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Editoriai

This valedictory editorial records the Society's debt of gratitude for the financial support given to the birth of *Vesalius* by the Societas Belgica Historiae Medicinae. In its infancy it was nursed by Professor Appelboom and his staff at the Musée d'Histoire de la Médecine of the Erasmus Hospital, Brussels with the generous and very competent help of Diana Gasparon as matron. The time has now come for the burden of care of its child to be undertaken by the whole Society.

When Professor Appelboom and Diana Gasparon resigned, the Editorial Board, after careful consideration, advised that the best interests of members would be served if the future printing of the journal was moved to Messrs David Winter of Dundee, in Scotland. This firm offers high quality and will undertake the distribution of the journal directly from its presses at competitive rates. The list of paid up members will in future be supplied to them by the Honorary Treasurer via the Honorary Secretary before the publication of each issue.

Volume I, Number I was published in June 1995. Retirement as Editor with the publication of the 14th number in the December issue of 2002 was made possible by the agreement to transfer editorial responsibility to Dr David Wright of Edinburgh, currently editor of the Report of Proceedings, *Scottish Society of the History of Medicine* and Review Editor of *Vesalius*. The hand-over has begun with his full co-operation. Dr John Blair has ably managed the arduous complexities of the working transfer, supported by Ailsa Blair as amanuensis extraordinary. In the absence of the appointment of any firm candidate as French Language Editor, Dr Alain Segal has kindly agreed to act as *locum tenens* in the interim period.

The Editorial Board received recognition that the editors alone would remain responsible for the content of the journal and that their decisions in this matter, in accordance with customary practice, were to be final. Members of the Editorial Board agreed to play active parts, undertaking specific roles in the work of publishing the journal. Appointment to the Board was to be more than nominal.

Over the past seven years it has been a great joy to watch *Vesalius* develop as an internationally accepted, peer-reviewed journal of the history of medicine.

Patient contributors and forgiving readers, many thanks !

Cet editoriai d'adieu reconnaît le débit de gratitude de la Société pour l'appui financier offert au moment de la naissance de *Vesalius* par Societas Belgica Historiae Medicinae. Soigné pendant sa petite enfance par le Professeur Appelboom et son personnel au Musée d'Histoire de la Médecine de l'Hôpital Erasme, à Bruxelles avec l'aide généreuse et suprêmement compétente de Diana Gasparon en rôle de surveillante générale. Le moment est enfin arrivé pour que le fardeau de responsabilité soit assumé par la Société entière.

Après les démissions du Professeur Appelboom et de Diana Gasparon, le Conseil Editoriai a recommandé, après mûre réflexion, que le meilleur moyen de servir les intérêts des membres serait de transférer l'édition du Journal à l'entreprise de Messrs Winter de Dundee, en Ecosse. Cette entreprise offre une qualité élevée et entreprendra la distribution du journal en direct de ses presses à un prix compétitif. La liste des abonnés leur sera fournie à l'avenir par le Trésorier Honoraire via le Secrétaire Honoraire avant la publication de chaque numéro.

La publication du Tome I, Numéro I a eu lieu en juin 1995. Ma retraite du poste d'Editeur au moment de la publication du quatorzième numéro, c'est-à-dire celui de décembre 2002, a été rendue possible par l'accord de transférer la responsabilité au Docteur David Wright d'Edimbourg, à présent éditeur du Rapport des Débats pour la Société Ecossoise de l'Histoire de la Médecine et Editeur de Révision de *Vesalius*. La passation est en marche avec sa coopération totale. Le Docteur John Blair s'est chargé admirablement des maintes complexités de transfert du travail avec l'appui d'Ailsa Blair comme amanuensis extraordinaire. En l'absence d'aucune nomination définitive pour Editeur de langue Française, le Docteur Alain Segal a aimablement accepté de servir de *locum tenens* dans l'intérim.

Le Conseil Editoriai a reçu des assurances que les éditeurs seuls maintiendront la responsabilité du contenu du journal et que, conformément aux habitudes courantes, leurs décisions à cet égard seront sans appel. Les membres du Conseil Editoriai ont accepté d'y jouer des rôles actifs en se chargeant de tâches spécifiquement liées à la publication du journal. La nomination au Conseil doit être plus que nominale.

Il m'a donné un grand plaisir, pendant les sept dernières années, d'observer le développement de *Vesalius* en un journal de l'histoire de la médecine qui est à la fois internationalement accepté et professionnellement reconnu.

Collaborateurs patients et lecteurs compréhensifs, je vous remercie tous !

Dr John Cule, Editor

The Présidentes Proposais

THESAURUS METABLETICUS HISTORIAE MEDICINAE

Lors du Conseil d'administration de Paris de juin 2001 un nouveau projet a été lancé au sein de la SIHM - l'organisation de plusieurs groupes de travail thématiques. Ce projet aura pour nom : *THESAURUS METABLETICUS HISTORIAE MEDICINAE*. La métablétique (du grec metaballein, changer) concept récent, est l'étude du changement. L'homme du début de ce troisième millénaire peut parfaitement se rendre compte de ce que devient malade et ce qu'empêcher de le devenir signifie pour lui, mais aura plus de difficultés à admettre le fait que sa façon de réagir à la maladie diffère fondamentalement de celle de ses ancêtres. Le métabléticien tend à démontrer qu'au delà de domaines bien limités certaines évolutions analogues ou identiques peuvent se reproduire. Ainsi des changements en médecine peuvent-ils aller de pair avec des changements en d'autres disciplines telles que la philosophie, la psychologie, la sociologie, l'éthique, les arts et lettres, etc.

L'histoire de la médecine ne peut donc se limiter à l'étude stricte de certaines découvertes ni à l'élaboration de quelques biographies de médecins célèbres (histoire intrinsèque). L'apport extrinsèque est tout aussi important et on pourra ainsi parler de véritables 'Humanités (pluridisciplinaires) médicales.' Cette information globale doit pouvoir être récoltée et diffusée. Deux grands groupes de travail peuvent ainsi être constitués. L'un s'occuperait de sélectionner l'information pertinente (histoire extrinsèque et intrinsèque), et de garantir que cette information se perde pas (problématique de la disparition progressive des livres et des revues et de l'avènement universel de l'information électronique souvent incontrôlée). L'autre groupe s'occuperait de la diffusion et du partage de l'information, donc essentiellement de l'enseignement et des publications. Un 'Conseil de Jeunes' aurait son rôle à jouer tant dans la récolte de l'information (recherche) que dans l'appréciation de la divulgation (travail critique et constructif). Vos réflexions concernant ce projet sont les bienvenues.

