

## IN BRIEF

- Continues the description of the important historical record of Georgian dentistry found in the sketchbooks of J. M. W. Turner.
- Describes the technology found in a Georgian dentist's workroom.
- Suggests a model for Turner's drawings.

## Science and technology in Turner's Georgian dentist's rooms

M. Bishop,<sup>1</sup> S. Gelbier<sup>2</sup> and J. King<sup>3</sup>

Turner's painting of a dental surgeon's rooms, discussed in the first of these two papers,<sup>1</sup> is a very satisfying work of art, successful in its relaying of a domestic drama, and also fulfilling Payne Knight's commission to produce a work to equal that of the older masters. It cannot, though, be relied upon to show us what a late Georgian dentist's rooms actually looked like. For this we are very fortunate to have Turner's sketchbook, with its preparatory drawings for the painting.

Turner, in the words of the *Oxford companion to art*, 'continued throughout life his habit of making rapid shorthand pencil jottings which he used later as reminders for imaginative compositions of atmospheric and scenic effects'.<sup>2</sup> The seven sketches relating to *The unpaid bill...etc* do include three rapid shorthand jottings, with a further three fluid drawings, but the jewel among them is a more fully worked pencil drawing. (Fig. 1)

However disappointing the painting may be as a technical source, this is more than compensated for by these sketches. As related in the first part of this paper, Ruskin, acting as Turner's executor, disbound and numbered those notebooks of Turner's which eventually came to the nation, and possibly it was at this stage that the above 'dentist' page, the most historically useful, was separated from the rest, and was missing when A. J. Finberg compiled his *Complete inventory of the drawings of the Turner bequest* for the National Gallery in 1909.<sup>3</sup> As was men-



Fig. 1 Interior of a dentist's laboratory. At least two, possibly three machine tools are shown, with cast flywheels. Also shown are racks of hand tools. J M W Turner RA (1775–1851), pencil on paper, 115x190 mm, c. 1806–1808. By kind permission, Tate Picture Library.

tioned in the first paper, it has previously been reproduced, though without commentary, and without association with the painting, in the catalogue for the 1998 Tate exhibition *Turner and the scientists*.

It is known that dental laboratories existed under that name from at least 1760, when the 'Dentrifick Elaboratory of the celebrated Professor WEBB' in the suburbs of Oxford was recorded in the *London magazine*.<sup>4</sup> Turner's drawing and the other two sketches

showing interiors, give a unique opportunity to see what such an 'elaboratory' looked like. Even now, every detail gives a feeling of recognition which his painting does not give. In contrast to the painting, the room in the sketch is lit naturally by a typical Georgian sash window, and not by glamorous light falling through the decorative glazing of a window of an earlier age, it is heated by a coal grate rather than a log fire, and the machine tools are also 'modern', with lightly

<sup>1</sup>Queen Anne House, 2a St Andrew Street, Hertford, SG14 1JA; <sup>2</sup>The Wellcome Trust Centre for the History of Medicine, 24 Eversholt Street, London NW1 1AD; <sup>3</sup>St Bart's and the Royal London, Department of Human Science and Medical Ethics, Turner Street, London E1 2AD.  
\*Correspondence to: Malcolm Bishop, Queen Anne House, 2a St Andrew Street, Hertford, SG14 1JA.

fabricated spoked flywheels and not rusticated frames with heavy solid wooden flywheels, and so on throughout. The sketchbook illuminates the position of the dentist as a craftsman in an age of outstanding craftsmanship, just at the time when many of the activities needing the equipment shown were starting to move into dedicated industrial premises out of the dentist's laboratory.

**Location of 'Turner's' dental practice**

Records are good relating to locations of practices in London in 1808, and these records, and those from the eighteenth century, show occupation of premises for considerable periods, for example at 2 Frith Street, Soho, where de Chamant practised, or 32, St Albans Street, Pall Mall where Ruspini worked, extended occupation being a necessary condition for the establishment of a laboratory such as Turner shows.

