The Export of Industrial Technology to Eastern Europe from Carron in the Late Eighteenth Century: Russia & Silesia

Geoff B Bailey

When the Carron Ironworks was established in 1759 Scotland was still a rural country. Despite the use of steam engines in a handful of pits, it was technologically backward and its inhabitants reflected the pre-industrial culture. They were ignorant unskilled workers, unwilling to adopt new working methods and content to earn enough to survive upon. There was no enterprise culture, except amongst its merchants, and there were no large manufacturing plants to compare with those in other countries. Scotland's main chemical product, salt, was produced in a traditional manner organised as little more than a cottage industry.

From its conception the Carron Ironworks relied upon foreign expertise. Even refractory bricks could not be made locally and like the hearthstones and timber axle for the water wheel had to be imported from England. Whilst Cadell saw to the day-to-day management of the works, the other two founding partners, Roebuck and Garbett, scoured England in search of the right sort of hard-working knowledgeable foundryman whom they tried desperately to entice northwards. William Downing, a carpenter, millwright and bellows maker was poached from a foundry in the Midlands along with his fellow countryman Thomas Bowne. They were told to bring only two of their workmen, as the intention was to "*train Scottish labour for future use.*" As was usual, they brought with them family members to help and Downing's nephew was put in charge of the millwrights. The Cadells were aggrieved that the Company was employing English craftsmen rather than Scots. Garbett was blunt "*It would be egregious folly to venture any other way… but I hope when these men have built us one furnace, that we shall be able to build another without them"*. The English tradesmen were not to know that the unskilled labourers that they were to train were to replace, rather than to augment, them at the earliest convenience. They had to be bribed with high salaries to venture into what they, and many others, perceived to be a little-known uncivilised country far from their native land. After all, it had only been 13 years since the last Jacobite rebellion. As late as June 1762 these English mercenaries were taunting the Scots about their country and its customs. They were rebuked in the customary fashion – a fight broke out.

To run the new works men from the Coalbrookdale area were recruited. This region of Shropshire had led the world in the development of ironfounding technology, in particular in the use of coke instead of coal

as a fuel. The men chosen were at the cutting edge of this ongoing revolution and were keen to use the latest structures at Carron to continue their improving experiments. This opportunity may have been part of the lure. The furnacemen Thomas Cranage, George Munro and John Onions were amongst the first to arrive. They were all respected specialists. Cranage later returned to Coalbrookdale, where he developed a method for making bar iron using coal. That such innovation was being encouraged at Carron is shown by a patent of 1762 taken out by Dr Roebuck himself, in which he claimed to have manufactured malleable iron using pit coal.

After the furnacemen came those who were to oversee the moulding and casting floors – John Dodds, Thomas Ingle and Peter Price. Robert Hawkins from the Bersham Works in the Dale was to receive £100, the same as the manager of the Carron Ironworks, to teach Scotsmen "*the art of boring cylinders and grinding sad irons*." The cylinders were for steam engines and Carron intended to develop this new market.

English miners, nail makers, engineers, etc, followed – and so the poaching of skilled artisans continued. Men were even sent back to English foundries to inspect and then copy the machinery that they found there. Fathers and sons were employed so that they could hand their skills and knowledge on. There were so many Englishmen working at Carron that for a while it became known locally as the "English Foundry".

Through many trials and tribulations Carron became a centre of excellence – the most famous foundry in Europe. As well as inventing the carronade it was well established in new designs for architectural and engineering castings. Experts liased with the Company in the production of new inventions and improvements to existing machinery. Industrial spies and foreign dignitaries visited the works with an envious eye.

GASCOIGNE

Illus 1: Charles Gascoigne.

One of the areas in which Carron led the world was in steam engines. Through engineers such as John Smeaton and John Rennie they had improved the efficiency of existing models and were able to market the knowledge. In 1773 Charles Gascoigne, the new manager of Carron, received a request from Russia for a pumping engine as well as a large order of guns. This came through Sir Charles

Knowles of the British Navy, who was then serving in the Russian Navy. The returning engine was to replace a windmill for pumping water out of the military dry docks at Kronstadt and was designed by Smeaton. At that time trade with Russia was encouraged under a treaty agreement. The engine was despatched in 1774 and was accompanied by Carron men who were to supervise its installation and train the Russians in its use. The men comprised four smiths, four stonemasons and two carpenters under the chief engineer Adam Smith. By the time that work was completed in 1776, Knowles had been replaced by Admiral Samuel Greig, a native of Inverkeithing. Adam Smith and a blacksmith named William Bruce agreed to remain in Russia permanently.

In 1784 Admiral Greig renewed his acquaintance with Gascoigne when he placed an order for 432 cannon of a new light constructed design. By this time the political environment between the two countries had worsened and the Russian authorities had become convinced of the need to improve their own foundries to house an independent arms manufacturing base. In 1782 Empress Catherine had appointed Greig as an observer to the Alexandrovski Works in Petrozavodsk on Lake Onega. She then entrusted him with the task of enlisting British expertise in this field and it was only natural that he should look to Carron and its manager. Gascoigne was reputed to have had a hand in the development of the carronade, though this was more as a facilitator than as an inventor. What was more, in spite of all his hard endeavours at Carron, Gascoigne was in dire financial straits. His estates at Abbotshaugh and Gairdoch had been sequestered to pay the creditors of the failed Carronshore shipping company of which he had been manager. After years in administration these were put up for sale in October 1783. The country mansion that he had built for himself at Carronshore had gone with the estates and he lived in rented accommodation in Edinburgh (NAS CS96 – 3725, p.83). He had even once been arrested in London by his creditors there (NAS - CS96/3725, p.43) and all further visits to England had to be conducted in secret (eg HRC Forbes archives 185/5). Moreover, some of the other partners in Carron, particularly Ambrose Tibbats, were beginning to question Gascoigne's transactions for the Carron Company.