At the meeting of the Administrative Council in Paris of June 2001 a new project was launched in the ISHM : the organisation of some thematic workshops. We'll name this project : *THESAURUS METABLETICUS HISTORIAE MEDICINAE*. Metabolics (from the Greek metabellion, 'to change'), is a recent concept used to describe the study of change. At the beginning of the third millennium people realise what it means to be sick and to try to prevent it, but it is much more difficult to admit that the way we react to sickness differs fundamentally from that of our ancestors. The metabletician tries to demonstrate that beyond well-limited domains, analogous or identical evolution can recur. In that manner changes in medicine can parallel changes in other disciplines like philosophy, psychology, sociology, ethics, the arts and literature, for example.

Also the history of medicine cannot be strictly limited to the study of some discoveries or to the elaboration of biographies of some famous doctors (intrinsic history). The extrinsic contribution is equally important and so we can speak of 'multidisciplinary medical humanities.' This global information has to be gathered and shared. Thus two main workshops can be constituted. One would select the relevant information (extrinsic and intrinsic history) and hence ensure that this information would not be lost (the problem of the progressive disappearance of books and journals and of the universal appearance of the - mostly uncontrolled - electronic information). The other group could explore the diffusion of the information and how it is dealt with, i.e. essentially teaching and publication. In both matters a Council of young scholars and researchers of the ISHM could play a role in research concerning the gathering and constructive criticism concerning its sharing. Reflections concerning this project are welcome.

Prof Jean-Pierre Tricot, Catholique University of Louvain, Belgium.

Report on the 38th International Congress on the History of Medicine 1-6 September, 2002, Istanbul.

Istanbul was wonderful. It is indeed a fabulous city, placed uniquely between western and eastern worlds, with timeless treasures, yet distinctly modern. We who were there could enjoy both the world of medical history within the lecture halls and the awe-inspiring buildings and palaces of great empires without.

A sterling feature was the huge amount of support given by the Turkish government, the Ministry of State, but also by the Ministries of Culture, Health and Tourism, who organised and gave the dinners. And so every day and evening included a visit to one of the museums or palaces, with tempting food and enjoyable Turkish music, setting a standard it will be hard to emulate.

Sunday 1st was taken up with Board Meetings. The Executive Board meetings followed the usual lines, and in the afternoon the Administrative Council met, with national delegates present. The president tasked the vice-presidents to study the society regulations and report back to him, and significant anomalies were discovered by them such as differing rules in French compared to the English version, which he later again tasked them to study further over the subsequent months. The welcome ceremony in the evening at 1700 hrs was in the Istanbul Archeology Museum, where the Minister of Culture, Professor Suat Caglayan addressed the delegates. The museum displayed many items of Medicine in Antiquity, prepared by Halil Ozek and colleagues, and the evening included a fine concert sponsored by the Culture Ministry and given by the Turkish Music orchestra. This splendid evening set the pattern.

Monday 2nd had an opening ceremony of welcome and inauguration by Dr Resat Dogru at 10 o'clock, followed by the first sessions of papers - false historians, Turkish hospitals, surgery of antiquity, culture art and medicine, alternative medicine, nursing, paleopathology, war and medicine, women in medicine.

The president, Professor Jean-Pierre Tricot, gave his address to delegates during lunch by reading his speech in French and English and detailing his ambitious project. He wished it to be made known to everyone, and so it is given in full above.

On Monday evening there was a concert on 'European Music at the Ottoman Court', introduced by Emre Araci, by the Borusan Chamber orchestra in the Cemal Resit Rey Concert Hall. On Tuesday 3rd we all enjoyed a magnificent cruise on the Bosphorus, with music and dinner.

Wednesday 4th, the day of external events, included a tour to the Topkapi Palace when two exhibitions specially made available for delegates were seen — The Healing Shirts of the Sultans, prepared by Dr Hilmya Tezcan, and the Room of the Chief Imperial Physician, prepared by Ferda Albek. Lunch was in the famous Konyah Ottoman restaurant, and in the afternoon a visit to another exhibition, of manuscripts selected from the botany,

pharmaceutical, and veterinary collection at the Suleymaniye library. As striking an exhibition as any was that shown in the evening. It was opened by The Minister of Health, Associate Professor Osman Durmus.

During this afternoon, Drs J. Cule and J. Blair, and Professor J. Pearn, were interviewed by Turkish television and the news programme appeared next day.

This was a History of Medicine seen through miniature pictures, which Dr Sari had commissioned to be painted specially. This was in turn followed by a concert arranged by the Culture Ministry, played by a small orchestra of stringed instruments together with a military band clad in bright red uniforms, in the Military Museum and Culture Centre. The Whirling Dervishes showed the power of their dancing. Yet another excellent dinner followed.

The social finale was on the 5th. The Gala dinner had everything such an event required, and was enjoyed by all. It was in the Cliragan Kempinkey Hotel, a former palace.

As well as all these, provided by our Turkish hosts, were daily trips to sites in the old and modern parts of the city.

But each day had its full quota of papers and presentations. Some were shorter than usual, allowing more contributors to have their say, and the themes were: Reappraisal of Medieval Medicine, History of Medical Philosophy, Health Politics, Legislation and Institutionalisation, Medicine in the Near East through History, with emphasis on Famous Anatolian Physicians and Pharmacists, the Relation between Turkish Medicine of the Eastern and Western Worlds in the past, Historical Sources of Complementary Medicine, and various other subjects of interest. 437 papers were presented.