The candidate for the model for the laboratory may be guessed at in that of Martin Van Butchell (1735-1814) at 56 Mount Street, Grosvenor Square. In and about 1800 Turner spent three or four evenings in Mount Street every week, at the house of William Wells, a water-colour artist and teacher of drawing,<sup>5</sup> and Van Butchell was so eccentric a figure, and so well known in London, that Turner could not have failed to know of him. Turner was interested in machinery, and in its accurate portrayal, as is well shown by the 1998 Tate exhibition already mentioned, and if he had seen the workshop in 1800 he would have known where to ask to sketch in 1806/1807, when he needed a model. Van Butchell's house was far from closed to visitors, indeed, at one time he exhibited the embalmed body of his first wife there, and of him it was later recorded that: *'amongst the number of his occupations, Martin Van Butchell was a good dentist, as a mechanic particularly'*.<sup>6</sup> To ascribe the workshop to Van Butchell is

also to explain the otherwise apparent over-equipping of the room, for in addition to his continuing dental work he made patented spiral springs for many purposes, as well as manufacturing surgical trusses and extending his surgical practice to the cure of fistulae.<sup>7</sup> Unless documentary proof of this association between Turner and Van Butchell emerges, it must remain a surmise, but one based on reasonable grounds.

It is assumed that many Georgian dentists carried out their laboratory work on site, but too many travelled the country following their patients during the 'season' for this to have been wholly the case, and this, and the personalities of some of the practitioners, indicates that already there would have been employment for what would now be termed dental technicians. It is hard to imagine Ruspini carving dentures, though easy to picture de Chamant shaping porcelain, so Turner's painting which clearly shows the dentist at work in his own well equipped laboratory, adds significantly to the understanding of the profession of the time. Thirty years later technicians were certainly employed, and in 1840, John Tomes made sure that he could do all his own laboratory work by undertaking a study of mechanical dentistry, though intending to employ the best artisans when set up in practice, and he mentions *'boys employed as dental artisans'*.<sup>8</sup> Language has changed, and in this context at the time a boy did not mean a male youth, but an unqualified (by apprenticeship) man.

No employer would have wished, or could afford, to see such an employee standing idle, so a dentist with a well equipped workshop was in a position to take in work from his colleagues once techniques advanced far enough for the impression to attend the laboratory, rather than the patient. For these impressions when not working directly from the mouth, the Georgian dentist employed beeswax, and cast the working models up in plaster of Paris, the technique which, along with the hinge articulator, is credited to Philip Pfaff (1716-1780), dentist to Frederick the Great of Prussia.<sup>9</sup> Two fine examples of models cast from such impressions can be found in the museum of the British Dental Association. One, by Isaac Wilson, who practised in Bath in 1817, on which a gold denture has been prepared (Fig. 2a), the other by an unknown dentist showing an unfinished ivory denture. (Fig. 2b)

**Capitalisation**

Like the surgeon, but unlike the physician, the dentist needs technologically advanced equipment with which to operate. In addition, there is for the dentist the expense and difficulty attached to the setting up of dental laboratory equip-



Fig. 2b A part completed ivory denture on the original plaster cast. LDBDA 3588. By kind permission, British Dental Association Museum collection.

ment and his operating environment. It is indeed one of the marks of the true dentist that he had to have access to specialist laboratory facilities, unlike a barber, apothecary, or retail chemist whose practice of dentistry was limited to tooth-drawing.

(Manufacturing chemists did need access to expensive technology of their own, and large steam engines, one of which, a Boulton and Watt of 1797, which operated in the heart of London at 66, Aldersgate Street to grind and prepare artists' colours, among other materials, is preserved as an exhibit at the Science Museum.<sup>10</sup> The extent to which the hearts of Georgian cities were industrialised is astonishing to the modern view, especially since the clean air acts of the mid-twentieth century.)

Turner has portrayed a dentist advanced in years, and has filled the room with the sort of clutter which takes a year or two to accumulate. To equip a dental laboratory to this level, with all the machine and hand tools and with the raw materials, both chemical, and of ivory and gold, would have been a costly enterprise. In some recorded cases a relative or a favoured apprentice was in a position to be taken on as an inheritor, but it appears from the records that several dentists started from scratch, and these would either have had to farm out their technical work, while raising capital from extractions and other work which did not require machinery, or raised the capital from money lenders to establish a laboratory. With the record of the enormous fortunes left by Peter Hemet Sr, £20,000 in 1747, and over £26,000 by Thomas Berdmore in 1785,<sup>11</sup> such loans to dentists might not have been too difficult to obtain.

