The B.I.G. Journey
The evolution of a non-toxic printmaking process

Andrew Baldwin

In 1986, I joined the Visual Art Department, which later became The School of Art, at Aberystwyth University as a senior technician. One of my early responsibilities was to look after the general running of the printmaking studios. It was here that I was introduced to etching. I instantly fell in love with this process. Some of the attraction for this printing method was inevitable as three generations of my family had been involved in some way with ink, paper and metal in their professions in the printing industry. From a child, I had always been confident in my ability to draw. Yet, as I matured as an artist, I became increasingly aware that there was a lack of personality and feeling in my art. With seemingly little effort, I discovered that the mere process of developing an image through this new medium brought life to my images. So, it was that a lifelong relationship with this intaglio process began.

In these early days, the process I had been introduced to was very much a traditional one, using nitric acid to etch zinc and occasionally copper. In 1994, The School of Art moved to new premises in The Edward Davies building, the former chemistry department. This was an excellent building for printmaking as it already had a fume extraction system that could be used for the etching process. However, within a year of moving to these new studios, I became aware that certain issues of concern were beginning to reveal themselves. It was clear that contamination from the etching process was appearing throughout the studio. Gas masks used by students when plates were too large for the fume cupboards, and which were hanging in the studio, needed their rubber straps replaced regularly as these were breaking down and turning to dust. Most of the metalwork in the studio and the surrounding area was showing significant evidence of rust. But probably the biggest issue from a personal point of view was that I was beginning to show what I eventually discovered were signs of toxic poisoning from the nitric acid; the enamel on my teeth was breaking down and I was suffering from recurrent headaches and sore throats.

The most revealing evidence that there was contamination from the nitric acid in the room was from the condensation droplets on the studio walls. Once tested, these proved to have high concentrations of nitric acid. It had been assumed that the cause of this contamination was inadequate suction from the fume cupboards. However, it was later discovered that it was occurring due to the overly extensive pipework from each booth, which travelled through another room and then outside vertically above the height of the building. When the extractor fans were turned off, the gas that remained in the pipe dropped back into the studio, contaminating the air. This problem and the subsequent discoveries of the many other health issues that traditional

Figure 1

Figure 2

Figure Titles and Information

Figure 1: Extraction system and contamination from nitric acid
Figure 2: Wet Ground experiment

etching causes kick-started my interest in researching a cleaner and healthier environment for my students and me to continue our passion for making etchings. The B.I.G. journey had begun!

Like most other printmakers, I confess that before I began my investigation into the dangers of etching, I was ignorant of the toxicity of many of the products I was using to make a print. Ferric chloride has been used for many years to etch both zinc and copper, yet many artist printmakers prefer to continue using nitric acid. I suspect that ferric chloride has not become the preferred mordant in many print rooms for several reasons. For example, it can stain surfaces and is considered to be inferior by many for spit bite. Additionally, through its opacity and the general use of ferric chloride in a dip tank, the benefit of seeing the etching process is obscured, whereas nitric as a clear chemical causes none of these issues.

However, the supposed drawbacks of using ferric chloride are massively outweighed by its benefits over nitric acid. Firstly, ferric chloride does not require the installation of a costly fume extraction system. Secondly, once a batch of ferric chloride is mixed, it will last a considerable length of time, which reduces costs, and this reaps the benefits of the reliability of a constant etching time. So why do so many print studios, especially in the UK, insist on continuing to use nitric acid when it is more dangerous, more expensive and less reliable? Why do so many printmakers continue to use toxic etching grounds and carcinogenic aquatints? My experience has revealed that a reluctance to change and to embrace innovation is due to pressure from senior more experienced printmakers within groups. Individuals who have been achieving successful results that have taken many years to perfect are fearful they will lose that valued control if they adopt new practices. Furthermore, previous experiences of using a safer, less toxic process have resulted in the sacrifice of quality and reliability. For many, this has resulted in a lack of trust in new processes and materials. However, I suspect the answers to these questions are wider and more complicated, in part due to a particular cultural attitude. It has been well documented that although the UK is responsible for groundbreaking research across industries, the NHS, for example, has been criticised for being slow to adopt well-evidenced innovation. So, perhaps it is hardly surprising that the same unwillingness to embrace change exists within British printmaking.