Exhibitions of 79 posters and other items were a special feature of this Congress, and the standard was high. Three posters won a reward giving them free attendance at the next Congress in Bari. They were regarded not only as perfect presentations with respect to their text and illustrations, but also as contributions to medical history. The winners were:

1. Eric Martini (France): Vasco da Gama, the First Sailor to record Scurvy, reported the effectiveness of Oranges and Lemons,

2. Jose Doria, Hugo G. Silva, E. Pina, (Portugal) : La Delegation Turque, Le Dr Zambaco Pacho a Son Rapport sur La Lepre au XVe Congress Internationale de Medecine et de Chirurgie.

3. Gul A. Russell (USA/Turkiye) : The Source of Locke's Theory of 'Associative Learning' : New Evidence.

I am happy to have written this report at the special request of Professor Nil Sari. We have in common that we have shared the anxieties and the hard work such a congress demands of the organisers. I can say without hesitation that Nil has done a first-class job, both in the logistic detail and the width of experiences and scholarship offered in the programme.

Thanks too to Yesim Ulman, Congress Secretary, who answered all demands made on him. With them we thank Esin Kahya, Ali Haydar Bayat, Sevgi Sar, Oztan Oncel, Ibrahim Basagaoglu, Aysegul Erdemir and Ayten Altintas, the Executive Committee.

Cnidus, the Organising Body, must not be forgotten, and we all felt things were safe in the skilled hands of Mrs Sibel Arican and her colleagues. J. S. G. Blair

Report on the pre-Congress Tour to the Dardanelles, Troy and Bursa

This was a small tour but one full of interest. The guide, Tolga Koseoglu, took the party over the Sea of Marmara to Gallipoli, where the First War battlefields were visited and the wonderful words of Ataturk towards the dead of both sides in the contest touched us deeply. Surely there is no other major site with such an unselfish tribute to both friend and former foe.

Troy was seen in all its historic periods, with the various different architectures of old and its modern Wooden Horse. Bursa is at the centre of the Turkish silk industry, and shopping here was an experience.

Report on the Post-Congress Tour to Seljuk Medical Sites

Immediately following the 38th International Congress in Istanbul, the Congress president, Professor Nil Sari, led a group of scholars on a survey of Seljuk medical sites in east-central Turkey. Built in the first half of the thirteenth century, the sites consisted of medical schools and hospital complexes, usually conjoined with other centers of scientific learning and with mosques. Most of the sites are less well known than they deserve to be, even among scholars of medical history. Collectively they represent institutional and architectural expressions of a significant Seljuk commitment nearly eight hundred years ago to the goals of improving public health and advancing medical knowledge.

The first site visited, the Gevher Nesibe medical school and hospital in Kayseri, was also the oldest, and it proved to be a prototype for other medical centers of that region. Built in 1206, Gevher Nesibe combined patient care with physician training, scientific research, medical writing, spiritual support, and religious functions. Like similar and larger centers built later in Sivas and elsewhere, which the group also visited, impetus for the Gevher Nesibe came from an influential woman, in this case the dying daughter of a sultan.

Perhaps the most impressive site the group visited was Turan Melek, which began taking patients in 1228. Turan Melek is located in Divrigi, a once heavily fortified city perched near the headwaters of the Euphrates River, where it guarded a key pass on the ancient trade routes from India and Persia overland into central Anatolia.

Attached to a magnificent mosque of the same period, the Turan Melek complex is regarded as one of the brightest surviving jewels of Seljuk architecture. Distinctively Seljuk motifs decorate some of the most impressive portals in all of Turkey. Though dangerously neglected for centuries and still approached today from a gravel street, the Turan Melek complex has recently been recognized on the United Nation's list of world cultural heritage sites. With its lovely fountain system and its warm sandstone exteriors, this venerable center of international medical care surely deserves the designation.

Between Seljuk sites, the group stopped to see points of medical interest from other eras as well, including the oxygen-rich caves of Tokat, with their spectacular mineral formations, and the ancient city of Amasya, where impressive museum collections document the practice of medicine in that area from the time of the Hittites. For sheer fun and curiosity, nothing beat a side trip to the healing pools of Kangal. Fed by mineral springs that maintain a constant temperature between 37 C and 39 C, these selenium-rich waters contain an evolutionary unique population of small fish that eat dead, diseased, and disturbed skin from any body parts immersed in their domains. Regular patients spend three weeks in the pools, exfoliating and regenerating; the international medical history group spent only about an hour. Nonetheless, the sight of international scholars experiencing for themselves the truly bizarre, though surprisingly pleasant and strangely electrical, sensation of being super-cleaned by small fish is a sight never to be forgotten.

At every stop during four days of densely packed activities, Professor Sari had arranged to have top local experts offer walking tours and historical insights. She even arranged for the region's leading expert in the local cuisines of east-central Turkey to plan and oversee superb meals, which were hosted by provincial governors and city mayors in a variety of charming surroundings that ranged from nineteenth-century Ottoman homes and gardens to breath-taking cliff-side viewpoints. Her attention to such matters, both academic and social, made the expedition a model that might be wonderful to emulate in future years. Prior to the trip, the only common denominator of the group had been their separate efforts to help make the 38th Congress a success, some as members of the international scientific committee, others as ISHM counsellors, panel organizers, and the like. By the end of the trip, the scholars who went with Professor Sari had become good friends under ideal conditions. Those relationships should continue to pay valuable dividends for the world of medical history well into the future.

James C. Mohr,
Arts and Sciences Distinguished Professor of History,
University of Oregon, USA.

Merlin Pryce (1902-1976) and Penicillin: An Abiding Mystery

Dr Emyr Wyn Jones and Professor R Gareth Wyn Jones

SUMMARY

In the scientific and medical pantheon few have received more adulation and honour than Sir Alexander Fleming. Even so it is abundantly clear that his triumphant discovery of penicillin owed much to the work of others, especially Florey and Chain, who accomplished the difficult task of taking penicillin from the test tube to patient. This essay does not attempt a detailed re-examination of that discovery. Rather the present study suggests that even the initial observation on that critical day in September 1928 and its subsequent ramifications were even more complex and perplexing than the accepted version. It is likely that Professor Daniel Merlin Pryce, a somewhat unconventional but gifted son of the Welsh mining valleys played an important, quite possibly a crucial, role in that original observation. However one which, except for a very few occasions, he himself sought to downplay, even virtually to deny.