Other accounts confirm that dental laboratory work could provide a substantial income. Of the Chevalier de Chamant it was said *'it is wonderful to relate, that although his charges were enormous, and the operation (as may be supposed) not the most pleasant, yet people could not resist the Chevalier's fascinating and drawing puffs; in consequence of which he soon became*



Fig. 2a A gold swaged denture with riveted ivory teeth on the original plaster cast. Made by Isaac Wilson of Bath, and said to have been worn by William, Duke of Clarence (1765-1837, later King William IV) LDBDA 3596. By kind permission, British Dental Association Museum collection.

possessed of a large surplus of capital... Some practitioners refused to publish their fees, on the grounds that different cases presented difficulties and expenses that could not be foreseen. The denture/obturator worn by the Irish statesman and philosopher Edmund Burke (1729-1797) shows both what Georgian dentists could achieve, and the difficulties they had to overcome. (Fig. 3) Others were prepared to publicise their charges, and lists of fees do exist for the time. Martin Van Butchell's fees in 1777 were £5 5s for a single artificial tooth, £42 for a full lower set, £63 for a full upper set, and £105 for a full over full set, which fees he insisted were to be paid in advance.<sup>13</sup>

Paul Euralius Jullion, practising in Gerard Street, Soho, listed his charges in 1781 to include fitting a single artificial tooth (ivory/bone/porcelain not specified) at 10s.6d (silk ligatures) 15s.6d (gold wire ligatures) or £1.5s.6d with gold springs. His charges for a full upper or lower set were ten guineas, and for a complete set with gold springs £25. If human teeth were used all the fees rose substantially, the full set to £73 10s.<sup>14</sup> From these figures, it is apparent both that a busy laboratory could pay its way handsomely, and that the dentist starting in practice had every incentive to excel in prosthetics.

For a comparison with these dental fees, it is of interest that Turner obtained his living accommodation and gallery at the Rev. Mr Hardcastle's House at 64, Harley Street, for £50-£55 a year in 1800,<sup>15</sup> and in 1807 Turner asked 100 guineas for the genre painting of *A country blacksmith...etc*, which preceded *The unpaid bill...*<sup>16</sup> In 1796 William Addis paid a rent of £34 a year for his toothbrush manufacturing premises at 52 Whitechapel High Street.<sup>17</sup>



Fig. 3 A denture/ obturator with side riveted human teeth. Maker unknown. Said to have been worn by Edmund Burke (1729-1797), the 'father' of the conservative party, LDBDA 3593. By kind permission, British Dental Association Museum collection.

Fig. 4 Various Georgian or undated period dental artefacts including a toothpowder pot and a lower denture. Silk dental floss was used, and the Addis company made the holders. The small rectangular containers were for toothpicks; these are the simplest type. Private collections, photography courtesy of Dr Louis Gaigher.



#### Contents of the flasks and vials, cupboards and drawers

It is not difficult to find material to fill the cupboards, drawers and brightly coloured containers in Turner's painting. For the dentures he made, the Georgian dentist needed plaster of Paris and beeswax, and a plentiful supply of ivory, (noted by Turner by his inclusion of tusks in the painting), and of human teeth, as well as gold sheet and springs. The sets of drawers built into the machine tools (Fig. 1 and Fig. 7) contained the exchangeable gears and parts for the turning lathes and grinding lathes. The racks on the walls hold the turning tools themselves. The other drawers and cupboards would contain boxes for dentures, pots for dentifrices, and also possibly the bills and flyers for which some practitioners were notorious, as *Real life in London* records: 'The practice of advertising and billing the town has become so common, that a man scarcely opens a coal-shed, or a potatoe-stall, without giving due notice of it in the newspapers, and distributing hand-bills: and frequently with great success. But our Doctors, who make no show of their commodities, have no mode of making themselves known without it. Hence the quantity of bills thrust into the hand of the passenger through the streets of London, which divulge the almost incredible performances of their publishers. A high-sounding name, such as the Chevalier de Chamant, the Chevalier de Ruspini ... are perhaps more necessary, with a few paper puffs...than either skill or practice, to obtain notice and secure fame'. This should not be taken as a genuine reflection of the character and behaviour of either principal named. A reputable practitioner of the sort Turner illustrates may have indulged in these practices, or may not, and Turner has included a long partly open drawer in the painting to which the parrot clings, and from which papers peep, but the true interest of the attack on the profession is that

the journalist has taken note of dentists (as Turner did), clearly associating them with professionals and not tradesmen, implying that they should know how to behave better, and thus starting the century long battle which eventually saw advertising as being regarded as disgraceful in a dental professional context.