The gun order of 1784, valued at £3,400, was despatched in August and was followed by small orders over the following two years. This kept a channel of communication open between Greig and Gascoigne. Slowly the nature of the trade changed. First it was parts for blast furnaces. Later it included patterns and then plans and instructions for casting and boring cannons. British legislation prohibited the export of machinery and expertise and early in 1786 Gascoigne was called to appear before the Lord Advocate to answer for his actions. After confessing his naiveté in sending sensitive items for the manufacture of instruments of war to a foreign power he was pardoned. Despite the political and legal brakes on the situation he continued the Russian project and in April that year he announced his intention "*for going over to Russia to assist in Regulating the foundry of guns in that Kingdom*."

The project was also commercially sensitive and could mean the loss of large orders from the Russian government. Despite this the Carron Company agreed that Gascoigne should go to Russia, but understood that he would return before the winter. Why he or they felt that his personal presence was necessary is uncertain. It has to be assumed that Carron Company, through Gascoigne, was negotiating for a financial stake in the Alexandrovski Works. He left for Kronstadt in May 1786 on the "*Empress of all the Russias*" with twelve craftsmen to help to install the equipment sent from Carron.

Having delivered the agreed team of experts to undertake the appointed tasks the "*Empress of all the Russias*", commanded by Andrew Strathearn, then returned to Carron. This time its operations were more clandestine. They were discovered and on 9th September the Edinburgh Evening Courant announced to the nation that:

> "*We hear that a number of artificers have lately been discovered and brought on shore from on board a ship at Carron, bound for Russia, and committed to gaol; and that a vessel loaded with fire clay bricks in the Frith has either sailed or is on the eve of sailing for the same quarter - contrary to act of parliament. Too much attention cannot be paid to so dangerous a traffic, and it cannot be doubted but that an immediate scrutiny will be made into this transaction, by the gentlemen to whom that business belongs, as the commerce and manufactures of this country will be most materially affected by it.*
>
> *We hear that the workmen have since been liberated, but the person who was employed in inveigling them is still detained in gaol*."

Andrew Strathearn, Archibald and James Heugh were accused of "*enticing artificers from Carron Works… to Russia, or other foreign parts, to the prejudice of the manufactures of this kingdom*." All three failed to appear in court and were fugitated in their absence. Amongst the artificers were James Harley, John Eadie, John Swan and William Muirhead. The wheel had turned full circle. Carron Company in the 1760s had been the poacher, now it had turned gamekeeper.

In Russia Gascoigne was rebuilding the Alexandrovski Works on the same lines as Carron. He did not return to Carron that winter, giving as his excuse that the icy winter had set in, preventing his sailing. Instead, he negotiated a generous salary for himself. His intention to stay is evident from the long-term nature of the productivity bonus that he secured. This gave him 50% of any savings on production costs. In 1789 his salary was £2,500, which compared favourably with the £700 received by his replacement at Carron.

The specialists who arrived with Gascoigne in the *Empress of all the Russias* included Adam Armstrong, his assistant and translator (who had tutored Greig's children in Scotland and had acted as a negotiator to get Gascoigne to leave Carron); Josiah Roebuck, a chemical metallurgist; Charles Baird, cannon-turning master; George Clark,

Daniel McSween, John Glen and James Walker, masters of various unspecified processes; William Brown and James Russell, cannon-boring masters; and Timothy Roper, model master. Gascoigne's task of rebuilding the Alexandrovski Works and the Konchezerski iron foundry, some 25 miles away, was enormous and he needed further skilled foremen. Alexander Smith had come to Russia in 1783 to help his father to run the Kronstadt engine. He now joined Gascoigne as the works' mechanic. Gascoigne found the Russian workmen to be unreliable and encouraged Greig to find more British artisans. "*At Carron*", he wrote, "*in every new thing my method was to engage the best workmen that could be procured for money to make a beginning & I never once failed by taking that method*" (Cross 1997, 252). Before long he was sent the person who was to become his 'Principal Furnace man', a Mr Barlow, who had secretly left Carron. Barlow was "*intimately acquainted with every thing appertaining to Blast Air and cupola Furnaces*".

Illus 2: Map of Europe showing places mentioned in the text.

The following spring the Scottish contingent built their own homes in Petrozavodsk. Before long they had created a distinct community, part of which became known as the "English Street". In April Alexander Ingram returned to Scotland to bring back his own and George Clark's families, as well as Gascoigne's second daughter Mary. Mary arrived at Kronstadt in July 1787, en route to her father's residence. She stayed

with Nicholas Belaoff, a major in the Russian navy and secretary to Admiral Greig. He, Gascoigne and Greig kept in regular contact (NLS Ms10946 f105, 108 &127). They also corresponded with Thomas Graham of Airth, Gascoigne's childhood friend. Barlow's family came out the following spring.