RÉSUMÉ

Dans le panthéon scientifique et médicale, peu sont eux à recevoir tant d'éloges et d'honneur que Sir Alexander Fleming. Il est tout à fait clair, néanmoins, que la découverte triomphante de la pénicilline doit beaucoup aux efforts d'autrui, en particulier de Florey et Chain, qui, eux, ont accompli la tâche difficile de transférer la pénicilline de l'éprouvette au patient. Cette dissertation ne propose d'approfondir l'examen détaillée de cette découverte. L'étude actuelle indique plutôt que même l'observation initiale qui eut lieu ce jour critique de septembre 1928, et ses ramifications, étaient encore plus complexes et embarrassantes que dans la version reconnue. Il est bien probable que le Professeur Daniel Merlin Pryce, fils plutôt non-conformiste mais doué des vallées minières galloises, a joué un rôle important, voire capital, dans cette observation originale, rôle qu'il voulait pour la plupart minimiser, même nier.

THE TRAIL

A hint that Merlin Pryce's contribution to the discovery of penicillin might have been underestimated came in correspondence from Dr J. Hirwain Thomas, a retired consultant from Porthcawl in Wales. He referred to a short article that had appeared in his local Welsh language paper [*Papur Bro*] ~ *Yr Hogwr*, (1) by D. Vivian Thomas titled - "*Penisilin: Y Cysylltiad Cymreig*" - (Penicillin: The Welsh Connection) which claimed that Professor Merlin Pryce's contribution was much more significant than commonly believed.

Through the good offices of Dr Hirwain Thomas a direct approach was made to Mr D. Vivian Thomas and to his mother-in-law, Mrs Hilda Jarman [H.J.] Merlin Pryce's sister. Contact was also established with Professor Pryce's son and two daughters - Ms. Ann (Sian) Pryce [A.P.], Mr Edward Llewellyn Pryce [E.P.], both of London, and Mrs Eira Pryce-Anderson [E.P.-A.],

who lives in Copenhagen. All family members proved exceptionally helpful, submitting long written reports, sending copies of family documents and answering patiently additional telephone questioning.

Jointly they provided a picture of home life and illuminated their father's relationships with notable professional colleagues. The present paper, drawing on this and other documentary evidence is concerned with Daniel Merlin Pryce himself, his scientific and personal relationship with his 'chief' - Sir Alexander Fleming and the initial phase of the penicillin story.

MERLIN PRYCE'S LIFE

Born at Troed-y-Rhiw, Glamorgan, on 17 April 1902 to Rachel and Richard Pryce who kept a local tavern, Merlin was first educated at Merthyr Tydfil County School before moving to Pontypridd Grammar School for Boys. As a seventeen year old he started his pre-clinical

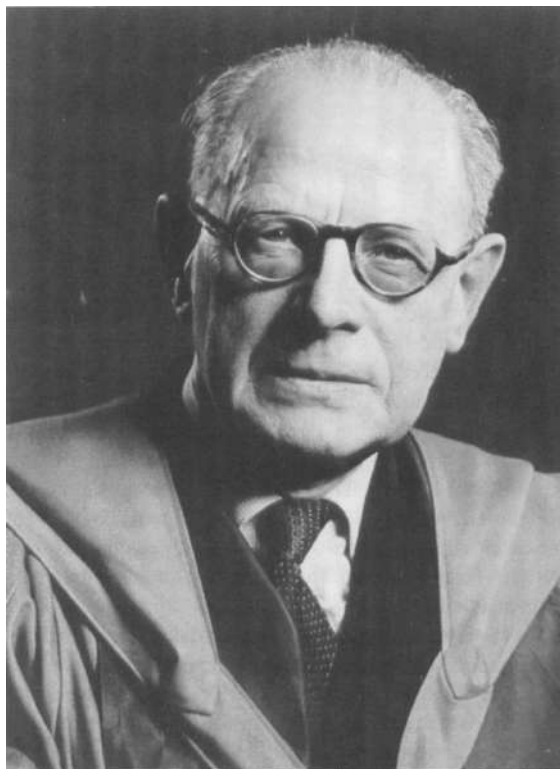
studies at the Welsh National School of Medicine in Cardiff, concluding his initial medical course at St. Mary's Hospital, London in October 1922. He took the Conjoint Diploma in January 1926, and passed the final M.B., B.S. degrees of London University the following November.

Early in the 1920s Merlin and his sister, Hilda, moved to London and were soon followed by their parents who started a small business in Ealing in 1925 where the four members of the family shared the home. In 1927 Dr Pryce was appointed to a Junior Research Scholarship under Alexander Fleming in the Bacteriology Department. According to Hospital Records he was later appointed 'Second Assistant Pathologist' - a 2-year post - under Professor Newcomb on 19 April 1928. He spent three years in the Department of Chemical Pathology, as assistant to Dr Roche Lynch, before being appointed 'First Assistant' in 1933, a post involving teaching duties. He was awarded a M.D. in Pathology from London University in 1935. Throughout the war he was responsible for pathological services in the section of St. Mary's that was transferred to Harefield and Amersham Hospitals but continued teaching. In 1948 he became Reader in Pathology, and six years later, when Professor Newcomb retired, he was appointed to the Chair.

It had been a long and, no doubt, arduous journey from Troed-y-Rhiw to his Professorship, but on his retirement in 1967, Merlin Pryce could look back with quiet satisfaction on forty years of distinguished service to the medical profession as morbid anatomist and to St. Mary's.

Some understanding of Pryce's personal qualities and his home life are essential to understanding his relationship with Fleming and the discovery of penicillin. In the present context, they are more important than his research and publications in pathology.