Though Turner does show one book propped up flat in the dentist's wall cupboard, and a bulging portfolio of manuscript resting against the operating chair, books written by the dentist would probably not have been kept on site, as they were usually sold or made available through booksellers, de Chamant for example used Mr Dulac of Soho Square.

As for the pots and bottles, Ruspini, we are informed by Canton in 1851, filled his 'Crucibles pipkins and vials' with fragrant and colourful contents. For his dentifrice alone Ruspini used powdered orris root, Armenian bole, crabs eyes, pimento powder, rose pink and spirit of roses, rectified spirit of wine, essence of scurvy grass, cloves, ambergris, alum, sage, gallic acid, and zinc sulphate.<sup>18</sup>

As was noted in the first essay, the bar of a vice in the middle of sketch 76, with the jaws covered with a coat or cloth, seems in the painting to have become the outlet of an alembic distilling apparatus discharging into a pot, an impression reinforced by the coal hod having been 'moved' to a position beneath it. Although the vulnerable position shown is highly improbable in a real workshop, the presence of such a distilling arrangement somewhere on the premises is to be expected, as it was required for the production of distilled water and the 'spirits' and 'essences' added to dentifrices and liquid tooth-cleaners and breath fresheners. Jacob Hemet, of the great Hemet dental family, patented his process for the production of *Essence of pearl and pearl dentifrice* in 1773, and the abridged version given by Dr Hargreaves in *White as whales bone*, fills

a few more bottles on the shelves, and shows how the pestle and mortar, and the alembic (although usually a spherical glass vessel with a beak-like spout down which the distillate was delivered, that in Thomas's *Alchemist* is made of copper), would have been employed.

*To form the essence of pearl the following substances are used: amber, alcohol, benzoin, 'native mineral alkali, the odorous particles of the flowers of oranges and roses extracted by watery infusion', an 'essential and vegetable salt', 'vitriifiable earth', and orrice root, the fruit of the aromatic aracus.*

*[In the alembic] These different ingredients are digested, and that which comes over on distillation is the essence of pearl.*

*[In the pestle and mortar] The pearl dentifrice is made by thoroughly incorporating together the insoluble particles which remain after making the essence, adding to them the aromatic substances mentioned above.<sup>19</sup>*

All this is a reminder that as well as being a master shaper of bone and ivory, and a jeweller with gold, the Georgian dentist was an empirical chemist compounding his own dentifrices, mouthwashes, and in Ruspini's case a successful styptic.

**Laboratory work in house, or farmed out**

The large number of dentists noted by Wright (76 in London from 1800-1808)<sup>20</sup> needed to be served by a busy and advanced technical service. We do not know to what extent the dentists of the time did their own technical work, or employed technicians, while they undertook the final fitting. A ghostly figure appears working at the bench to the right of one of Turner's drawings, who may be an employee, but only the family is shown in the painting. Farming out would have been very unlikely where secrecy was imperative, for example in the distillation and preparation of formulae for dentifrices etc, but would have been much more likely for the preparatory carving of ivory and bone.

Wright takes this view, and lists 25 toothbrush makers or ivory toothpick box makers, who might have undertaken dental work, including two, Minshull and Son, and Hannah Porter, who were possibly connected to dentists of the same name. He also points out that *'It is certain that many of the general brush makers, turners, ivory and tortoiseshell workers etc. in the directories would also have made toothbrushes and toothpick cases'* (Fig. 4) and no doubt any of these could also have provided a service to a dentist not wishing to make his or her (four female dentists are listed) dentures in-house. The firm started in 1780 by William Addis the first, concentrated on the manufacture of toothbrushes, selling through booksellers, and expanded rapidly.



Fig. 5 A George IV toothbrush made for the King by the firm of Addis, in the late eighteenth century brush pot by Spode seen closed in Figure 4, together with an interspace brush. By kind permission Mr Robin Addis. Photography courtesy of Dr Louis Gaigher.

The history of the firm relates that in 1840 53 separate processes went into the making of an Addis toothbrush (Fig. 5) and it seems unlikely that any dentist would be able or willing to compete however well equipped his laboratory, though he may well have sold brushes.

**The multi-function dental laboratory**

By showing a workshop in which distillation and chemical functions were taking place alongside the turning and preparation of ivory and bone, Turner is clearly illustrating an establishment where the dentist is working in-house, and not farming out the technical work. At the same time the capitalisation needed for such up-to-date machinery, and the number of items of machinery, show the success of the practice, and the volume of work undertaken.

