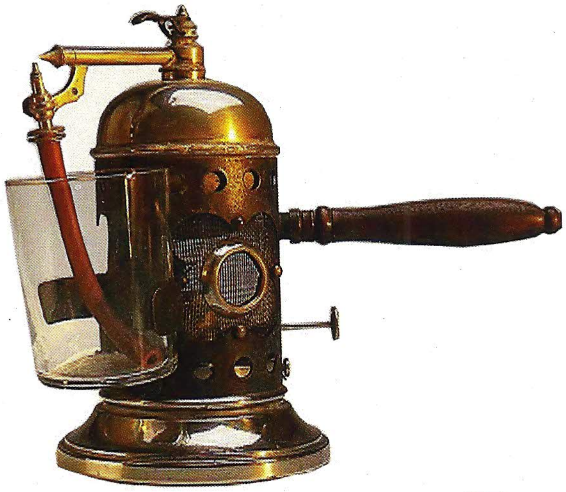
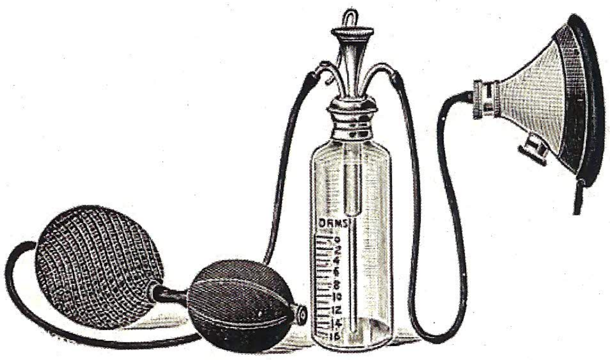
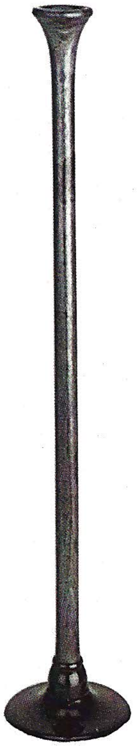
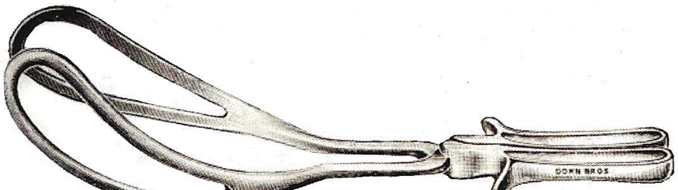



The Historical Medical Equipment Society






BULLETIN NO. 28 ISSN 1366 - 4719 FEBRUARY 2013

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CONTENTS

FUTURE MEETINGS

NEXT MEETING: MARY ROSE MUSEUM, PORTSMOUTH IN JUNE / JULY . DATE NOT YET CONFIRMED.

EDITORIAL

The year 2012 was an eventful one for the Society. We came near to dissolution when we could find no one to succeed Peter Mohr as Honorary Secretary/Treasurer. However our Chairman retrieved the situation when he recruited Heather Whitaker to act as Assistant Secretary and Treasurer. The Chairman and Assistant Secretary have together run the Society over the past year. This has included the collection of subscriptions and the organisation of a very successful meeting at the Royal College of Surgeons in London in November. The employment of a paid assistant necessitated an increase in the annual subscription. Fortunately this resulted in very few resignations which I think is a reflection of the value that members attach to the Society. Heather is organising the Society most efficiently and has recently instituted an HMES blog to which members are invited to contribute photographs and articles:
historicalmedicalequipmentsociety.wordpress.com

However we still need an Honorary Secretary/ Treasurer. Now that we have an Assistant Secretary the workload will be considerably reduced and it is very much hoped that someone will come forward.

The meeting at the Royal College of Surgeons was a great success and the talks have been reproduced by their authors in suitable form for this Bulletin. John Prosser started proceedings with an excellent overall presentation on the 'History and Mystery of Blood-letting'. Until the middle of the nineteenth century blood-letting was the dominant intervention in medical practice. He covered its history and discussed reasons for its popularity and subsequent decline. He exhibited several fine examples of bleeding bowls and lancets. Tim Smith extended the topic with a presentation on 'Cupping and Leeching'. He concluded with video clips of present-day 'dry' and 'wet' cupping. John Kirkup then gave an erudite talk on 'Surgery and its Implementation'. He described the origins of instrument design and its subsequent development. After lunch Ravi Kunzru took members on a conducted tour of the museum. In the afternoon session Adrian Padfield spoke on 'Captain GT Smith-Clarke and Modernising the Iron Lung'. Smith-Clarke made very important contributions to medical engineering and through Adrian's researches and presentations these contributions are now beginning to receive the acknowledgement they deserve. Mick Crumplin then spoke on the wounds and death of Nelson. He is the acknowledged authority on this subject and we were treated to a superb account of this fascinating aspect of medical history .

I hope the Bulletin in its current format is to the liking of the Society. Comments or suggestions are always welcome. I personally think that the image component is particularly important in a publication such as ours. I would ask that contributors always submit images in as high a resolution as possible and always as items separate from the text. We sometimes stray away from purely 'medical equipment' articles but I think that is no bad thing so long as our central theme is instrumentation. Nasim Naqvi has submitted an excellent article on pre-Columbian South American clay figures. This is perhaps not primarily a 'medical equipment' article but is nevertheless a fascinating historical account that fully deserves inclusion.

THE HISTORY AND MYSTERY OF BLOOD-LETTING

JOHN PROSSER

My interest in this subject began when I purchased a pewter bowl with handle that I felt was probably a bleeding bowl. It was rather dirty having been used as a paint pot. However after cleaning up, the rings marked with numbers became clearly visible (fig.1). For me this raised a number of questions: how, why and when did the practice of bloodletting arise? Why did it last so long? Why and when did the practice virtually disappear?

Fig.1 Pewter bowl before and after cleaning.

Origins. Primitive man may well have practiced bleeding to 'let out evil spirits' (trephining was also almost certainly used for this purpose). The first depictions of bleeding and leeching appear in Egyptian hieroglyphs dating from about 1500 BC. Bleeding was also advocated by Hippocrates who taught that good health depended on the balance of the four humours: phlegm, yellow bile, black bile and blood, blood being the most important of the four. Natural bleeding by epistaxis, menstruation, and injury was also thought to be beneficial. These ideas were accepted and encouraged by Galen whose teachings spread throughout the Roman Empire and beyond, and influenced medical practice for nearly two thousand years. During the Dark Ages and Medieval Period monks were the main practitioners of bleeding. Routine bleeding was felt to be important for health and the timing of bleeding depended on the Christian Calendar. But by 1160 monks were forbidden by Church Edict to undertake bleeding and the practice was taken over by barbers.

Fig.2 Two lancets with tortoiseshell handles.