Gascoigne was performing a delicate balancing act. He was still dependent upon Carron for shipments of machinery and parts and was anxious not to be seen to be enticing away Carron employees. It was important not to displace Carron Company's trade in cannon until his own foundries were regularly producing reliable armaments. Consequently Gascoigne asked Greig to talk to Her Imperial Majesty about "*an order for some Guns or Carronades to Carron Co*", explaining that "*the Country in Scotland are outrageous gainst the Company & me, under the notion that we are doing a national prejudice to Scotland & they universally say the Co may expect no more Encouragement from this Empire, consequently so strict is every Eye upon us in Scotland, that I cannot get some very necessary Hands, & Instruments, which otherwise the Company could not object to (& that is truly the case) & the Country would not observe us were the Company doing business in the Gun way for HIM*". The orders continued – as did the influx of skilled men. John Taylor arrived in August 1787 and Gascoigne informed Greig that he was "*a Man I did not want but will not be the less usefull only I fear my Friends at home may suppose he came out at my instigation; tho he never wrought with Carron Company, at least for years past he wrought several years with me as Master Ship-Blacksmith at Carron Wharf and is a masterly & industrious workman*" (Cross 1997, 253).

The Alexandrovski cannon foundry became one of the major suppliers to the Russian armed forces. Work at the reconstruction of the nearby foundry at Konchezer was finished in 1789. In that year Gascoigne was given control of another foundry at Kronstadt. With his financial and technical interests growing rapidly he left Josiah Roebuck and George Clark to manage it. In 1801 Gascoigne established a further foundry and put Mathew Clark, George's son, in charge of it. By this time Gascoigne had already successfully restructured major textile production plants. In 1797 he was commissioned to supply the new machinery and steam engines for the Imperial mint. It was completed in September 1799 and all the medals and coins minted in St Petersburg until 1805 came from it.

Gasciogne was well rewarded for his work in Russia and lived in considerable splendour. From Catherine he received the Order of St Vladimir (3rd class). At Tsar Paul's coronation he was gifted 2,000 serfs. In October 1798 he was raised to the rank of actual state councillor and later given the order of St Anna (2nd and then 1st class).

THE BAIRDS

The situation at the Alexandrovski Foundry that greeted Gascoigne and Charles Baird in August 1786 is well described in the letter below. This was written by Charles' brother, James Baird, who joined them from Carron in October 1787. Its tone probably echoes what the English thought when they first came to Carron.

Letter to John Rennie, engineer, at London.

"Petrozavadskoy May 12th old stile
Sunday 1790

My dear Friend,

The unaccountable appearance wch my silence for above 3 years must have with you, the unfavourable impressions wch you must in consequence thereof entertain of me, & my consciousness of having allowed our correspondence to drop on my side, have altogether pressed upon me so heavily for many months back, that our post, wch is here to St. Peterb: once a week, has never gone away without my feeling very effectually the awkward, & aparently unfriendly, situation in which I stand towards you. When one finds himself indebted to a friend as a correspondt: he naturally seeks an opportunity to repay Him at least two fold, this has literally been my situation, and however strange it may seem you may believe me when I tell you, that your obliging letter of so ancient a date as the 31st March 1787 wch I received at Mount Cn during the hurry of my preparing to leave my native Country, has from the very time I became settled here till this very moment, lain exposed in my desk for the express purpose of reminding me that I ought to answer it. Now my dear Sir were I to enumerate the many difficulties I've had to encounter since receipt of your letter, I know your goodness of heart would find me excused, but as such a detail would not well be brought within the compass of a letter, and would require much more time than I'm sorry I have to spare (indeed except Sunday I never have an hour I can call my own) I must take it for granted, that when I lay my hand to my heart & tell you that my silence has not been occasioned by any want of respect, the accot: twixt us will be settled so that with a firm resolution to be as punctual for ye future, as circumstances may permit, I take ye liberty to renew our Correspond:ce wch I fondly flatter myself will prove as agreeable to you, as I know it will be to myself.

Your letter of 1787 wch lyes before me I fully intended myself the pleasure of answering personally in new Surry Street some time in the course of that Summer, but having been detained settling my Carron Concerns 'till ye beginning of Septr., I was obliged to embark with my Wife & little Daughter (then only 4 months old) at Grangemouth, and after an uncomfortable passage of 5 weeks, 14 days at St Petersburg, & 8 days on the road hither, we got safe to this remote corner of the world ye last day of October, just as the Winter was setting in. Since that time my wife has

blessed me with a fine Boy now 14 months old, and thank God notwithstanding of the intense cold in Winter, and the extraordinary heat of our Summers, we have all enjoyed that inesteemable blessing Health, in as perfect a degree, as we cou'd reasonably have expected even at home. This together with my having been fully employed, & well & regularly paid have made ye 2 1/2 years I've been here pass pretty tolerably. From my calling this place remote, you'l perhaps think it more so than it really is, & therefore for the honour of our Fabrick I must tell you, that altho' we have ye Lake Onego on the one hand, & surrounded by woods on ye other, yet ye City of Petrozavodskay, created ye Capital of the Province of Olonetz soon after ye British came here, is not much further from us than Bainsford (where you pass ye Canal going to Carron) is distant from Falkirk. It stands upon four times as much ground as Falkirk, running along the Banks of the Onega, & I suppose 'tis in point of population somewhat more than double. Ye houses we Scotch Colony inhabit, form a very handsome Street, wch goes by ye name of the English Line, detached from ye Town, built of wood, & lately linned within, & faced without wt Brick & plaister'd in such a stile, as wd do honour to some towns in England.