Pryce was a devoted St. Mary's man from his early student days to his elevation to the Chair in 1954; an event greeted with delight by his colleagues. He does not appear to have initiated any new fundamental research projects although pioneering the use of twin diffraction rings in measuring the size of red corpuscles and a method of growing tubercle bacteria. Rather he shone as an excellent teacher of generations of medical students. His students and colleagues held him in respect and warm affection, recalling his teaching as 'practical and matter of fact', his 'sincerity and integrity' - and his modesty and self-effacement. Retrospectively Pryce's colleagues admit that, in spite of the efficiency and success of his department, 'he had to make the best of accommodation that could only be described as



Professor Merlin Pryce

inadequate'. By nature and conviction he was a co-operator rather than competitor. In his obituary in the *St Mary's Hospital Gazette* (2) his colleague, R.R. Wilcox, pays tribute to 'his larger qualities of warmth, sincerity, tolerance and love of his fellow men - and above all that of his family. Above all he was a brave man.' The tribute concludes by stating that his departed colleague 'seemed to have been a permanent feature on the St Mary's scene, - All salute the passing of one of St Mary's best loved and stalwart sons'. One of his oldest friends and colleagues commented, after knowing him for close on half a century, that 'he brought his Welsh warmth, laughter and kindness, and professional integrity to his chosen place of work, and over the years he was one of those who made it a pleasant place to be in'.

In July 1934, a few months after being appointed First Assistant in the Pathology Department, he married Molly Whelan, who was a constant source of strength and encouragement to him. They had three children, Ann, Edward and Eira. All three are alive and well, and cherish happy memories of their father and mother and a home atmosphere of enquiry and encouragement. They regard their father as 'a great man and think that he deserves better recognition' ... 'Always helpful but he was very modest, rather reticent and perhaps a bit of a dreamer [A.P.], did not conform to the establishment [E.P.] and, by universal agreement, an idealist. Although reticent and modest and deeply committed to his work, he was gregarious rather than a loner [H.J., A.P.]. All stressed that he was never rude or sarcastic at home, or with the students at St Mary's always insisting on the children's need to be truthful while setting them an example himself. He was both humane and humorous

and encouraged his family to enjoy 'a very wide range of interests.... loved classical music....'Art Galleries and Museums' and 'to the great Italian and French films' [E.R]. His interests extended to learning German, Italian and finally modern Greek.

As a young man he had an ambition to become a geologist and discovered the remains of an Ichthyosaurus [E.R]. This was later translated into an attachment to all forms of natural history, a love of mountains and archaeology and hence possibly his love of rock climbing and museums. He could not bear languid, idle holidays.

Pryce had a long wait for professorial recognition. This tardiness is almost certainly not a reflection on his ability. It has been suggested that Pryce's reticence and shyness, which persisted in spite of his professorial success, was the result of his social background and an awareness of his lack of a public school education compared with most of his counterpart colleagues at St Mary's. On the other hand it could simply have arisen from his desire to attain preferment within St Mary's. There was an influential Masonic Lodge there at that period comprising many consultant staff. Pryce was pressed to join but, although well aware of the advantages, declined to do so.

Of much greater importance in this context might have been his commitment to Communism, probably extending back to his student days in Cardiff, and perhaps even a little earlier. As a youth he could not fail to have been aware of the enormous tension in the south Wales coalfield during that period. His awareness of the impact of deprivation and suffering did not lessen with the passage of time. He welcomed with enthusiasm the advent of the National Health Service, and indeed worked hard to expedite its coming. One may safely assume that most of his consultant colleagues were vehemently opposed and concurred with the stubborn early resistance of the BMA. Nor was his advocacy merely theoretical. In later years, when he needed vascular surgery, he insisted on being a patient in a general ward in St Mary's, and enthusiastically praised the care that he had experienced.

The exercise of staunch humanitarian principles was an abiding feature in the Pryce home. When the home of Alexander Fleming, transiently his former Chief at St Mary's Bacteriology laboratory, was bombed and severely damaged in March 1941, Fleming and his first wife, Sareen, were offered immediately accommodation at the Pryce's home and stayed there several months. Happily Molly and Sareen, both Irish and former nurses, were on excellent terms. During the war Molly undertook activities that brought her in contact with a

number of unmarried mothers. Molly and Merlin took them in and gave them shelter and comfort in their own home during the late stages of pregnancy, and after delivery, received them back, if necessary, for a period of convalescence. In turn they would help with the children. To the consternation of their neighbours, the Pryce's used to invite German prisoners stationed locally to tea. The local condemnation did not deter their conciliatory gestures.

During his last years he suffered much from hypertension and its progressive complications. Although he had retired, he undertook locum duties as hospital pathologist for colleagues in the London area. He zealously maintained his links with St. Mary's and resumed his research on coagulation of the blood.

Daniel Merlin Pryce died on 8th February 1976 and was cremated at Golders Green Crematorium; but his life also was celebrated in a funeral service at a Roman Catholic Church. At that service his close friend for over thirty years, Lord Porritt, formerly Senior Consultant Surgeon at St. Mary's Hospital, and later President of the Royal College of Surgeons of England, paid an eloquent tribute to his colleague.

THE GREAT EVENT

Other young men and women have trodden a similar path to academic recognition overcoming difficulties and disadvantages. However, one event makes Merlin Pryce's story unique; because, as a young doctor he was directly involved in a great discovery - perhaps the greatest discovery, in the history of medicine.

As a junior researcher in Fleming's Department in 1927, he was directed to undertake a special study of the *Staphylococci* - and their variants. Macfarlane (3) emphasises how closely Fleming and Pryce worked together culturing staphylococci from various sources for further study. Pryce's scholarship was a short term rotating appointment; consequently he had to leave the Bacteriology Department between February and April 1928 to gain experience in the Haematology and Pathology Department. Nevertheless both men had become lifelong friends despite the differences in their status and age.

It is at this point that the histories of Pryce, Fleming and Penicillin become intertwined as recorded by Maurois in his 'official' biography (4), as Pryce was present at the crucial moment when Fleming first noticed and then decided to subculture the strange mould.

Pryce annotated his personal copy of the Maurois' biography. Some of the comments are of minor significance, such as changing the word mutants to

variants; substituting 'scalpel' with 'loop'; asserting that 'Flem was one of the *tidiest* of workers and because of this, well able to work efficiently in a small lab even often shared with another (First Todd &)' With regard to 'stifling' in the tiny room [in a previous paragraph], Pryce wrote 'Balls! the door was always open.' Incidentally, the 'window which looked on to Praed Street' which [Fleming] 'would open', and through which the offending mould was said to have drifted, had never been seen open. Other observers claim it was 'because [the window] was inaccessible'. But the window became part of the myth!