Peak of popularity. Bleeding whether by lancet, scarification, cupping or leeching reached its peak in Europe and North America in the 18th and early 19th century and declined toward the end of the 19th century. Considerable quantities of blood might be removed. On average 16-30 oz (450-900 ml) were taken but patients would sometimes be bled to the point of syncope with the end point being collapse, or cessation of respiration or heartbeat.

Equipment used. The classic double-edged sharp-pointed thumb lancets were the most commonly used instruments (fig.2). They were often carried in elegant and ornate cases (fig.3). Spring lancets (schnappers) (fig.4) were invented in Germany in 1680. They were de-

Fig.3 Lancets in silver cases.

Fig. 4 Spring lancet.

signed to reduce the pain of incision. Fleams (fig.5) had a sharp blade at right angles to the

Fig.5. Fleam with blood stick.

shaft and were struck with a fleam hammer (or blood stick). They were more commonly used in veterinary practice. Bleeding bowls came in a variety of shapes and sizes and could be ceramic, silver, pewter and even glass (figs. 6-8. In prac-

Fig.6. Pewter bleeding bowl .

tice probably any convenient receptacle was used. The barber's bowl normally used for shaving was often depicted in images of blood-letting (fig.9).

Reasons for its long period of popularity. Bleeding remained popular until the end of the 19th century because of the influence of revered

Fig.7. White ceramic bleeding bowl.

medical writers and because it fitted the current theories of disease. It also made patients feel better in that something active was being done in which they believed. At times they even demanded it themselves. There would have been a strong placebo effect. It is also possible that euphoria may have resulted from cerebral ischaemia, rather like inebriation!

Fig.8. Blue and white ceramic bleeding bowl .

Reasons for its decline. Bloodletting was a major part of medical treatment for thousands of years although from Ancient Greek times there were those who considered it dangerous. But real doubts began to emerge in the middle of the 19th

Fig.9. *Heemskirk painting of bleeding. 17th century. Depicting barber's bowl in pewter with the usual cut out to go under the chin.*

variably higher in those who were bled. Although there was much resistance to change from the medical establishment the general application of bleeding for most conditions declined from the 1860s. However it continued until the 1890s for certain specific conditions such as 'fever'. In that condition the bounding pulse seemed to be 'crying out' for blood to be removed. In veterinary practice bleeding continued for longer still and horses were being routinely bled up to the time of the First World War.

century. Knowledge was rapidly being gained about the causes of disease by scientists such as Louis Pasteur and Robert Koch. Some doctors also began to look at death rates with and without bleeding and found that death rates were in-

Fig.10. Possible child's bleeding bowl

Bleeding in children

Finally a question I asked myself when I found this very small bleeding bowl (fig.10) Did they bleed children? There is not much evidence that the practice was widespread and generally medical writers counselled caution when bleeding children.

THE HISTORY OF CUPPING AND LEECHING

TIM SMITH

Bleeding by lancet, cupping and the application of leeches are all extremely ancient forms of blood-letting. The earliest references to all three can be found in Egyptian hieroglyphs dating from about 1500 BC. In this article cupping and leeching will be described in more detail.

Fig.1. Bronze cup. Greek 400-100 BC .

Cupping

A variety of materials have been used for making cupping equipment including gourds, horn, bamboo, bronze (fig.1), glass (fig.2), pewter and rubber (fig.3). The technique involved applying the cup to the skin and then creating a partial vacuum by a variety of methods such as i) *suction by mouth and lips*; this was used particularly with horn and gourds, ii) *flame*; this was the most common form, in which the interior of the cup was briefly heated by a flame, the cup applied to the skin and as it cooled a partial vacuum was created, iii) *mechanical pump*; a pump (usually brass) was used to create a negative pressure in the cup, iv) *rubber bulb*; a negative pressure was created by simple squeezing of a rubber bulb.

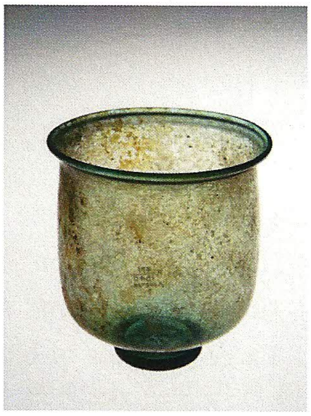


Fig.2. Glass cup. Roman 100-300 AD.

Fig.3. Cups with rubber bulbs.

There were two types of cupping: *dry cupping* where a partial vacuum was created over intact skin and *wet cupping* where preliminary scarification had taken place. In the former blood 'loss' occurred through bruising under the skin, in the latter actual blood accumulated in the cup.

Fig.4. Renaissance image of Venus and Adonis showing cupping points.

The position of the cups was often considered important and specific to the condition or region being treated (figs. 4).

Fig.5 Traditional English cupping set with 10 bladed scarifier and spirit lamp C. 1800.

Fig.6 Traditional French cupping set with scarifier and spirit lamp.

In the 18th and 19th centuries elaborate and inventive pieces of equipment were devised (figs. 5-9). The partial vacuum was created either by a flame or by a hand pump. Some de-

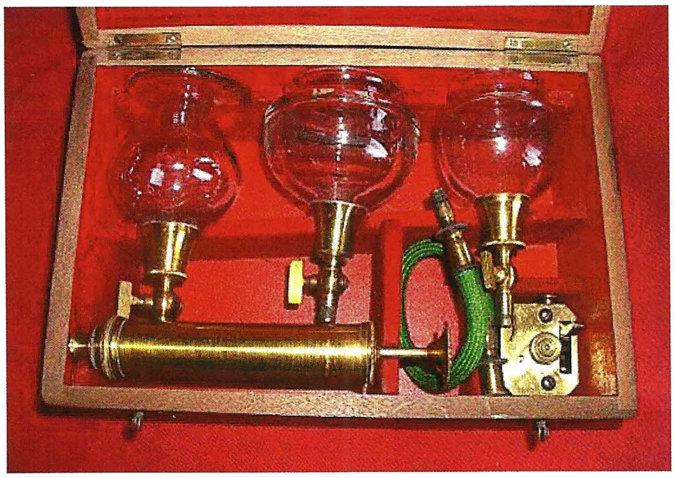


Fig.8 French cupping set with scarifier and brass pump.

Fig.9. Harteloup mechanical leech 1850.