'Tis now full time that I give you some account of our Fabrick, wch bears ye name of Alexandrowskay Zavad (or Fabrick) it was erected at a very great expense about 20 years ago, consisting of a very complete pile of excellent Brick Work 133 feet long, 90 feet Broad, and ye walls 55 feet high - in wch there were 4 old Constructed Blast ffurnaces (blown by as many pairs of large Bellows <u>all of wood</u>) intended for the Casting of Cannon. The rest of the Buildgs were all wood, ye chief of wch were, a very awkward clumsy Forge, as badly constructed as ye business was ill understood. A Bor.g Mill contain.g 4 Carriages for B.g Guns each of wch was accommodated wt a small water wheel. & a spacious Magazine containing hardly any thing but Bad Guns, when Mr Gascoigne now Sir Charles, & my Brother arrived in Augt. 1786, and at that time ye whole was in very bad order, & ye Business so much upon ye decline, that in place of Casting 100 Guns a year, wch ye R'ns make us believe they once did, they cou'd only send to Proof about a Gun a week, few of wch Stood, & half of those that did stand were full of Holes and unfitt for Service. The first thing Mr G. did was to rebuild one of the B. Furnaces agreeable to the English proportion for Charcoal ffurnaces (for you may well imagine we use nothing but charcoal in our B: F's) and to errect a proper Blowing Machine. These together with a couple of Air Furnaces, & a 2d B:F: Errecting and the B.g Mill House errected 12 feet by 40 within, was the state the Fabrick was in when I arrived. My Brother havg undertaken the Blast ffurnace Department, the Errection of ye Boring Mill Machy I found waiting for me to begin wt, and I did so the very day after my arrival, wch I arranged as follows: We had sent from Carron a most Capital Axis of cast iron, constructed for a wheel 7 feet wide, to this breadth we built ye water wheel, ye

diam. 18 feet only, wch I've since rather repented, it was placed exactly in ye middle of ye Ho... cross ways, and upon each end of the axis I connected 5 cast iron Teeth Wheels, (some of wch were sent from Carron, but ye most of them cast here) so that we have 10 different Movemts., & I can say without vanity 'tis ye most complete Boring Mill in Europe. I have made many alterations & several improvements in ye Ways Carriages & Stools, as well as in ye Bars & Cutters, wch being rather out of your line I shall not at present enter into, let it suffice to say that we succeeded so well, that in 4 months Feby 1788 we had one movemt. ready, and bored a 30 pr Gun pretty accurately, that is in such a way as Guns are generally bored in Britain, but this did not satisfy me. I had long had a desire to bring Gun Boring to some degree of perfection, for as your Engine is your Hobby Horse, so is Boring mine, and great labour both in body & mind has it cost me. My success you'l be able to judge of when I tell you, that from ye 1st July last year to the 1st Janry 1790, we bored 260 Guns 36 - 30 & 18 pounders, not one of wch had any defect of consequence in the Bore, & what is equally surprising all except 7 Stood Proof. They were all 4 only excepted so straight in ye Bore (all above 9 feet long) as to admit from Muzzle to Breach a turned Cylinder of Cast Iron 3 feet long, & in Dr. only 1/20 below ye respective Calibers. at Carron where ye Machinery is recknon'd pretty tolerable, I very well remember, one Gun being spoiled in 10 was thought nothing of. During ye above half year not above one half of our Movemts were in action. In ye months of Jany & Feb we bored on our 10 Carriages above 200 Guns. On purpose that our Movements might go as regular as possible we have lately errected upon the same level wt our Boring Mill, being upon ye Tail water of our Blast Furnace wheels (head & fall 11 feet. Our Blast Furnace wheels are 24 feet wt a head of 3ft 10 ins. So that we have in all a head of 38 feet 10 ins, and plenty of water) a Mill wt 5 Movemts for Curing ye Gun Heads & Turning ye Guns, & it is wt great ease we can turn out 100 Guns a month. But I have at present been too long upon my Hobby. Besides my letter gets too large.

We have now in all 4 B.Furnaces, & a small Essay Furnace blown by 2 Machines, from any of wch, in case of accident we can blow the whole. We have 7 Air Furnaces for Guns & 4 for Artillery Stores & Goods. At present we are busey with a Forge, also upon ye Tail water, & are this year to sett about a wheel for Turning our shot moulds, cuting Elev:g screws for our Guns & c & c.

Since Augt last year my Brother has been at Cronstadt superintending some Air Furnaces we have lately errected there for ye casting of Artillery Stores, ye want of him hurries me very much. If He or I can be of any service to you in this Country pray let us know.

You may have perhaps heard that your old man George Sherriff has found his way hither, after assisting a Mr Mitchell in puting

up an Engine at Copenhagen He wrote Sir C.G., but without waitg an answer He came upon chance, wch as one of our Scotch Mill Wrights had just left us to go home happen'd more fortunately than He had any reason to expect. I told Him I was writing to you, & ask'd if He had any thing to say to his old Master. His answer was that He wd always have a great respect for you, & wd send you his Compts, but as He was sensible He had not used you altogether well at ye time of his leaving you, He was afraid you wd not accept of them.