At one point in his bitter dispute with his erstwhile employee Faleur, Nicholas Dubois de Chamant, (who when in France had been allowed the use of a small kiln by the Royal Porcelain manufacturers Sévres, and would certainly have had to have a workshop to prepare, and a kiln to fire, his porcelain teeth made from the compound supplied by the great experimental potters Wedgewood),<sup>21</sup> claims to have treated upwards of 15,000 cases by 1806,<sup>22</sup> having set up in England in 1792. Even allowing for an element of massaging of the figures, this average of over 1,000 cases a year gives an idea of the demand for prosthetic dental treatment in the late Georgian world, and the need for semi-industrialised production methods.

**Georgian machine tools and other technology**

The drawings provide something of a treasure store of Georgian technology and machine tools, shown in their working environment. Confirmation of the reliability of Turner's sketch is provided by James Watt's (1736-1819) personal workroom which although not on public exhibition, has been preserved intact and moved to the Science Museum from his house at Heathfield Hall near Birmingham. It contains three treadle lathes in a comparable space, as well as the hod and stove/furnace and many drawers and racks of hand tools.

The most versatile workshop aid shown (twice, once in the master drawing, and once in the sketch for the right side of the painting) is the pillar or leg vice, a universal and indispensable tool in the Georgian workshop. Not only could work be held in the jaws of the vice, but subsidiary smaller machine tools could be mounted on it. The pillar allowed for a moderate amount of swaging and riveting to be done. A rather pretty contemporary example may be seen in the new Watchmakers Company Museum at London Guildhall. Another is prominent in the foreground of the 1772 painting of King George III's favourite instrument maker John Cuff and his assistant by Johann Zoffany (1733-1810). This workshop painting, recently on view at the Queen's Gallery, Buckingham Palace, makes an interesting comparison with Turner's workshop, showing as it does the same arrangement of a workbench in the best light beneath the window, and the tools racked, shelved, or hanging on the walls (Fig. 6).

The only common machine tool at the time was the lathe, and since a single common lathe could be employed for the functions of drilling, polishing, and turning, (Cuff is grinding a glass lens in Zoffany's portrait) it is a sign of the workload of the laboratory Turner shows, and of the particular demands of dentistry, that more than one machine tool appears in the sketches. The cost of a lathe for the Georgian dentist setting up a laboratory is known, thanks to the survival of the basic records of the company of Holzapffels, who sold high quality lathes in London from 1795. These records,<sup>23</sup> now kept in the Guildhall Library, itemise the cost, date of supply, and surname of purchaser, from No. 1, which was sold to Mr Crisp for £25 15 shillings and 10 pence on 31 June 1795. The record shows the average price for a lathe in the firm's first full year of business (1796) to have been £13, with 12 units sold. By 1807, when Turner was working on his painting, the record shows 40 units sold in an incompletely recorded year at an average cost of £25 10 shillings. The cheapest common lathe was three guineas, and the most expensive purchase was made by Lord Camelford of a lathe and bench for £157 10 shillings in 1801. It was possible to spend more on machine tools for the small workshop, and Sir Jno. St Aubyn spent £477 on a screw mandrel and rose engine in 1805/1806. Not many Holzapffel lathes and benches were sold as a unit of the sort shown in Turner's drawing. (To clarify Turner's drawing, Figure 7 shows an 1810 Maudslay lathe and bench, with the drawers for gears and tools clearly seen.) It was customary to employ a local joiner to make the bed and frame, and the records show flywheels and 'iron work' (which by itself cost three guineas) being bought as separate items. Grinding lathes are recorded as items separate from common lathes, and Turner's sketches show one on the left, which becomes the dominant machine in the painting.

It is frustrating that the lack of full names and addresses makes it impossible to associate any of the Holzapffel purchasers with known dentists. 'Dental' names, Bell, Cartwright, Robinson, and T. Berdmore occur, but unfortunately mean nothing without more detail, especially as the lathe purchasers would have to be the fathers or sons of the famous dentists of those names. As an historical note, lathes were bought by The Marchioness Townsend, Lady F. Compton, Lady Blunt, Mrs Stubbs, and Mrs Jun. Norcross, though whether for personal or estate use we do not know.