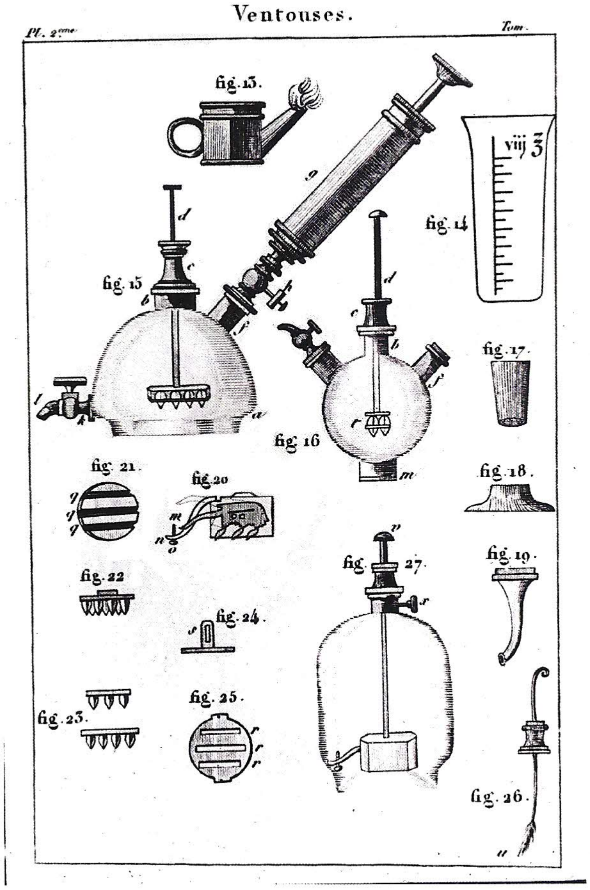


Fig.10 French blood letting devices 1821.

vices contained the scarifier within the cup (fig.10). The Junod 'boot' may perhaps be considered an extreme form of cupping (fig.11). Large volumes of blood could be sequestrated

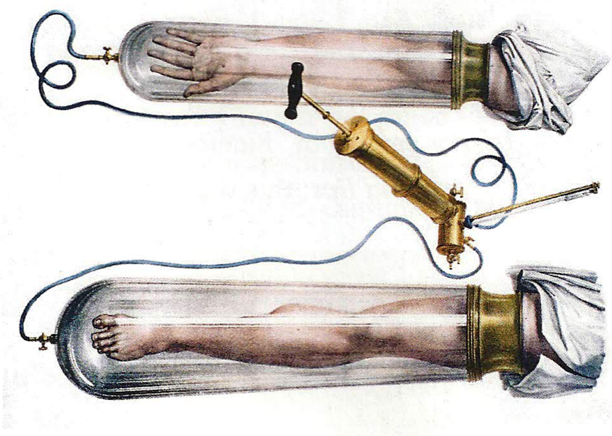


Fig.11 Junod 'boot' C.1835.

particularly in the lower limb.

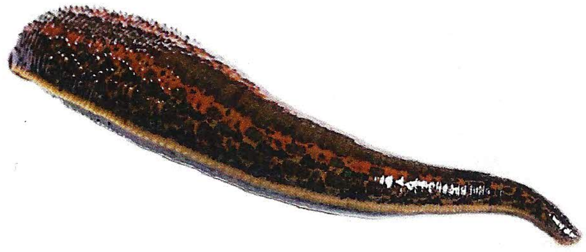
In the Far East cupping continues to enjoy widespread popularity to the present day and in the West it also has its 'New Age' enthusiasts.

Leeching

Leeches provoke an unfounded horror in modern minds possibly because of their portrayal in films such as *The African Queen, 1951*. People were less squeamish in previous generations and leech therapy reached its peak between 1825 and 1840 (fig.12). Leeches

Fig.12. Application of leeches to neck 1827.

were often gathered by country women who would wade into ponds and streams and collect them from their legs and ankles (fig.13) At St Bartholomew's Hospital records for the year 1837 show that some 96,000 leeches were used. The European leech *Hirudo medicinalis* (fig.14) can consume 5 times its own weight in



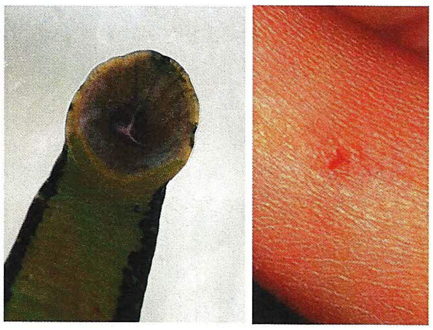


Fig.14. European leech Hirudo medicinalis. with detail of head and bite mark.

20 minutes (up to 15ml). It commonly feeds every 2 months but can survive for up to 2 years between feeds. Bacteria in its gut, rather than enzymes, break down the red cells over a period of time. Contrary to popular belief the leech bite is not painless and there is no evidence that the leech secretes a local anaesthetic agent. But it certainly secretes a powerful anticoagulant and leech bites continue to bleed for some hours afterwards.

Various artefacts are associated with leeches. They may be classified as i) *leech applicators* (fig.15)

Fig.13 An aquatint of 1814 depicting leech collection.

Fig. 15 leech applicator.

ii) *leech transporting containers* (figs 16-18), and iii) *classical leech jars* (figs 19-20). The latter are now very desirable collectors' items. In recent years leeches have regained a niche application in conventional medicine. They are use to enhance flow, particularly venous drainage after some forms of plastic surgery and after surgery for procedures such as the re-attachment of severed digits.

Fig.19 Essex type leech jar 1830.

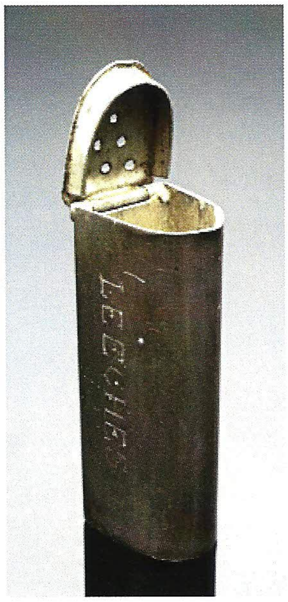


Fig. 16
Pewter leech box.

Fig.17
Leech cage.

Fig.18 leech carrying jars.

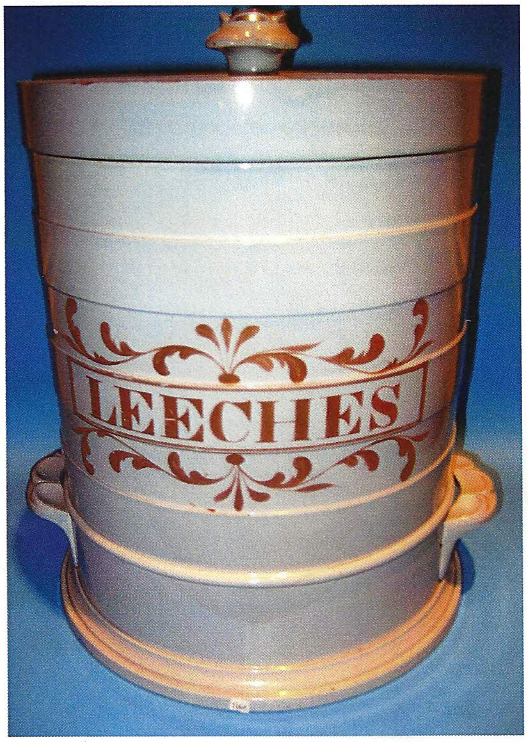


Fig. 20 Cylindrical English leech jar 1850.

