than the title suggested; for it included men such as Armstrong, Lowthian Bell, Palmer and Swan.⁷ Three years later plans for a university college which had gestated for decades came to fruition in the founding of the College of Physical Science; the four foundation chairs were in chemistry, physics, mathematics and geology.

The public library movement had started, not without opposition, in 1872 and by 1880 the library had absorbed from the Mechanics' Institute not only the science books and apparatus but also its teaching function. Dr. J. H. Rutherford opened his technical school in Diana Street in 1885, and in 1888, the school having been transferred to Bath Lane, it received the desks, apparatus and models from the library.⁸

The Natural History Society had possessed a museum since 1829, but in 1884 the present Hancock Museum in Barras Bridge was built, making the fine collections available to a wider public. Also in 1884 the Tyneside Sunday Lecture Society began to bring eminent speakers, including scientists, to the Tyne Theatre in Westgate Road. In the Jubilee Exhibition held in the Bull Park in 1887, one of the sections was devoted to science and education; there was a special class of entry restricted to artisans. Finally, the Technical Education Act of 1889 allowed the Corporation to assist technical schools in the city by means of a rate not exceeding one penny.

By 1889 the professionalisation of science was far advanced, and the local leadership of the meeting passed from the scientific industrialists to the professors at the College of Science and the College of Medicine. P. P. Bedson (chemistry), G. A. Lebour (geology), H. Stroud (physics), H. M. Merivale (mining), T. Oliver (physiology) and Rutherford Morison (surgery) were examples of the rising academic influence. Lowthian Bell and Charles Parsons represented the diminishing industrial leadership.

The speakers were also academic scientists. Many of the great names in late nineteenth-century science, including Sir Oliver Lodge, Lord Rayleigh and Johnstone Stoney (who first suggested the term "electron") addressed the sections. Other distinguished speakers were economist Sidney Webb, explorer Dr. Nansen and archaeologist Sir Flinders Petrie.

Local scientific contributions came from Joseph Wilson Swan, Isaac Lowthian Bell, John Pattinson (first Public Analyst of Newcastle), Professors Bedson, Lebour and Potter, and Alderman T. P. Barkas, a self-taught expositor of science. Dr. Thomas Oliver spoke on industrial health, Spence Watson on the difficulties of arbitration and Dr. Rutherford on technical education.

The industrial content of the lectures was very much smaller than in 1863, perhaps

because of the troubles which industry was bearing. The Great Depression of the 1870s had left its mark on Tyneside, and the reports were generally gloomy. Glass, chemicals, lead, engineering, fireclay and tanning were all described as being in considerable decline.⁹

There were areas of growth here and there; Cookson was able to report favourably on antimony and Curt Netto of Wallsend was positively enthusiastic about aluminium.¹⁰

The excursions were mostly of a scenic, architectural or archaeological nature, to such places as Mitford, Wallington, Bywell, Hexham, Durham, Alnwick, Bamburgh, Holy Island and the Roman Wall. Nevertheless, the Tyne Improvement Commissioners were able to promise—weather permitting—the lowering into place of a concrete block towards the completion of Tynemouth Pier.

The lecture halls and meeting places, too, were changed. St. George's Drill Hall, often used for exhibitions, now served for the general assemblies. Section meetings were held in the adjacent College of Medicine (the building recently vacated by the Dental Hospital), the Durham College of Science (now the Armstrong Building on the University campus), the Grand Assembly Rooms in Barras Bridge, several church halls in the vicinity of the Drill Hall, and the Public Library in New Bridge Street.

The Public Library did more than accommodate a section. Col. Sir Francis de Winter, President of the Geographical Section, requested 97 reference books to be placed on the table during the meetings and the Library was able to supply 94; the President affirmed that London could not have done better.

A lecture on the Forth Bridge, specially intended for working men, drew a crowd which more than filled the Drill Hall. Lord Armstrong entertained leading members of the Association in the Banqueting Hall in Jesmond Dene, and a civic reception in the Hancock Museum attracted 2,600 people. As in 1863, scientific clergymen preached in local churches.

Each afternoon the Mayor held an "At Home" in the Mansion House. This aspect of the meeting had occasioned sharp discussion in the Council.¹¹ In 1881 when the Stephenson Centenary was held in June and the Institute of Mechanical Engineers met in the town in August, the Mayor's allowance had been raised from £300 to £1,300. Arguing from this precedent, and urging that "the visit of such an Association could not fail to have beneficial results for the whole community", Alderman Stephenson moved a special grant to the Mayor of £500. There were protests that such calls for extra expenditure were becoming too frequent, and counter-protests that £500 was not enough to do justice to the town's reputation. The Mayor, however, said that the sum would be sufficient "with what he himself would spend", and the motion was carried.

So ended the last of the nineteenth-century meetings of the British Association in Newcastle, quietly successful with an attendance of some 2,500. The three meetings had done much to bring before the public in these parts the breadth of the world of science, the grandeur of scientific themes, and sometimes the pecuniary advantages of the cultivation of science. But the meetings also gave Newcastle the opportunity to put on show its buildings, its magnificent countryside, the innovative capacity of its

industrial leaders, the skill and craftsmanship of its working people and—above all—the warm, welcoming nature of the Novocastrian character.

NOTES

¹ British Association Papers, 1838. Newcastle University Library.

² *Allan's Illustrated Edition of Tyneside Songs* (1862); reprinted Newcastle (Frank Graham), 1972, 273.

³ Proceedings of the Town Council, Newcastle, 1851–2, 70.

⁴ The complete programme is reported in Proceedings of the Town Council, Newcastle, 1862–3, lxi–lxxix.

⁵ Armstrong, W. G. (ed.), *Industrial Resources of Tyne, Wear and Tees*, Newcastle, 1864, xix. All the

industrial papers are reprinted in this work.

⁶ Ref. 4, 392. there was also a synchronized time gun at North Shields.

⁷ Campbell, W. A., *Chemistry and Industry*, 1968, 1463.

⁸ 8th Report of Public Library Committee, Newcastle, 1888–9, 12–13.

⁹ *Handbook to Industries; British Association Official Guide*, Newcastle, 1889, 142, 189, 219, 235.

¹⁰ *Ibid.*, 129, 133.

¹¹ Newcastle Council Reports, 1888–9, 351; a report on the whole meeting appears at lix–lx.