More significantly commenting on Fleming's revisiting the work on staphylococci, Pryce wrote in the margin - "This has nothing to do with the resumption of work by Flem. on 0. Flem wished to quote me as saying that the variants were stable. Biggar said that in his paper but I had not set out to verify this and would not commit myself, and would not say yes tho. F repeatedly asked me to. This is when he came over to the blood lab to see me about it. If I had said yes (and it would have been easy to say so) there w'd have been no P'in".

Fleming published the first paper on the penicillium mould in 1929 (5) with only the mildest therapeutic suggestion - 'It may be an efficient antiseptic for application to, or injection into, areas affected by penicillin-sensitive microbes'. It received little attention. The 'discovery of penicillin' - the substance that had destroyed the culture of *staphylococci* growing on the famous mould-infected Petri dish - lay largely dormant for more than a decade, although various scientists sought to purify and exploit the active ingredient without success. In 1940 Howard Florey and Ernst Chain and their colleagues in Oxford successfully addressed the problems of purification and assessing the therapeutic value of their purified penicillin and later its production in adequate quantity and quality. Only then did observation turn into revolution as Fleming himself recognised (6).

The first official biography of Fleming in 1959 was prepared by Andre Maurois at the invitation and with the active support and assistance of Lady Amalia Fleming, his second wife. The book (4), translated from the French by Gerard Hopkins, received international acclaim and attained an enormous circulation although it was clearly evident that the distinguished author was somewhat handicapped by lack of knowledge of bacteriology. It became the original 'authorised' *version* of events.

There followed a vast 'Fleming' bibliography (see refs 6-12.)

Despite all these publications a number of mysteries remain, some personal and some scientific. What was precisely Merlin Pryce's role on the fateful day in September 1928? Indeed, is there convincing evidence to support Vivian Thomas' more ambitious claims for Merlin Pryce? And why did he appear reluctant to take any credit for participating in the crucial discovery?

In order to examine these issues further, we will need to turn in part to the testimony of the Pryce family but also to the correspondence between Merlin Pryce and Professor Ronald Hare in the late 50's and 60's. We will also need to appreciate that, not only was much luck and some serendipity involved in the crucial observation, but also some scientific confusion.

FAMILY TESTIMONY

As already noted, Merlin Pryce's three children - Edward, Ann and Eira [Elizabeth] had been very helpful in presenting a full picture of their father's life. They were born between March 1936 and January 1940, so that they became aware of progress in clinical exploitation of penicillin, which was important institutionally to St Mary's Hospital as well as to the family, as young children. This caveat has to be borne in mind with regard to the timing and reliability of such recollections.

"Penicillin was a natural fact of our lives as we grew up but Father didn't refer to it. Usually his students or colleagues would ask when they came for a meal. So from early on, and I can't say how early but extremely early, we knew something about penicillin." However, there was no expression of satisfaction or pride at all. He just described it as it happened, i.e. an extraordinary event that he noticed ... as it happened — genuinely and sincerely ... "[E.P.A.]

Unfortunately no early family letters, documents or any written evidence that would provide that so important link to the Petri dish, are extant. It was clear in their view that 'it was [their father's] decision not to accept and receive joint recognition with Fleming.'

Eira Pryce-Anderson recalled that

"my father *never* talked [spontaneously] about his part in penicillin. He was modest ... [However] he [Pryce] told the story, which I can clearly remember, when persuaded. The first time when I was 14 ... and the second time when I was 18. The time of the second occasion was within 7 years of father's retirement from the professorship of pathology. On both occasions (he) told the story exactly the same way—He knew, it seemed, the story by heart.'

There is complete agreement on the warmth of their family's relationship with the renowned 'Flem' and his first wife, Sareen. Later Merlin Pryce's personal copy of the Maurois biography bears a message in Lady Amalia Fleming's hand: To my husband's loyal friend with my affection and all good wishes. Amalia.'

Further family evidence is offered by Mrs Hilda Jarman, Merlin Pryce's sister, on 13 August 1998. She started her story with their joint move to London when her brother began his clinical studies at St Mary's. She remembered Merlin qualifying and securing his first job in the Bacteriology Department under Fleming at the age of 26 or so. She was aware of his desire to study pathology and naturally very proud of his professorship. Then she went on to describe the Petri dish event as she first heard it seventy years ago - and heard it, of course, from Merlin himself on a number of occasions. She stated that Fleming was away on holiday and was due to return. It so happened that a routine tidying up of various bacteriological plates and dishes was necessary. This was normally done by the technical staff - the laboratory assistants - but on this occasion they were involved in some labour tension or difficulty - she ventured, with some hesitation, to call it a 'strike'. As a result the responsibility for clearing or destroying old and used plates fell entirely on 'young Merlin'. During the clearing process Merlin noticed unusual features on one of the plates and preserved it carefully - and destroyed the rest - and personally showed it to Fleming on his return from holiday. Soon afterwards, she suggested, Merlin moved to pathology.

Mrs Jarman went on to say that when Fleming wrote his first paper on penicillin he wanted to include Merlin's name as a significant contributor or possibly co-author. Her brother 'who was always of a retiring nature and a very modest man would not accept the suggestion.' She confirmed that Fleming and Merlin remained life-long friends and recalled that, when the Fleming home was bombed [in March 1941], Fleming and his wife, Sareen, went to live with Merlin and his family at home in Rickmansworth. It can be certain that Merlin and Molly also gave Fleming a great deal of support when Sareen died. She informed me spontaneously that the Fleming Papers were kept at the British Museum [Library] and that they were not available for inspection, and added that sadly Merlin's diaries have been lost. For a lady in her 96th year (1998) her memory was clear and detailed.

Many, although not all, the details of Mrs Jarman's recollections can be confirmed independently.