SURGERY AND ITS INSTRUMENTATION

JOHN KIRKUP

Surgery, from the Greek means 'hand-work' undertaken to treat wounds, fractures and other external evidence of what are considered surgical problems, originally by application of the hand alone. Hence, at least from the Old Stone Age human beings have been treating injuries in a surgical sense, and very often performing surgical actions on themselves. Thus the attempt of King Harold to remove an arrow from his eye is understandable, just as the many recorded sculptures of individuals removing thorns or splinters from their feet confirm (fig.1). I imagine every-

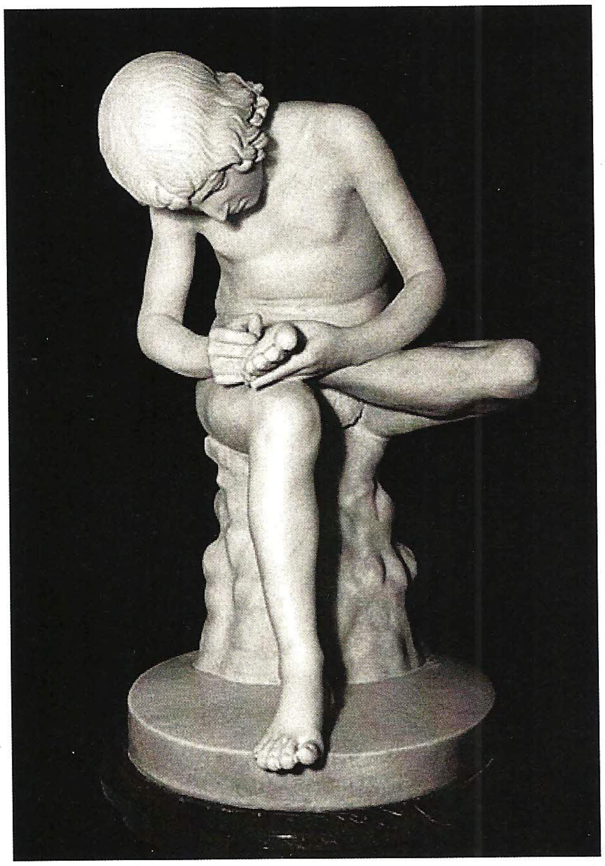


Fig. 1. Thorn extraction, using thumb and index finger as a pincer; statue from the 15th century.

one has removed or attempted removing foreign bodies in their feet or hands, or from their eyes, or applied a wound dressing or a bandage support. Indeed we are all surgeons of various degrees of proficiency, usually as an instinctive or spontaneous gesture, sometimes as a desperate or life-saving attempt even performing amputation and, occasionally as a calculated or cosmetic act to remove a disfiguration.

Clearly auto-surgery has its limitations and the development of specialists for more complex surgical problems is well recognised and dependant on a specific armamentarium of instruments as well as techniques. Originally instruments were derived from natural materials in wood and stone but in the Greek and Roman era distinctive metallic instruments were devised in bronze and iron; later, various steel alloys culminated in stainless forms and latterly a certain amount of plastic. The fundamental eight basic forms (fig, 2) have expanded greatly in the last 100 years

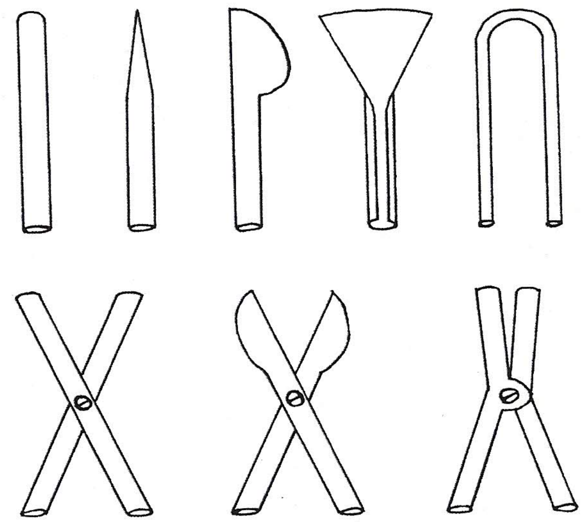


Fig. 2. Basic instrument forms: top line, probe, needle point, blade, tube, spring forceps; bottom line, central pivot forceps, scissors, inset pivot for dilator.

and are now often complex - for example, in the case of operative endoscopes.

The first manuscript drawings of surgical instruments are attributed to Albucasis in 1,000 AD; unfortunately his earliest surviving manuscript is two centuries later and subsequent manuscripts show 'improvements' rendering the original instrument forms uncertain. In 1497, Brunschwig produced printed illustrations of his equipment, including surgical scissors for the first time. Printing has ensured accurate knowledge of surgical instruments although few have been found, due to manufacture in poor quality corroded steel until the 18th century. Surgical procedures remained restricted until the 19th century when the major discoveries of general anaesthesia, chemical antisepsis, thermal asepsis and X-rays were discovered resulting in an explosion of surgical techniques and of instrumentation (fig. 3). Whilst from 1916, stainless steel alloys became the materials of choice for their resistance to corrosion.

Finally the manufacturing skills of instrument craftsmen must not be forgotten for the complexity of burgeoning surgery required a parallel increase in sophisticated instruments, usually refined by the input of the manufacturers.