As is to be expected, a wide range of hand tools is also drawn. Hanging on the wall by the cupboard in the sketch are a frame saw and a cross-cut or rip saw, and what could be a bow drill. Below them are

**Fig. 6** Johan Zoffany, John Cuff and his assistant. 1772. This charming painting shows Cuff at his lathe beneath a sash window, with a pillar vice to his right. His assistant leans on a swaging block. The Royal Collection © 2004, Her Majesty Queen Elizabeth II.



the racks holding the tools for turning operations, and also the files, augers and gouges the operator would need for ivory and gold work in the vice. In the painting Turner transforms these tools to manipulate light in the way that was so much admired in his work. He only shows one saw, painted as a stylised rectangle hanging on the wall close to the window above the shelves of jars, while beneath the shelves the tool-rack nearest to the window has become a barely recognisable cascade of colour and light.

Turner has reduced the number of machines in the painting to two, the important grinding and polishing lathe on the left, which he has antiqued with a solid wood flywheel and rustic woodwork, and to which he has added a rest pad, and in the background by the wall, a turning lathe, which he has 'moved' towards the window and used in a virtuoso display of light and the ellipse. It is difficult to be certain about the number and function of machine tools shown in the 'master' drawing. As mentioned earli-



**Fig. 7** <sup>24</sup> An 1810 Maudslay lathe with tool drawers. Henry Maudslay (1771–1831) started his own lathe-making business in 1797. By kind permission, the Science Museum.



**Fig. 8** The patient treatment area. This is a continuation of Turner's sketch in Fig. 1, and was made by the artist pushing back p. 76 in his sketchbook. The two sketches placed together provide a wall-to-wall view of a dentist's workroom. *River and Margate* sketchbook, p. 75a. J.M.W. Turner R.A. (1775–1851). Pencil on paper. 115x190 mm. 1806–1808. By kind permission Tate Picture Library.

er, Watt had three in his workshop in a comparable space, and three or even four appear to be shown in the sketch. That Turner chose to retain more than one in the painting reflects his lifelong interest in the mechanical. The differing size of the top pulleys in the turning lathe against the wall were not provided to give different speeds, but to allow for the expansion and contraction of the spliced and twisted gut drive belt in different atmospheric conditions.

Not everything which might be expected in the laboratory is seen, for example a swaging block. Although there is the hint of an anvil shape, it is in a completely improbable position, to the left of the turning lathe. The stove implied by the hod is also not seen.

### Lighting

For Turner the artist, handling light was already an advanced accomplishment. For Turner the recorder of the workshop, light seems also to have been important. Both in the drawing and the painting, the position of the common lathe with natural light falling over the right shoulder of the operator is the recommended ideal. In the drawing, light for the polishing lathe in the darker part of the room may come from the enigmatic rushlight shaped device in front of it, but is more likely to have been provided by the oil Argand lamp sketched on the shelf to the right, its parts, the tubular reservoir, shade, and chimney can clearly be seen. In two places on the wall, what look like gas fishtails (if so, this would be perhaps the earliest known illustration) are likely to be brackets to support the lamp. Turner himself sketched by the light of such a lamp in Mount Street.<sup>25</sup> Confirmation of the use of these lamps in the laboratory context is provided by the presence of an

Argand lamp in Watt's workshop. (Watt was in correspondence with Argand, and the firm of Boulton & Watt also made them). These lamps provided much more efficient use of fuel by admitting air to both the outside and inside of the burning wick.

The difficulty in obtaining adequate artificial lighting for dentistry before the Argand lamp and gas is seen in prints of Hogarth's *Night* (1738, final state 1762) where the barber who advertises '*Teeth Drawn W<sup>th</sup> a Touch*' is shown shaving a client by the light of no fewer than 12 candles fixed to his window, with another on a wall bracket.

Natural light is provided by the window, and the sketchy but immediately recognisable Georgian sash window in 77a is of the type more clearly seen in Zoffany's painting and Cruikshank's 1821 caricature of a dentist's room,<sup>26</sup> and is itself a technological advance. The sash window design was imported from the Low Countries, possibly arriving with King William, and in the Georgian period proved ideal for allowing the use of newly available large flat panes of glass giving much improved lighting.

### Ventilation

Ventilation of a workshop is as important as lighting, and sash windows are an efficient heat pump. Since the design allowed for independent opening of the top and bottom sash, when correctly adjusted hot air exits above, drawing fresh cooler air in at the base, important especially when a stove and fire were alight. (Some may feel that the foul air of the workshop was preferable to the London air of the time, but Mount Street, if that is indeed where we are, was at least near Hyde Park).