It is generally agreed that the Petri dish incident occurred on 3 September 1928 - a Monday - the usual

day to return from holiday. Fleming indeed had been away for several weeks at his country house, The Dhoon, Barton Mills, Suffolk, but he made a special journey to St Mary's on that Monday:

'a flying visit to London to assist a surgical colleague with the treatment of an abscess ... It was probably while waiting for his colleague to appear that Fleming took the opportunity to discover penicillin ... Having discovered penicillin without looking for it and narrowly escaping failure to do so. Fleming then returned to his country home to resume his interrupted holiday, and did not start work again until the end of September (but leaving his new assistant Stuart Craddock to carry out some experiments). Even so, it was not until the end of October that an experiment with penicillin was recorded, and late November before serious research can be said to have started' (7).

Mrs Jarman also said that Andre Maurois, when preparing his book - *The Life of Sir Alexander Fleming: The Discoverer of Penicillin* - came to St Mary's Hospital to interview Lady Fleming and Merlin Pryce: probably quite early in 1956. After Maurois left the room, Lady Fleming turned to Merlin, by then Professor of Pathology, and said, according to Mrs Jarman: 'Anyone would think that you had found the mould', in a voice that could be described as 'withering', but Mrs Jarman finally suggested 'a voice that was not at all gracious'. According to Mrs Jarman, Merlin replied: 'but I did'.

THE FLEMING LEGACY

As one might expect, at least one British scientist, Professor Ronald Hare, the eminent bacteriologist on the staff of St Thomas's Hospital, London was seriously considering writing Fleming's life-story. Hare was also a close personal friend of Merlin Pryce. A doctor's son from Durham he was also a student at St Mary's Medical School, graduating M.B., B.S. (London) in 1924 after a distinguished undergraduate career. In common with Fleming, his first post was in the Inoculation Department in 1925 at St Mary's working on puerperal fever. He stayed in that department for four years. Later having obtained a M.D. in 1935 - the same year as Pryce - he took a post in the Connaught Laboratories in Toronto and stayed in Canada for ten years. In 1946 he was appointed to the Chair of Bacteriology at St Thomas's Hospital, London where he stayed until his retirement in 1964.

Hare maintained a life-long interest in infection by bacteria - especially the spread of *Staphylococci* in hospitals, and diseases caused by *Streptococci*. While in Canada he set up the first penicillin plant there. Tributes

after his death in March 1986 were paid to 'his incisive mind and his great ability to recognise facets of research likely to be useful and rewarding.' Emphasis was given to 'his dislike of hypocrisy of any kind.' Socially he was noted for his kindness and his 'unquenchable and lively interest in other people.' He was a keen musician and water colourist.

Pryce and Hare spent many holidays together including in the summer of 1928, mountaineering, sleeping in tents, climber's huts and remote farmhouses, with Pryce undertaking the difficult climbs and fell-walking and Hare, it seems, being more concerned with pursuing his primary interest in painting.

Hare possessed all of the attributes necessary to write an authoritative biography of Fleming and there is incontrovertible evidence that he had planned to do so. On 13 February 1956 Pryce wrote to Hare a letter that is recorded in an appendix to this paper (Letter 1) It proves that Ronald Hare was seriously considering writing a biography of Fleming at exactly the time Lady Fleming was pressing Maurois to undertake the responsibility. She visited Maurois in Paris 'to explain very exactly the problems with which [he] should have to deal' and appeared to be indicating the tenor of the biography and ensuring that it accorded with her wishes. As Pryce wrote: 'She wanted anecdotal stuff and not a truly scientific review and assessment. Amalia Fleming must have known Hare - and of his reputation. Pryce was emphatic that Hare was the person to write the biography, because he knew Fleming, was conversant with the complexity of the field and had an ability to write well. Furthermore, Maurois wrote in French while all Fleming's work was recorded in English.

By allowing Maurois access to the Fleming Papers she blocked Hare's desire to prepare the biography. One cannot escape the conclusion that her obstructive tactics were deliberate, born possibly of an element of personal animosity between her and Hare. Nevertheless in 1970 Hare published an important analysis of the penicillin story (7). Twenty-five years later in 1982 when Ronald Hare published his final detailed article (8), the first footnote was again despondent with regard to the Fleming papers at the British Library. The copyright-holder, Lady Fleming, would not grant permission for the documents to be quoted by Hare or even the reproduction of some drawings 'lest it lead to the wrong suspicion that she agreed with the conclusions of the author.' The last section of the footnote reads:

'The editors consider it unfortunate that the facts about a discovery of such importance, made over half a century ago, cannot now be made available for public discussion except from one particular standpoint. Historians of modern medical science, when dealing

with the Fleming Papers should be warned in advance of this hazard'.

THE HARE - PRYCE CORRESPONDENCE

Pryce's letter to Hare of 13 February 1956 revealed that Hare was contemplating a biography of Fleming. The next letter available - dated some four months later - disclosed that Hare had been hard at work, and had submitted a draft for Pryce's assessment on 27th June (letter not included). There is no letter at hand to indicate Pryce's assessment of the first draft of Hare's biography, but on 18 July, 1956, Pryce sent a closely-typed A4 sized script giving a full description of events surrounding the fungus-infected Petri dish (Letter 2) Pryce added a postscript at the top of the page in his own hand: 'Dear R.H. I w'd rather the story went like this. Kindest regards DMR' A curious turn of phrase, one which would imply that Pryce had amended Hare's version. No copy of an acknowledgement from Hare has been seen and it appears highly probable that he decided, around this time, to discontinue - or at least postpone - his plan to write Fleming's life-story. The knowledge that Maurois was already at work and that he had the support and 'guidance' of Lady Fleming, to say nothing of access to the Fleming Papers, must have been a strong disincentive.

Interestingly the Maurois description of the Petri dish incident is an obvious paraphrase of Pryce's detailed contribution of 18 July 1956. Hare is unlikely to have passed the document on to a rival, but Pryce could well have co-operated with Maurois if he had received a direct personal request from Lady Fleming, given his unfailing loyalty to his former 'Chief. Thus in all probability Merlin Pryce himself is the source of the 'authorised' version!