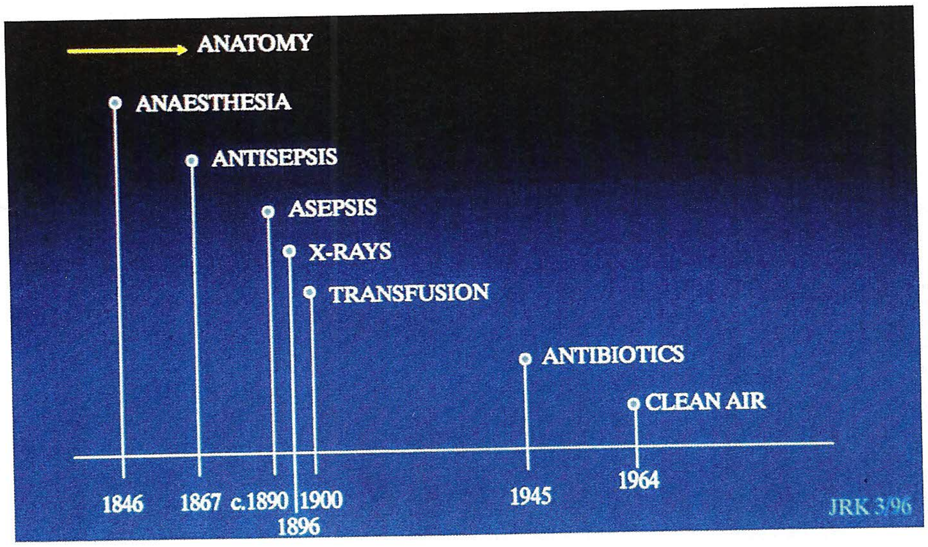
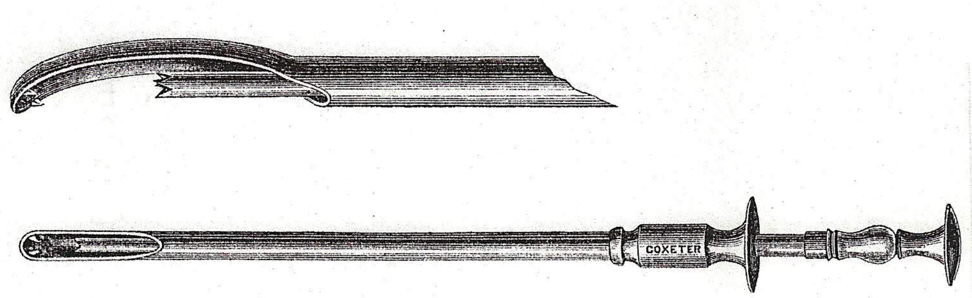


Fig. 3. Safe surgery, emphasising the fundamental contributions of anaesthesia, chemical antisepsis, thermal asepsis and X-rays were all 19th century discoveries.

WHAT IS IT?

What is this popular instrument of the 19th century?



A QUESTION?

Adrian Padfield has a question. " I've had a letter from a very old friend whose great, great grandfather George Ewart exhibited three different spirometers at the Great Exhibition of 1851. Unfortunately my friend has no images and knows nothing more about them. If anyone can throw any light on these items would be most grateful" . Any replies please to A.Padfield@sheffield.ac.uk.

THE MORTAL MEMORY -THE WOUNDS AND DEATH OF VICE ADMIRAL LORD HORATIO NELSON

MICK CRUMPLIN

One of Britain's greatest military heroes had a charismatic leadership style that, while exemplary, put him at high risk. Plagued, as many were 200 years ago, by illnesses through his career (seasickness, scurvy, poisoning by the fruit of the Manchineel tree, malaria and intermittent digestive problems), it was to be a French bullet that would end his life on the 21st October 1805.

Born on September 29 1758 at Burnham Thorpe Rectory, in Norfolk, and losing his mother at the age of 9 years old, Horatio grew up an adventurous and seemingly fearless boy. His first wound was suffered in April 1794, when as captain of *HMS Agamemnon*, he assisted in the bombardment of the town of Bastia, in the north of Corsica, where Britain was seeking an additional Mediterranean naval base. He was 'sharply struck on the back' by debris thrown up by a French cannon shot strike. Bruised but not seriously hurt, he went on into June, while similarly besieging the citadel of Calvi, on the other side of Cap Corse. At 7am on 10th July, he was showered with stone fragments from another French ball, which had struck a merlon in front of him. This time, he bled from multiple facial and neck wounds and suffered an intraocular penetration by a stone fragment. This caused great pain and blindness (he could only discern light from dark) in his right eye. Normal vision never recovered and afterwards his iris was noted to have been distorted. In 1797, he was to receive a pension of £632 for this and the loss of his arm.

His next injury occurred at the Battle of Cape St Vincent on 14th February 1797, whilst engaged with the Spanish fleet. As commodore serving on *HMS Captain,* he was struck in the lower abdominal wall by a shard of wood from a shattered block. He developed a hernia after crushing muscle damage. The rupture was the size of a fist and sometimes uncomfortable. After his abdominal strike, he suffered temporary urinary retention - presumably with clot retention. Fortunately, this relieved spontaneously.

On July 25th July, the same year, he was given a squadron to capture a Spanish treasure ship and the town of Santa Cruz on Teneriffe. Leading a 1,000-man assault force, he was, predictably, one of the first to clamber onshore, on to a mole, which was raked by Spanish small arms fire. Shot in the right arm, he promptly collapsed back in his boat, into the arms of his stepson, Josiah Nisbet. Nisbet snatched off his stock and twisted it into a tourniquet. Nelson was rowed out to *HMS Theseus.* As he heaved himself up the 74's tumblehome he shouted for the surgeons to get their instruments ready. His arm was amputated above the elbow by surgeons Eshelby and Remonier. He bore up well during the procedure and requested that all squadron surgeons should, in future warm their instruments before surgery!! The operation was complicated since the surgeons had inadvertently included the median nerve in the silk ligature round the brachial artery. After months of pain and spending thousands of pounds on medical consultations, the offending ligature came away with sepsis and Nelson, now free from pain, was ready to sail the seas on a long and frustrating voyage to seek out and destroy the French Mediterranean fleet, which had transported the French Army to Egypt.

After a long and intensely frustrating sail, Nelson came on Admiral Brueys's fleet moored up in Aboukir Bay. On the 1st August 1798, by squeezing the French fleet between two withering fields of naval ordnance, Nelson destroyed the enemy ships and suffered his next trauma. He was struck on the right forehead by a piece of langridge (scrap metal). Thinking himself mortally wounded, he was helped by his flag captain (Berry) down to the cockpit, where Surgeon Jefferson stitched and taped up his forehead (Fig.1.). There was no loss of consciousness, retrograde amnesia, or skull fracture, so some subsequent aberrations of Nelson's behaviour whilst resting in Naples, was unlikely to have emanated from this injury, despite speculation to the contrary.

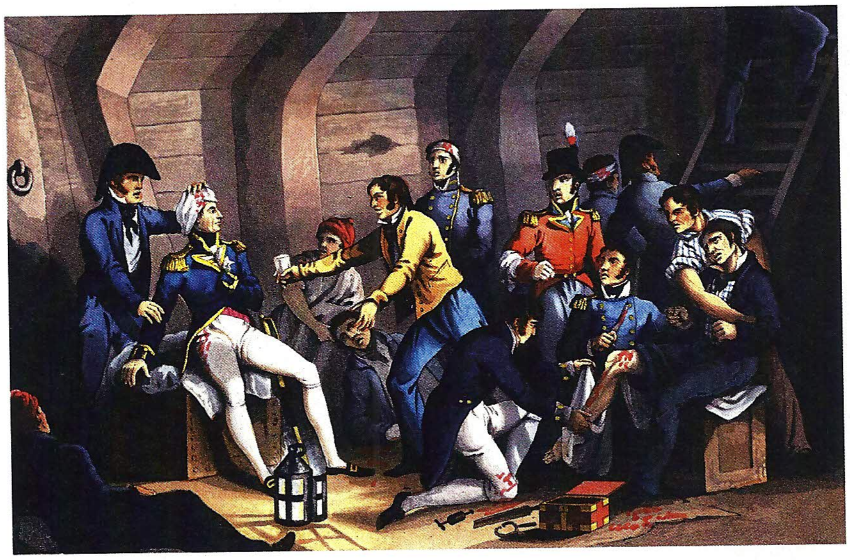


Fig. 1. Surgeon Jefferson presented with Admiral Nelson and his head injury in the cockpit, on the orlop deck of HMS Vanguard 1 August 1798. Note the assorted instruments strewn around the deck and the matelot about to undergo an above knee amputation. (Author's collection).