It was with these considerations that I began to look for alternative materials and processes that could not only deliver a safer environment to work in but also maintain quality and, if possible, deliver even greater versatility within the medium. My early investigations into safer etching took me to Edinburgh Printmakers in 2001. They were one of the first studios to recognise and highlight the potential dangers of traditional practice in etching. They had developed an acrylic-based etching ground to replace the highly toxic traditional ground that contains arsenic, mercury and lead. They had also developed an acrylic spray aquatint. Edinburgh Printmakers were instrumental in converting me to the use of ferric chloride and

Figure 3

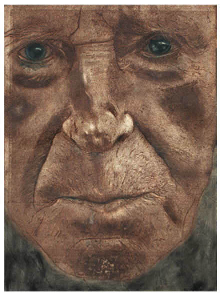

Figure 4

Figure 5

Figure Titles and Information

Figure 3: ‘Punch Drunk’ early coffee lift experiment
Figure. 4: ‘Stone Face’ first sandpaper aquatint
Figure 5: ‘A Great Read’ faux mezzotint

its benefits. Although their etching ground was far less toxic than the traditional ground, for practical reasons I struggled to make it work. It was difficult to remove, and it was suggested that potassium hydroxide, another extremely disagreeable chemical, should be used to strip the ground. However, 21 years later, I am still using many of the processes they introduced me to and for that, I am eternally grateful. I am also grateful that Edinburgh Printmakers now use my etching ground and are one of my greatest ambassadors in the promotion of B.I.G. and its associated processes.

The development of a safer etching ground was initially quite frustrating. The product needed to be strong enough to cope with the strongest mordants, sympathetic to the scratch of the etching needle and of course, contain no hazardous toxins. At times it felt as though I was working on the proverbial three-legged stool. I would be successful in two areas only to fail miserably in another. Finally, after much trial and error, I managed to produce a recipe that I was confident could stand up to the scrutiny of even the most seasoned etcher printmaker. I was fortunate in that from the onset of B.I.G.'s development I had an abundance of printmaker students available to trial its useability.

I had never considered developing B.I.G. for anything other than my use and that of my students. However, printmakers from other studios had heard about B.I.G. and were keen to try it in their studios; one of these was Edinburgh Printmakers. It was here that Liz Chalfin, the owner of Zea Mays Printmakers in Massachusetts, first used B.I.G. on a non-toxic workshop run by Edinburgh Printmakers. After the course, Liz contacted me and later spent a week learning about the versatility and safer characteristics of the ground. Suitably impressed, Liz took the ground back to Zea Mays, her non-toxic environment for printmakers in the USA. Once Liz and her studio had begun to run workshops, other private and educational studios in the USA wanted to use B.I.G. Takach, one of the largest stores of printmaking supplies in North America, were keen to stock it but due to US regulations, I had to first get B.I.G. analysed and tested by an independent laboratory to give it a certificate of safety. This was achieved at a considerable financial expense; however, it has proved to be worth the cost. B.I.G. is now widely used by printmakers around the world.

FURTHER RESEARCH AND DISCOVERIES

WET GROUND

Once I was confident that B.I.G. could perform hard ground line etching, I began to explore other ways in which it could be used safely. The first area of investigation was a soft ground alternative. As B.I.G. is applied wet and then cured in an oven it was clear how this could be possible. The initial challenge, however, was to find a way to reduce the amount of wet ground from lifting when passing the plate through the press, specifically in areas where objects were not placed. Using the same methodology as I used to develop the ground, I tried many different materials and processes. Eventually, I discovered that a sheet of screen-printing mesh coated with a thin layer of ground, laid on top of the wet grounded plate, would repel the ground in the open sections of the plate, thus reducing foul bite.

I went on to discover that while the ground was wet a multitude of other effects could be created. These included treating the wet grounded plate like a reduction monotype. By placing tracing paper over the wet ground and rubbing into it, varying tones could be created. Drawing on the tracing paper placed on the wet ground would also create effective pencil-like results. Once the ground is cured, the image can be further developed with ground hard techniques. The wet ground can also be exploited by using relief printing principles. For example, the grain of a piece of wood can be transferred to newsprint using B.I.G. and then offset onto a degreased plate. Once cured, a highly detailed negative image of the woodgrain is achieved. In this way, a range of interesting textures that are not usually achievable with the traditional soft ground process can be transferred to a plate.

COFFEE AND MOLASSES

I observed how difficult it is to remove a dried coffee stain from a kitchen worktop. This led me to discover that if I used instant coffee like India ink on the plate using a nib, brush or toothbrush, I could work similarly to the traditional sugar lift. Although the traditional sugar lift liquid is not toxic, it is a rather complicated and expensive recipe to obtain. Instant coffee, however, is something that most of us have in our kitchen cupboards and, with B.I.G., it led to consistent and reliable results.

I further wanted to be able to transfer textures and type to a plate but found it was not possible to offset instant coffee as I could with the wet ground. Further investigations resulted in the discovery that if molasses is reduced slightly with water, it behaves like ink. This allows the offset process to plate to be performed very much like the wet ground, except because it is used as a lift process a positive image can be obtained. This allows items such as movable type to be used to create positive images. Molasses can be used to screenprint an image onto a plate and then used as a sugar lift to create photo etchings and more.