By a letter I've lately had from home, I find that my Brother Frank a young man not yet 20 (who' was some time wt me at Carron), after serving an apprenticeship at Glasgow as a joiner & house carpenter has from the request of a friend inclined to serve our family engaged himself in ye service of ye Muirkirk Co Airshire, wt an intention after viewing ye principal Founderies in Shropshire & c, of taking ye Managemt of these Works. Last post brought me a letter from Him partly written at Dublin, where He had been wt my intimate friend Mr Gillies of Dalnotter one of ye Partners, & find at Liverpool in April, where another partner Mr Roberton had met them, & writes me that they were then on their way to Colbrookdale, & that He was to remain in that neighbourhood for a considerable time (I suppose for 3 or perhaps 4 months) and expected to be a good deal with Mr John Wilkinson of Brosely. I once had ye pleasure of dinning (at his own house) wt this King of the English founders, but you may well imagine, I cannot upon so slight acquaintance use ye liberty to write Him in behalf of my Brother. I do not know whether you are acquainted wt Wilkinsons but I'm sure you must have many acquaintances at & about ye Dale. May I solicit your sending him any recommendations you can wt ease and conveniency. Wch by ye bye I hardly deserve at your hand, but I know you are a good Christian, & will repay Evil wt Good.

I have another Brother Hugh, a stout fellow who served his time along wt Frank. If you are in want of Workmen, for I know you are partial to your Country men drop a line to my father....

My dear Sir,
Your sincere friend and hble servant,
JAS BAIRD."

(National Library of Scotland, MS19827, f9-11.)

Charles Baird had been born at Westerton, Bothkennar, a farm owned by the Gascoigne family. He was originally baptised Gascoigne Baird in January 1767. His father, Nicol Baird, became a toll collector and then superintendent of works for the Forth and Clyde Canal. Hugh Baird, his younger brother, also became an engineer, notably constructing the Edinburgh and Glasgow Union Canal. Charles Baird started his working life in 1782 as an apprentice at the Carron Ironworks.

By the age of 19 he had a supervisory post in the gun department, and in 1786 he accompanied Charles Gascoigne to Russia to establish the Aleksandrovsk gun factory at Petrozavodsk, and a cannonball foundry at Kronstadt.

Gascoigne Baird came to be known as Charles Baird, perhaps to avoid confusion with Charles Gascoigne, and had his change of name to Charles Baird officially sanctioned by the church authorities in Scotland in February 1792. After his success at Alexandrovski, Charles Baird went on to conduct business on his own account. He was involved in the construction and reconstruction of several Russian foundries. In 1792 he set up in partnership with Francis Morgan and two years later married Sophia, Morgan's eldest daughter. Their St. Petersburg business became known as the Baird Works (Russian: Завод Берда) and specialised in steam-driven machinery. It supplied machinery for the Imperial Arsenal, Mint, and glassworks, and undertook a range of projects from bridge-building to ornamental metalwork. These included the first cast iron arch bridge in Russia in 1805. Baird also had a sugar refinery using his own innovative method of refining.

A letter of 1805 contains an interesting description of his career and character:

> *"about 14 years ago [he] had acquired sufficient property & knowledge of the country under Mr Gascoigne to venture setting up for himself as founder, forger, Steam-Enginemaker & c, but, has chiefly been connected with the Board of Admiralty. He also undertakes all the Ironwork for the Mint-Department, & has done a great deal for us there… He is about 40 Years of age – certainly very active & intelligent, - knows the Russian language well, which, rest assured is a very essential point & a work of time:- is pretty intimately acquainted with the Mechanical Professors in general, both Russian & Foreigners – also with many of the principal Nobility; & with the proper mode of applying the Key to the private Doors of the Chief-Officers in most of the Govt Departments."* (Cross 1997, 260).

Illus 3: Charles Baird.

In 1815 Charles Baird also started the first steamship passenger services in Russia, between the capital and Kronstadt, with a vessel called *Elizaveta* which was constructed at his works. He soon acquired the monopoly on passenger and freight traffic, earning him a large income. He was honoured for his achievements.

Lubecki, the founder of the Bank of Poland, visited Charles Baird's munitions foundry near St Petersburg in 1811. He was greatly impressed and decided to recruit such hard-working Scots to develop the Polish economy. David, one of Charles' sons, set up a successful

engineering works in Lublin, Poland, in 1817. At this time Scotland was going through a post-war depression and it was easier to recruit Scots directly from their native country than to entice them from well-paid positions in Russia.

Baird's business was operated by Russian serfs, some of them extremely skilled in fine ornamental metalwork. His son Francis and nephew William Handyside made important contributions, with Francis carrying the Baird Works forward after his father's death. Charles Baird also brought other engineers from Scotland to work with him. Handyside took the lead in the firm's work with Montferrand, and another nephew, Nicol Hugh Baird spent a few years in St. Petersburg, later becoming a noted engineer in Canada. Other Handyside brothers came to work in Russia, including Andrew Handyside.

Charles Baird was known for his business skills as well as his technical ability, and his achievements were recognised both in Britain and in Russia. In 1841 he was elected to the Institution of Civil Engineers, and he received the title of Knight of St Vladimir in Russia. He died on 10 December 1843 and is buried in the Smolensk Lutheran Cemetery.