How Admiral Nelson, on board *HMS Elephant* escaped injury at the sanguinary Battle of Copenhagen in 1801, beggars belief. He did however suffer significant indigestion the night before the action!

His last and fatal wound was sustained off Cape Trafalgar, on the 21st October 1805 on his flagship *HMS Victory*. Behaving entirely in keeping with a Vice Admiral of his station, he led the windward squadron (Admiral Cuthbert Collingwood headed the lee Squadron) and broke through the French and Spanish fleet line at about 12.15 hours. Locked in and entangled with the French 74' *Redoutable*, commanded by the intrepid Captain Jean Lucas, *HMS Victory* and *HMS Temeraire* smashed the French ship to a wreck. At around 13.15 hrs, one of many shots from the mizzen top of the French ship rang out and Nelson collapsed on his quarterdeck, fatally wounded. He was bundled down to the orlop deck and the cockpit, where Surgeon William Beatty was busy with many casualties (ultimately around 75 wounded men), had Nelson stripped and then he examined his commanding officer. Finding no exit wound and both patient and surgeon realising the Admiral's backbone and spine had been shot through, Nelson was left to die cared for and visited by, Captain Masterman Hardy, Chaplain Scott and Purser Burke and Nelson's personal servants. Beatty's capital instrument set is illustrated in figure.2.

Fig.2. The capital instrument set that belonged to Sir William Beatty FRS.
(Courtesy of the Royal College of Physicians and Surgeons of Glasgow)

The nature of the wound and the proximity of the marksman had forced the ball through some coat and epaulette, in front of the shoulder, thought the chest wall and two segments of the left lung and then, after transecting Nelson's spinal cord, the missile had come to rest in the muscles of his back (fig.3).

Fig.3 The passage of the fatal musket ball that killed Vice Admiral Lord Horatio Nelson, 21 October 1805 (Courtesy of the late Professor Leslie Le Quesne)

Beatty, when performing a post mortem on the dead admiral's corpse on 11 December, noted less blood in the chest than he had expected. Clearly, since there had been many survivors of such non-exiting chest wounds. Why had Nelson succumbed? The answer lies in his spinal injury. Normally, compensatory vasoconstriction would have slowed blood loss to an extent. Beatty had assumed the main or a large branch of the left pulmonary artery had been breached and we are left with this as a plausible explanation of the hero's death. But the ball had passed posteriorly to the main pulmonary ligament. The fact is that, the division of the cord (at T6) had simply destroyed much of his autonomic nervous system and so, below this level, he could not compensate for an otherwise survivable haemorrhage.

Although Nelson had been doomed to an early death, this had saved him from an ignominiously difficult future life, with paraplegia and a continuing unpopular relationship with Emma Hamilton. His sacrifice had helped Britain become the most powerful nautical nation in the world.

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CAPTAIN G T SMITH-CLARKE (1884-1960): MODERNISING THE IRON LUNG; (1952)

ADRIAN PADFIELD

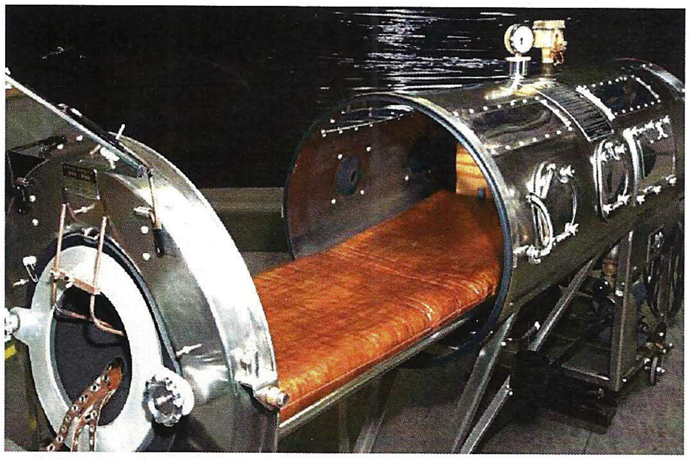

Fig.1 Emerson Iron Lung showing interior.

Introduction

The so called Iron Lung was devised by Drinker and Shaw in 1928, originally to treat patients overcome by toxic gases. A similar device, the Spirophore had been invented by a French physician, Woillez in 1876. When the Drinker was used for a child dying from respiratory paralysis due to polio, it soon became the method of treatment. A more sophisticated iron lung (fig.1) developed by Emerson a few years later shows the sturdy metal construction. A polio epidemic in South Australia in 1937 stimulated the inventor Edward Both to create a plywood version of the Drinker, which was both cheaper and easier to service. A visit to the UK by Both in 1938 and a link with William Morris/Lord Nuffield resulted in Nuffield turning over part of Morris Motors to the manufacture of Both cabinet respirators. These 'iron lungs' were supplied free to UK hospitals, to hospitals in the British Empire and elsewhere (including Russia). Figure 2 shows a Both belonging to the Birmingham Regional Hospital Board around 1950 by which time it was beginning to deteriorate.

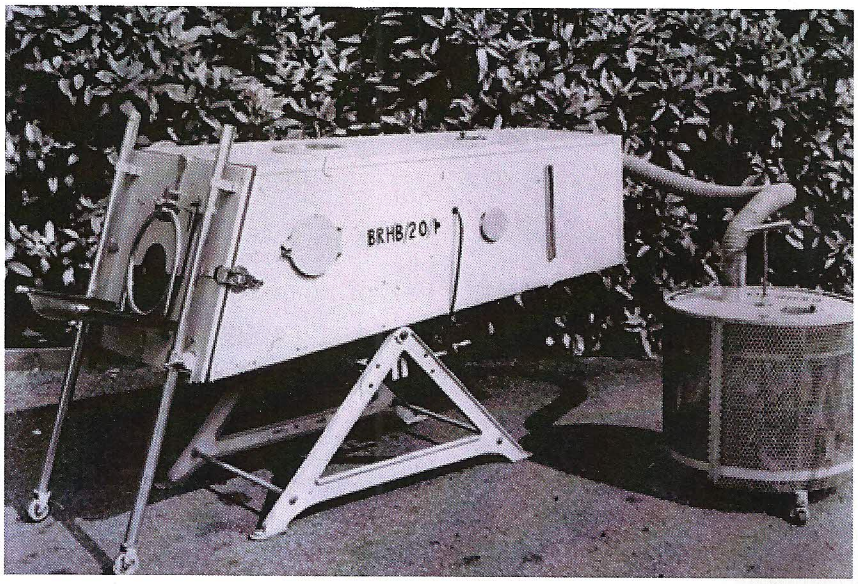

Fig.2 Both cabinet ventilator including pump.