SANDPAPER AND EMERY PAPER

Probably one of the most exciting discoveries I made when I was expanding the versatility of B.I.G. and attempting to increase safety was the discovery of sandpaper aquatints. The investigation into whether either sandpaper or emery paper could be used as an aquatint began when I discovered the prints of Martin Lewis, an Australian printmaker who moved to the USA in the early 1900s. I was instantly drawn to the beauty of his work and on investigation found that some of his prints were described as having incorporated sandpaper aquatints. This was an instant attraction to me, as it is well known that a traditional aquatint of powdered rosin is both toxic and explosive. I felt that if I could produce a working aquatint without the airborne particles this would eradicate these potentially dangerous issues.

My early experimental emery paper aquatints revealed great advantages over traditional aquatint. Firstly, there is the option to create a whole range of effective aquatints from the very fine to the more grainy aquatint, depending on what grade of emery paper is being used. Secondly, whereas, with a traditional aquatint, the tone is only achieved by length of time in the mordant, with this method tonal changes can be attained in two other ways. The first of these is achieved through the number of times the grounded plate is passed through the press with the emery paper on top. This was discovered by a happy accident when I did not cover the entire plate on a couple of passes of emery paper in my first experiment. You can see the contrast in tone in the top left-hand edge of Figure 4. The second is achieved by the amount of pressure on the press, as the plate and emery paper pass through. A graduated tone can be created by layering a wedge of newsprint under the plate to vary the pressure, and this is reflected in the graduated tone across the aquatint. I was initially baffled as to why this method had not been adopted more widely by others using the traditional ground, until I discovered that the sandpaper aquatint described by Martin Lewis was created by passing an ungrounded plate through the press as many as one hundred times. It seems that a traditional ground cannot stay on the plate with so many holes pressed through it in such proximity, something B.I.G. can cope with.

One technique using emery paper that I have been particularly drawn to is the faux mezzotint. A fine grade of emery paper is used to create an aquatint that can be etched to black. The plate is then treated similarly to a traditional mezzotint plate, gradually scaping back to reveal the image. This technique creates a deep velvety black through the effect of many holes etched in the plate holding the ink, similar to a mezzotint, whereas a traditional aquatint is created by lines created around droplets of resist.

There are many more ways of using B.I.G. to create safer etchings through the use of readily available and non-toxic materials. Icing sugar and bicarbonate of soda can be used for aquatints and lavender oil for marbling, and much more is still to discover. The B.I.G. journey is far from over.

(See https://www.nuffieldtrust.org.uk/research/falling-short-why-the-nhs-is-still-struggling-to-make-the-most-of-new-innovations.)

AUTHOR

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Andrew Baldwin started his career in 1976 working for 10 years in a small family commercial printing business where he was educated in the use of reprographics, letter press and litho. In 1986 he joined the staff of Aberystwyth University School of Art as senior technician. In 2001 he achieved 1st class degree in fine art followed by a PGCTHE where he was awarded an excellence in teaching award. As a tutor Andrew has been teaching printmaking for over 25 years and has travelled the world teaching and promoting safer printmaking techniques. He has attained several awards for his own printmaking, most notably Most Exceptional Artist at by the Federation of British Artists and the printmaking section of Welsh Artist of the Year. Andrew also runs his own Printmaking Studio 'Trefeglwys Printmakers' where he teaches non-toxic printmaking to guests from around the world. His etching ground BIG is now used by printmakers internationally.

IMAGE GALLERY

Figure 1: Extraction system and contamination from nitric acid
Figure 2: Wet Ground experiment

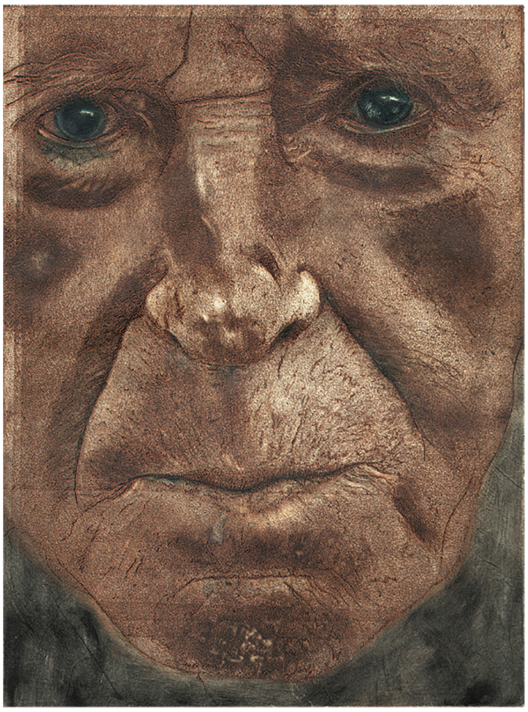

Figure 3: ‘Punch Drunk’ early coffee lift experiment
Figure. 4: ‘Stone Face’ first sandpaper aquatint

Figure 5: 'A Great Read' faux mezzotint