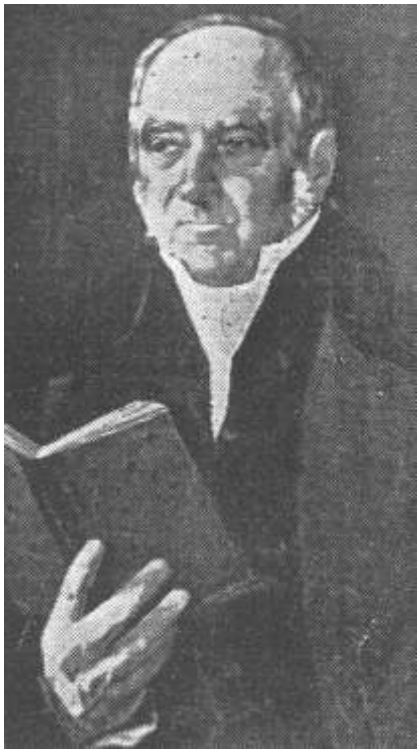
SHERRIFF

George Sherriff, mentioned in the fifth paragraph of James Baird's letter, was another Carron man. He was the eldest son of Thomas Sherriff, a wheel and cartwright who moved from East Lothian to the Carron area in 1760 in the wake of the work produced by the new company.

Thomas Sherriff married Margaret Cowie of the parish of Airth in around 1761, and by her had a family of four sons and three daughters. Of the former, William Sherriff emigrated to Philadelphia, from whence he did not return. Thomas Sherriff, born in Larbert parish, December 1776, settled in Glasgow, where he died and left a family. Another son, Alexander, and a daughter Mary, seem to have died in early life.

George Sherriff was born in Stenhousemuir on 8th May 1768. At an early age he entered the service of the Carron Company. This was a period of considerable progress in technology, and a time when Scotland was producing many of the best inventors. He must have taken a keen interest in the rapidly developing science of engineering and in particular the improvements being carried out on steam engines. At any rate, aged only eighteen years, George Sherriff obtained employment with Messrs Boulton and Watt at Birmingham. There he remained for two years learning the trade. Then, in 1789, John Rennie the engineer was asked to erect a Boulton and Watt engine in Copenhagen. The work on site was to be supervised by Mr Mitchell, aided by George Sherriff. By this time there was already a large contingent of Scots workmen in Russia, employed by the Imperial Government. George saw an opportunity to join them. That autumn he turned up at the foundry at Petrozavodsk, where the Scots had been

given the task of improving production. As luck would have it, the Scottish millwright had just departed for his home country and so a job was available.



Illus 4: George Sheriff.

Sherriff's arrival was indeed timeous. Gascoigne had been tasked with supplying a steam engine for draining the Voitski gold mine. Production of the parts was already well in hand at the Alexandrovski foundry and Sherriff was able to supervise their completion. Within a few months the machine parts were ready and despatched to the mine, where Sherriff assembled the engine. It began operating on 19th July 1791, but broke down the following day. There were problems with the castings, but Sherriff was able to keep the engine running, if somewhat intermittently. He was released at the end of 1792 with a testimonial to his satisfactory work. He stayed in Russia, gradually amassing a substantial sum of money. Whilst still in the service of Russia, on 12th September 1792, he married Sarah Roper of Kirkcaldy. She was the daughter of one of Gascoigne's original artisans. Sarah died shortly after giving birth to a daughter, Sarah, on 26th September 1793 at Petrozavodsk. This Sarah died in Glasgow on 13th July 1855.

In 1797 the steam engine from the Voitski gold mine was transferred to the Imperial Mint in St Petersburg. Gascoigne sent Sherriff from Lugan to install it. In a letter of 23rd September 1799 Sherriff is mentioned as a "*man of great skill in the construction of steam engines which he has completed at the Bank mint*" (Cross 1997, 441). This brought him to the attention of the Royal Family. From Tsar Alexander 1st he received the gift of a tortoise-shell snuffbox with the Emperor's portrait in gold relief on the lid. The Emperor Nicholas gave him a large silver medal or medallion.

At the end of 1799 Sherriff decided to return to Britain. His place at the Mint was taken by Joseph Major and Sherriff was asked by him to approach Boulton and Watt for an estimate for the supply of a rotative steam engine from their Birmingham works. Before long Sherriff was back in his native county. He had experienced the dynamic industrial expansion of the Russian economy and felt that the same policy could be implemented at home. So, in 1804 he feued some thirty ells of the lands of Dalderse, and erected thereon the Dalderse Iron Foundry. To be close to his new works he took sasine of a further two acres of Dalderse lands, called Pow Flatt, and erected Abbotshaugh House.

George Sherriff also took an active role in the local community. In particular he helped to raise funds for the erection of the Grahamston Subscription School, which was completed in 1810. He acted as Preses of the committee's meetings, and gave substantial donations of his own. He also contributed to the funds for the building of a new steeple in Falkirk. In 1806, already a mason, he applied to join the Falkirk Masonic Lodge.

On 5th February 1808 he married for a second time, to Margaret Bell. She was the daughter of John Bell, a well-to-do merchant in Camelon, and Marion Cuthil. Dalderse Foundry closed sometime around 1810, many of the workers moving to the newly established Falkirk Iron Works.