G T Smith-Clarke

George Thomas Smith-Clarke (GTS-C) came from a humble background in Bewdley and never attended secondary school. In 1902 he joined the Great Western Railway in Swindon and advanced to become Chief Draughtsman in the Motor Department, Slough in 1913. In 1915 he joined the Aeronautical Inspection Directorate of the Royal Flying Corps and was promoted to Captain. (fig.3). He was an engineer of rare and wide ranging talent who had a notable career from 1922 as Chief Engineer of the Alvis Car and Engineering Company. He was not honoured in his lifetime but richly deserved public recognition and reward. I shall concentrate on his work with the 'Iron lung' after he had retired from Alvis in 1950 but there follows a short résumé of his medical involvement.

Fig.3 Capt G T Smith-Clarke in 1919.

In 1935 GTS-C became chairman of the Coventry & Warwickshire Hospital but he had already put his ingenious mind to solving medical problems and helping patients. In 1925 he applied for and obtained a patent for a 'Loud Speaking Telephone'. A modification of this was used in a home for deaf children. The headaches which had troubled him so much and because of which he had a sabbatical year in 1933 may have been cured by intra-nasal surgery. This was to be carried out under local anaesthesia but there were problems: the scissors being used by the surgeon were ineffective. GTS-C took the scissors away, redesigned them and took them back for the surgeon to use successfully. He also contributed to a book: 'The Eye in Industry' by Dorothy Campbell, an eye surgeon. When he retired from Alvis in 1950 he became more involved with health matters. He became vice chairman and then chairman of the Coventry, Nuneaton and Rugby Group Hospital Management Committee. He had an extensive workshop of his own and designed, constructed and developed several pieces of equipment most notably an angiocardiograph. Other items were a 'turnover' bed for burns patients, a hydraulic hoist for lifting patients out of baths and an extempore tool for removing a broken femoral pin. He made a stroboscopic device for eye testing and an electric trepanning cutter for neurosurgery with a pressure sensitive switch to switch it off when through the skull.

In 1952 the Senior Administrative Officer of the Birmingham Regional Hospital Board was concerned about the breathing equipment available in the event of a polio epidemic. GTS-C was coopted on to a sub-committee to study the problem and provide a solution. Birmingham Region had 48 Nuffield Both cabinet respirators, two Drinkers and others. GTS-C had been horrified when he witnessed the difficulties and unpleasantness a patient went through when nursed in the iron lung. It was decided that modifications were needed to the 13 year old Both machines. The pump unit, separate from the cabinet, was noisy and had impracticable speeds. Nursing staff complained that it was difficult to manage patients in the cabinet (only two portholes, too close to the patient's head and one small window) and there was no alarm. The five machines at the Coventry and Warwickshire hospital were selected for the preliminary alterations. Together with the hospital senior physicist and others, a machine was completely dismantled and GTS-C made drawings. Patterns for castings were created and the Managing Director of Alvis had the larger castings made and machined at the works, while GTS-C machined smaller parts in his own workshop. The pump speeds were made more useful

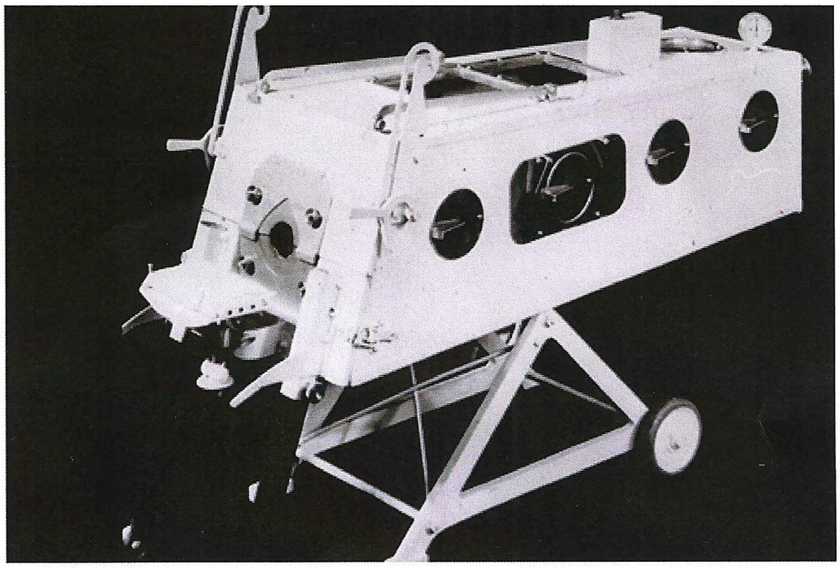

Fig.4 Modified Both ventilator.

and the pump made easier to work manually in the event of a power failure. Many modifications were made to the cabinet (fig.4), large windows, multiple portholes and small cork holes for drips & catheters, tilting mechanism, heating by electric light bulbs, rubber wheels and a simple patient alarm. All this was completed by GTS-C and his assistants between May and August 1952. The modified Both was inspected in mid August by members of the Ministry of Health. An MoH Working Party subsequently recommended that kits of parts to modify all Both respirators in the UK should be produced. Two former Alvis employees set up a company, Cape Engineering of Warwick to manufacture the kits. GTS-C acted as a consultant. He later completely redesigned the cabinet respirator (fig.5) which became known as 'The Alligator'. This design greatly simplified nursing pro-