**The expansion of London, and with it the dentists**

The presence of the 'new' window in the sketch is a reminder of how much London was being transformed by new building. Between 1801 and 1819, the town expanded from approximately 110,000 houses with 730,000 inhabitants, to 150,000 houses with one million occupants, and Ruspini's old premises were swept away between 1812 and 1824, during the construction of Nash's Regent Street. The new dentists were moving west into the new parts of town as they were finished.

### The patient treatment area

Sketch 75a (Fig. 8) is a continuation of sketch 76 (Fig. 1). Here Turner's drawing of the patient treatment area in the dentist's room makes a complete contrast to Ruspini's (?) arrangement seen in Rowlandson's caricature of 1787, where everyone is in a room curtained at one end and with no laboratory equipment on view.<sup>28</sup>

The chair is a typical example of the high rectangular backed, upright, and upholstered armed chairs used by dentists at the time (Turner has rounded it off to 'antique' it for the painting). This design of dental chair had an extended period of use, Snell in 1831 illustrates a version with added headboard and reclining back, together with mounted instrument tray, light, and mirror, and a separate foot-board.<sup>29</sup> An Owen chair from c.1860, of similar pattern and with an adjustable head-rest, can be seen in the collection of the BDA Museum.<sup>30</sup> A foot-stool for the patient can be seen in the Turner painting, but not the sketch. These chairs were used together with another wide low stool upon which the dentist stood when leaning over the padded upholstered top and working from behind. The method of use when working from the side is seen clearly in the Cruikshank (1792–1878) caricature of 1821, *Tugging at a (high) eye tooth*,<sup>31</sup> where Cruikshank emphasises the shortness of the

dentist, and the tallness of his patient, by having him needing to use the stool even in this position. The method when working from the back is seen in 1849, in Cruikshank's drawings for *The tooth-ache* imagined by Horace Mayhew.<sup>32</sup> The sketch also includes a pillar vice with the leg only partly shown. This leg allowed for use of the vice for such operations as swaging, and fits in with the need for adjustment of metal based dentures at the chairside. Further various flasks and bottles are seen on shelves.

### Heating

In the sketchbook, warmth for the patient is provided by a coal grate which is lightly pencilled in, looking at first glance like an enlarged wing to the chair. These grates were smaller than wood grates, being much more efficient deliverers of heat, and were set in a wrought or cast iron cage raised from the hearth, so that clinker and ashes could be removed readily, in contrast to a wood fire, which burns better on a bed of ash.

### Summary

The social importance of Turner's painting has been commented on in the first paper. The equal importance of the preparatory sketches as an accurate record of the laboratory and operating room of a late Georgian dentist is what is celebrated here. It would seem that Turner's sketches for *The unpaid bill, or the dentist reproving his son's prodigality*, are a unique record of the existence of such combined dental surgeries and laboratories. Turner's little sketches and his painting define a particular moment in dental history, when the transition from tooth-drawer to highly skilled individual professional dentist had already taken place, and before the production of dentifrices and other dental materials had moved almost exclusively to the chemists and factories. They should be the primary image called to mind or paper when discussion of the profession at the time is undertaken, and not the amusing caricatures which were its contemporaries. Turner has done dentists a

huge favour in permitting us to examine in detail the interior of a Georgian dentist's operating room and laboratory, as well as giving artists the opportunity to see how he worked as he composed a picture.

The value of Turner's painting, and of his accompanying sketches, can not be overstated in its importance to the history of dentistry as they aid in one of the most difficult tasks of the dental historian, which is to make the past history of the profession ordinary, because the ordinary is so rarely recorded.

*The extensive help and advice of Michael Wright, formerly Curator, Mechanical Engineering at the Science Museum is most gratefully acknowledged, as is that of the staff of the Museum and of the Information centre of the British Dental Association, of the Tate Britain, of the Science Museum, the librarians of the Athenaeum, and of the private collectors who lent material.*