About 1823 George Sherriff returned to St Petersburg, presumably to take up service with the Russian Government again. His son, Thomas, born in 1811, became an engineer in the Russian Navy before finally settling in Glasgow as an ironfounder. George William Sherriff, born 3rd February 1819, died in his sixteenth year. John Bell Sherriff, the third son, was taken to Russia in 1826. His first intention was to enter the medical profession, and for that purpose he began the study of medicine. This, however, he abandoned, and joined his uncle, Christopher Bell, in business in Glasgow. Latterly he started on his own account, and in 1857 purchased Carronvale in order to be near to his birthplace. He died there on 5th November 1896. Alexander Sherriff, the youngest son, was born in Russia. Mrs Sherriff died at his birth in April 1826, aged thirty-nine years.

On 10th December 1843 George Sherriff died, aged 75 years, and was buried in Russia, in the Tautilo Deravino.

THE BAILDONS

Amongst the many English specialists that Carron Company attracted northwards when it was struggling to establish its huge and innovative works in the 1760s was an engineer/metallurgist named William Baildon. He worked alongside the more famous John Smeaton in improving the performance of the works and was evidently a well-respected man. He had authority from Charles Gascoigne to order materials for the works (NLS Ms10876, f279).

William's second son, John, was born on 11th December 1772 and baptised in Larbert Parish Church. Four years later Adam was added to the family, and in 1781 William. It would appear that the eldest son died at a young age and so it was John who followed his father's trade. He was often at the Carron Works with his father getting hands-on experience of the ironfounding process. In this way he learnt the practical skills essential for the running and maintenance of a modern coke fuelled furnace. The formal side of John's education was not neglected and he was instructed in mechanics, hydraulics and elementary and assembly drawing at Stirling by Daniel Manson. On

12th October 1787, aged 15 years, he received a good reference from his teacher and presumably started working full time at Carron.

In 1789 Count Frederick Wilhelm von Reden and Johann Frederick Wedding (the Prussian inspector of industrial buildings and an expert on transport) were visiting Britain on behalf of the Prussian Government in a search for the latest iron smelting technology. They were particularly interested in the design problems and performance of large coke furnaces. As well as inspecting and noting the practices and plant at a number of foundries they, like Carron Company before, realised that the key to the industry lay in the hands of certain skilled tradesmen. Indeed, there were many agents of foreign governments in Britain at this time with the express purpose of poaching trained manpower. Only three years earlier Charles Gascoigne, the manager of the Carron Company, had gone to Russia with some twelve Carron tradesmen, including Charles Baird. Despite his youth, John Smeaton recommended John Baildon to Count Reden and arranged a meeting.

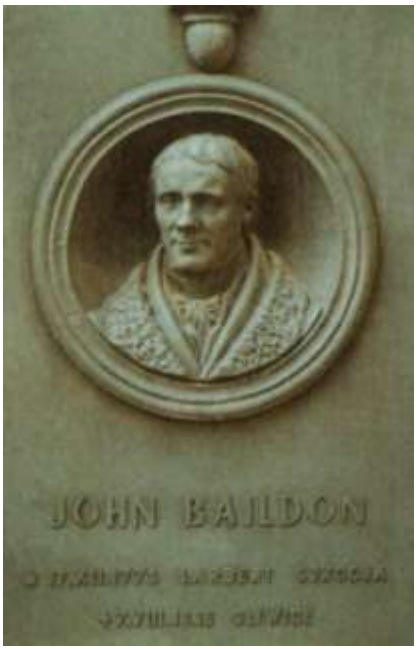
Illus 5: Painting of John Baildon with an ironworks in the background.

Reden decided to build a modern foundry near Gliwice in Upper Silesia. The site would be close to the new Klodnicki Canal, which would carry goods by the River Oder to Szczecin [Stettin]. On 12th July 1792, a cousin of Count Reden informed John Baildon of Reden's readiness to negotiate a contract with him and for him to start work in Silesia immediately after the construction of the Klodnicki Canal had begun. He advised John to gather any drawings and plans that would be useful in the construction of the foundry. With letters of recommendation from Crawford of Carron and Ralph Harrison of Newcastle, John Baildon set out on his journey to the "*unknown and densely wooded country*". In April 1793 he went to Edinburgh and was in London the following month. By 1st July he was in Wroclaw [Breslau], in September he was in Buchowiec [Bachwald] near Koware, and in November he reached Tarnowskie Gore, the headquarters of the Ministry of Mines. In March 1794 he was at the Malapanew Foundry, which had been established in 1754. From here he prepared the designs for the furnaces of the new "Royal Iron Foundry" [Krolewska Odlewnia Zelaga] at Gliwice. He also oversaw the construction work of this, the first blast furnace on the European continent to use coke. It produced 2.5 tons of pig iron per day. This completed, in 1800 John Baildon made a significant contribution to the design of the Royal Metallurgic Plant [Huta Krolewska] in Chorzow. Chorzow had become the main coal-producing area in southern Poland during the 1790s. The huta was a thoroughly modern plant with a greatly enhanced

output capacity. Production started in 1802 and continues as the Koshciuszke Iron and Steel Works.

Illus 6: Baildon's works at Gliwice.