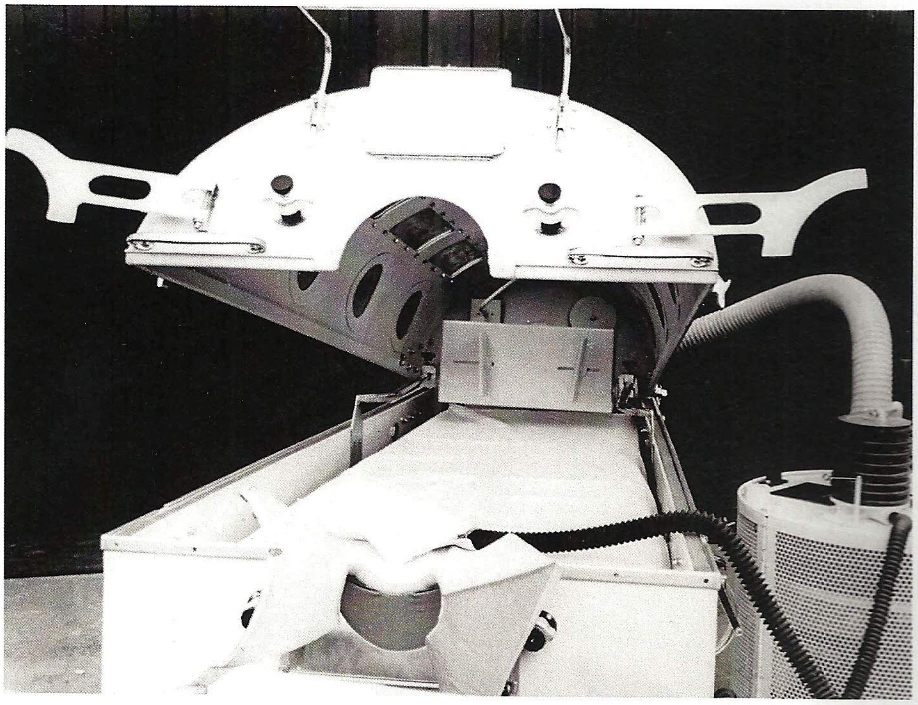

Fig.5 the 'Alligator' cabinet respirator

cedures and allowed the patient to be moved in and out of the ventilator with ease. It was built using the then new fibre glass but this material proved unsuitable and they reverted to metal. Child size alligators were also made.

All this and later work on what GTS-C at first called a 'junior respirator' and other devices were presented as 'The James Clayton Lecture': 'Mechanical Breathing Machines' at the Institution of Mechanical Engineers in December 1956. Because he was ill the paper was read for him by J O Williams the hospital physicist. A few words about this paper: there is an historical summary of artificial respiration which at that time perhaps no one in medicine could have bettered. He mentions the Humane Society and Charles Kite's apparatus for inflating the lungs. He even reproduced his own drawing of what he imagined Woillez' 'Spirophore' would have looked like. There is a short list of more modern equipment including Drinker's iron lung, pulsators, cuirasses & Eve's rocking bed.

Smith-Clarke died in February 1960. It was rumoured that he would have been honoured that year in the Birthday Honours. If ever a man deserved to be honoured he was one. Apart from his work during the First World War, his unstinting service for Alvis which included development of tanks and aero-engines just before WW2 and his help and advice to two Astronomers Royal, the work he carried out with the Both iron lung and the subsequent development of ventilators surely deserved national recognition.

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PRE-COLUMBIAN CLAY FIGURES

NASIM H NAQVI

During the last century a large number of clay figures belonging to ancient South American civilisations have been excavated . Some seem to have a medical connection; a few for instance illustrate human pathology or deformity while others may show an individual undergoing specific treatment. There is no agreement between anthropologists and historians as to the purpose or function of these objects. It is speculated that they might have been educational tools; alternatively they may have been religious offerings to the gods. These figures have been excavated in such huge numbers that genuine artefacts are now freely traded on the internet and sold to collectors or to the public as pieces of curiosity. I myself acquired two of these clay figures that clearly demonstrate recognisable pathology.

Fig.1 Inca skull showing a large trepanation. This would have been performed using trepanation knives or 'tumi' such as these.

Fig.2 Mayan dental work showing inlaid jewels.

The majority of such figures are pre-Columbian, on average about five to six inches tall and crafted in a variety of poses. They have been excavated from sites belonging to the Aztecs, Incas and Mayans and other civilisations that flourished in South America before colonisation. There is a fair amount of overlap in the geographical boundaries of these empires but they stretch from New Mexico to large parts of the South American continent. Similar overlap is observed in the history and time periods of these civilisations. Their medical achievements based on the archaeological evidence may be summarised under four main headings:

i) *Trepanation (fig.1)* This appears to have been widely practised and numerous skulls showing trepanation have been found, many of which show re-growth of bone.

ii) *Dental surgery (fig.2)* Skulls showing precious stones inlayed in teeth have also been discovered indicating dental surgical skills.

iii) *Bone setting (fig.3)* Pre-Columbian bones have been found with fractures that apparently been broken, realigned and set.

iv) *Coca leaves* While there is no evidence for the use of coca leaves as local anaesthetic at this time we know that such medication was used for 'treating' thirst, hunger and fatigue.

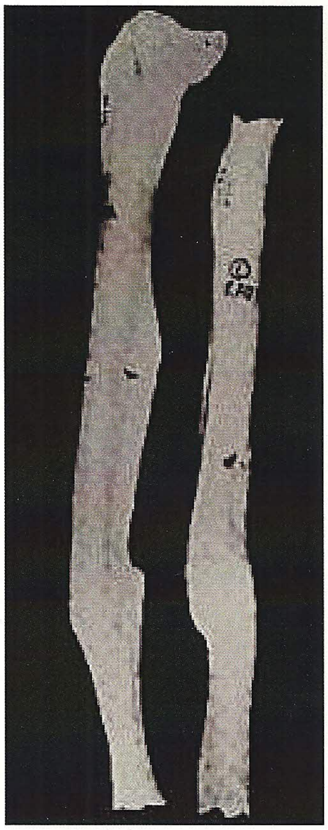

Fig.3 Bones apparently showing signs of reduction and re-alignment.

Following this very brief introduction to the medical practice of ancient American cultures the two clay figures in my possession are described below.

Fig. 4 figure of a man with skin lesions.

The first object (fig. 4) is a figure made of red clay of a man in the sitting position. The figure allegedly belongs to the 3rd or 4th century CE. The attached label also states that it came from Colima, a major historical city on the west coast of Mexico. The figure is about five inches tall and the subject appears to be markedly disfigured by some form of skin disease. Multiple lesions appear all over his body. These cannot be due to smallpox because this disease was not introduced until the sixteenth century, by the Spanish conquistadors.

Fig.5 figure of a Mayan man with ascites.

The second clay figure (fig.5) is of another male, in a standing position. According to its label it allegedly belongs to the Mayan period from the 7th to 9th CE. The workmanship is fine and delicate and typical of the Mayan period. It is a little shorter than the previous figure and like it is mounted on a modern wooden pedestal. The swollen abdomen of the subject would seem to represent ascities.

Fig. 6 figure of a Mayan woman self-administering an enema.

A search of the internet reveals many similar figurines. Two further examples are shown: i) a woman self-administering an enema (fig. 6) and ii) a man who almost certainly has coca leaves in his cheek pouches (fig.7).

Fig.7 figure of a man with coca leaves in his cheek pouches.