- Bishop M, Gelbier S, King J. J.M.W. Turner's painting: *The unpaid bill, or the dentist reproving his son's prodigality*. *Br Dent J* 2004, **197**: 757-762.
- Finberg A J. *The life of J M W Turner, R.A. etc.* 1939. In: *The Oxford companion to art*. Oxford: Oxford University Press 1970; p.1163.
- Finberg A J. *A complete inventory of the drawings of the Turner bequest*. Vol. 1. London: His Majesty's Stationery Office 1909.
- London magazine, or Gentleman's monthly intelligencer. *A companion to the GUIDE, and a guide to the COMPANION: Being a complete supplement to all the accounts of Oxford*. London 1760. **XXIX**: 202-204.
- Finberg A J. *The life of J M W Turner, R.A. etc.* 1939. In: *The Oxford companion to art*. Oxford: Oxford University Press 1939; p.69.
- Snell J (fl.1830) in: Campbell J M. *From a trade to a profession*. Private printing 1958; p.167.
- Van Butchell M. In: Campbell J.M. *From a trade to a profession*. Private printing 1958; pp.167-179.
- Cope Z, Tomes J. *A pioneer of British dentistry*. London: Dawson's of Pall Mall 1961; p.15.
- M D K Bremner. *The history of dentistry*. 1st. ed. 1939. 2nd ed. 1946. Great Britain: Henry Kimpton's medical house; p. 78.
- Science Museum, London. Inv. No. 1885-121. Boulton and Watt 8h.p. (12 Hp from 1806) operated 1796-1885. John Maud, later George Atkinson & Co. manuf. Chemists, Colour manufacturers, Drug grinders & oil pressers. 66 Aldersgate Street, London.
- Hargreaves A S. *White as whales bone*. Leeds: Northern Universities Press. 1998, p.87.
- Real life in London; or the rambles and adventures of Bob Tallyho, Esq. and his cousin the Hon Tom Dashall etc.* London: Jones & Co 1820. C.70 e1. p.159
- St James's Chronicle. 1. March 1777. In: Campbell J M. *From a trade to a profession*. Private printing 1958; p.167.
- Campbell J M. *From a trade to a profession*. Private printing 1958; p.139.
- Finberg A J. *The life of J M W Turner, R.A.* Oxford: Oxford University Press 1939; pp.62, 65.
- Christies' notes to the painting 2002.
- Beaver P. *Addis 1780-1980. All about the home*. Benington publications for companies 1980.
- Canton A. *The teeth and their preservation in infancy and manhood to old age*. London 1851. In: Campbell J M. *From a trade to a profession*. Private printing 1958; pp.26/7.
- Hargreaves A S. *White as whales bone*. Leeds: Northern Universities Press. 1998, p.91.
- Wright D W. London dentists 1800-1811: a listing from the trades directories in the Guildhall Library. *Dental historian* April 1989; **16**: 17-29.
- Woodforde J. *The strange story of false teeth*. London: Routledge & Keegan Paul 1968; p. 57.
- de Chamant N D. *Caution against the imposition of one Falseur* 1806. Ms transcription made by Townend B from advertisement. Townend Ms. BDA Library.
- Turner's Company. *Register of lathes (Holzapffel) 1798 [sic]-1927*. Guildhall Library MS 9475.
- Gilbert K R. *The machine tool collection. Catalogue of exhibits with historical introduction*. London: The Science Museum. HMSO 1966; p.12.
- Finberg A J. *The life of J M W Turner, R.A.* Oxford: Oxford University Press 1939; p.69.
- Bishop M, Gelbier S, Gibbons D. Fig. 2.in Ethics – dentistry and toothdrawing in the late eighteenth and early nineteenth centuries in England. Evidence of provision at all levels of society. *Br Dent J* 2001; **191**: 577.
- Laxton P. *Introduction; The A to Z of Regency London*. London: London Topographical Society. Publication No. 131. 1985 p.x
- Bishop M, Gelbier S, Gibbons D. Fig. 1.in Ethics – dentistry and toothdrawing in the late eighteenth and early nineteenth centuries in England. Evidence of provision at all levels of society. *Br Dent J* 2001; **191**: 576.
- Snell J A. *Practical guide to operations on the teeth*. Lithograph. Wilson J. 1831. In: Bonham's illustrated catalogue for the collection of the late R A Cohen. 10 Dec 2002; p. 120.
- LDBDA 4442
- Bishop M, Gelbier S, Gibbons D. Fig. 2.in Ethics – dentistry and toothdrawing in the late eighteenth and early nineteenth centuries in England. Evidence of provision at all levels of society. *Br Dent J* 2001; **191**: 577.
- Bogue D. *The tooth-ache imagined by Horace Mayhew. And realized by George Cruikshank*. London. Undated. Facsimile published by the Arts Council of Great Britain. ISBN 0 7287 0014 X also undated. Dated 1849 in Bonham's illustrated catalogue for the collection of the late R A Cohen. 10 Dec 2002; p. 14.