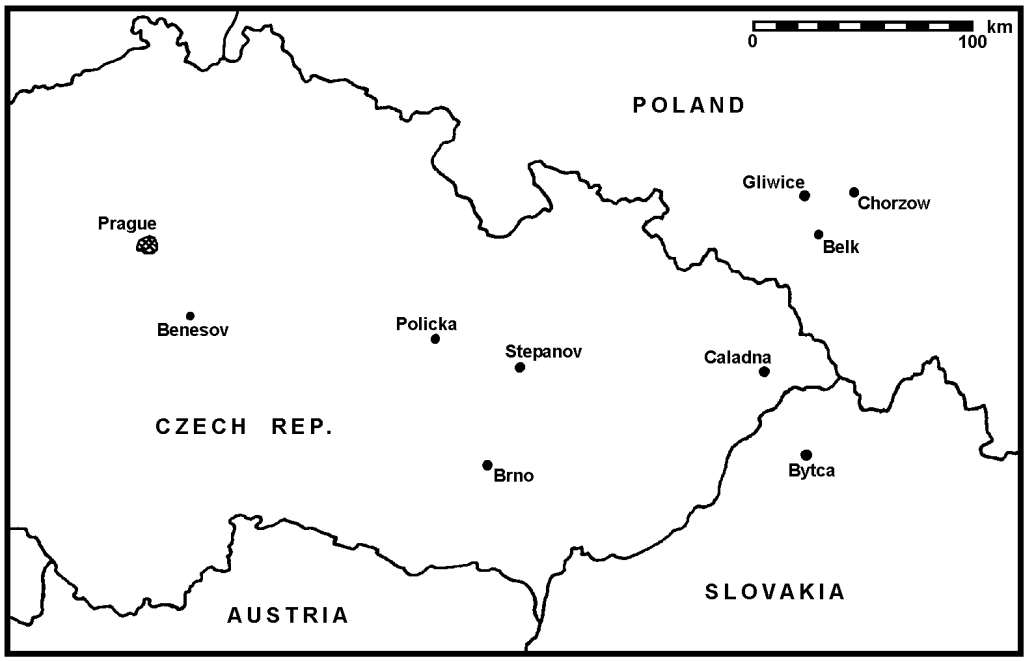
In 1804, still at Gliwice, John married Helena Antonia Jozefa Galli, the daughter of a rich merchant. He soon invested his part of the family fortune in industrial concerns throughout the area and was able to work outside the state controlled iron industry. Meanwhile, in 1796, John had arranged for his brother William to move to Stepanov near Tisnov [Brno] to help him to start an ironworks for the Homolacs. The two families worked closely on the establishment of the new works. John and William Baildon, together with Jan Vincent and Edward Homolacs expanded the enterprise and became partners in foundries at Benesov on the Cerna in Bohemia, at Policka and in Celadna. Relations between the Baildons and the Homolacs became even closer when William married Ruzena, the daughter of Jan Vaclav Homolacs. These proved profitable and provided John Baildon with the opportunity to set up a large works of his own. He chose a place called Dab near Bytca (at present Welnowiec), where he had considerable shares in the zinc ore. His partners in the new venture were Jocef Doms - a merchant, Wilem Homolac from Frydland - an industrialist, and Adolf Wenzel from Wroclaw - another merchant. It took five years, but on completion the foundry complex included seven puddling furnaces and a rolling mill. John designed steam engines for his works and other industrial purposes. He received the gold medal of the Academy of Sciences in Prussia for one of the engines that was in use. He also designed cast iron bridges, the sections of which were made at Gliwice.



Illus 7:
Baildon's grave monument in the Metallurgists' Cemetery, Gliwice.

Over the years John and his wife had five sons and two daughters. They lived in style in residences at Gliwice, Belk, Kopienice, Lubie (where the "palace" has the West Yorkshire Baildon family coat-of-arms over the main entrance) and Pogrzebien. One daughter, Maria, married Count Alexander von Strachwitz.

Adam Baildon, the third brother, became a doctor and worked for the East India Company on St Helena, where he died in 1815 at the age of 39 years. William Baildon died on 27th August 1833 of pneumonia. His widow, Ruzena, died in Graz on 2nd January 1855. John Baildon remained active until the last days of his life. He died on 7th August 1846, far away from his Scottish homeland, and was buried in the Metallurgists' Cemetery in Gliwice.



Illus 8: Map showing some of the places in Silesia associated with the Baildons.

John Baildon set the Silesian iron industry on its modern course, giving it a 20 year head start over neighbouring countries. With his brother, William, he pioneered the industry in the Czech country and Bohemia. From these locations their innovative processes gradually spread and to many the Baildons are seen as the fathers of modern iron and steel production in Eastern Europe.

Bibliography

Bara, J.L. (2000) 'A loose cannon – Charles Gascoigne in Russia', Calatria 14 (Spring 2000), 73-80.

Centrum Dziedzictwa Kulturowego Gornego Slaska (1996) John Baildon.

Cross, A.C. (1997) By the Banks of the Neva. Chapters from the lives and careers of the British in eighteenth century Russia.

Love, J. (1928) Antiquarian Notes and Queries.

Mcleod, M.K. 2000 Agent of Change. Scots in Poland 1800-1918.

Paley,W. (1912) Baildon and the Baildons: the history of a Yorkshire manor and family.

Watters, B. (1998) Where iron Flows Like Water! A new history of the Carron Iron works: 1759-1982.

Watters, B. (1999) 'Charles Gascoigne and the mistress of Elphinstone', Calatria 13 (Spring 1999), 81-84.

HRC – History Research Centre, Callendar House.

NLS – National Library of Scotland.