Ronald Hare's much more science-orientated 1970 version of events (7) contained a concise, factual and non-adulatory account of Fleming's personality that might well not have pleased Lady Fleming, but Macfarlane accepted in full its accuracy. The preparation of this volume meant a further exchange of several letters during 1967 between Hare and Pryce. It is not clear when the actual writing re-started, but a letter from Pryce to Hare on 23 January 1967 (Letter 3) shows that the work was proceeding steadily. Much of the letter refers to technical matters concerning staphylococci 'going stale', incubation temperatures and 'sealing of Petri dishes' - and with what appears to be a sincere attempt to reconstruct the details of an event that had taken place almost forty years earlier. This correspondence graphically illustrates the original technical problems and the difficulties of reproducing events and some of Pryce's technical misgivings (letters 3 to 9).

Several other illuminating points emerge from this increasingly fraught correspondence. While Merlin Pryce is at pains to protect on all occasions the reputation and standing of Fleming, Hare was focussed on the analysis of microbiological and experimental detail. Pryce was clearly jealous of his own integrity and reputation and sensitive to any implications of personal carelessness. Hare appears impatient and disbelieving of the authorised version and appears to suspect the Pryce is being less than frank. Technical nuances become intertwined with personality and history. Much of Hare's interest centred on the temperature and conditions at which the plates were stored. It is now clear why this exercised him as later work attempting to reproduce the discovery showed this to be critical. To produce the penicillin effect the fungal spores must have germinated and began to release penicillin before the staphylococci began to grow. This in turn implies a very specific temperature regime as fungi grow at lower temperature than bacteria. Hare in his 1970 paper (7) had found from examining the meteorological record for London that nine days in early August in 1928 were indeed cool enough for fungal spore germination and growth and that later in the month the temperature rose enough to allow staphylococcal growth. Sadly after this correspondence it appears that the long friendship between Hare and Pryce, including the shared holiday in summer of 1928, floundered. Apparently for the last few years of his life Pryce never spoke to Hare.

One salient point emerges. Merlin Pryce not only enormously admired Fleming but also regarded Fleming's specific action in re-culturing the mould as **seminal** and **crucial** and that he, 'DMP', would *not* have done that. Implying that he felt disqualified, almost 40 years later, from claiming any glory or praise: positive action being more important than any passive observation!

REVISIONIST IDEAS

When he was appointed Professor of Pathology in 1954 the *Western Mail* on 26.2.54 in its column of 'Our London Letter', perhaps depending more on patriotic pride than on inside information, referred to Pryce's 'brilliant career', and added that he: 'played no small part in the epoch-making discovery of penicillin.' Much more compelling evidence is required if Vivian Thomas' claims are to be given credence.

In his obituary Richard Willcox (2) while emphasising 'an affectionate personal relationship between Fleming and Pryce, notes '—he [Fleming] would question [Pryce] on his investigations of Penicillin - indeed he has been described as acting as a catalyst in its [Penicillin]

evolution.' Another St Mary's man of the same era took a much more robust view. Henry Courtney Mansel Walton was born on 22 January 1909, educated at Charterhouse, Cambridge and St Mary's Hospital and graduated in 1932. He was posted to India with the R.A.M.C. in 1934 where his duties were in the fields of pathology and hygiene, and from 1937 he specialised in pathology. He served in this capacity at home and abroad in the Middle East and Burma before being appointed consultant pathologist to the Swansea Hospital in 1951 where he served until his retirement. He died on 25 May 1988 at the age of 79.

Walton was a man with formidable St Mary's associations. His maternal grandfather, father, uncle, and son were all St Mary's men. Therefore it is highly improbable that he would do anything to diminish the status and standing of his 'hospital' or its role in the discovery of penicillin. Walton appears to have been a man of high personal integrity, founding the first branch of the Samaritans in Wales.

From his letter to Pryce (letter 10) he must have been convinced of the truth of his version of the story otherwise he would have kept a mere suspicion to himself. — 'Most of the doctors in south Wales know, because I tell them frequently that —.' - Certainly he had the experience and the social and medical contacts to be well informed. The tone of the letter is friendly and unequivocal and, as far as can be determined, he had no particular axe to grind. Edward Pryce was with his father when he opened the Walton letter. His comment was a brief and a somewhat forceful "Damn fool" - but he made no denial or further comment. The letter was not destroyed and found later among his papers but never referred to again.

Mr Vivian Thomas' article in the *Yr Hogwr*, (1) contains the following quotation. (Translation by E.W.J.)

'Over twenty years ago my wife and I were guests at the annual dinner of the West Kent Pharmaceutical Society. It was strange because the chairman was a brother of my father-in-law, and the guest speaker was the brother of my mother-in-law, namely Professor D.M. Pryce. In the course of his speech he spoke of that moment in 1928 when he suggested to Alexander Fleming that he should look on a dish where an historical piece of mould had grown. He said that it was possible that Penicillin would never have been discovered if he had not been working with Fleming at the time and that if he [Pryce] had not noticed this particular dish. This growth was the miraculous substance that became such a wonderful remedy.'

This unexpected statement would be of considerable importance if it could be confirmed. No record of the annual dinner can be found in the *Royal Pharmaceutical Society Journal*. However the *Kentish Times* for Friday, 26 November 1965 contained a full account of the dinner held at the Yorkshire Grey Hotel, Eltham Green, on 17 November 1965, when 'Professor Pryce ... proposed the toast of the Pharmaceutical Society of Great Britain'. The report was headed 'A COMPLETE REVOLUTION IN MEDICINE'.

'If it had not been for Professor Pryce, Professor Alexander Fleming might never have discovered penicillin. The speaker told the diners how he had walked into the room where Fleming was working, prompting him to pick up the plate on which that historic piece of mould had formed'. [Then he quoted the actual words used by Pryce in inverted commas] "If I had not walked in at that moment and talked to him, he would never have picked up the plate and there might be no such thing as penicillin."

It was a well-attended dinner and some 170 chemists, hospital pharmacists and their associates were present.

This is the first and perhaps only occasion, when Pryce spoke in such positive terms that, in essence, amounted to a priority claim; contrasting with family evidence of his reluctance to be drawn on the subject and his comments in the Hare-Pryce correspondence.

There remains one other relevant episode. Eira Pryce Anderson relates an experience, "very distressing at the time". Among the large congregation at the Memorial Service held at St Mary's Hospital, was Ronald Hare, in spite of the long years of estrangement. At the beginning of the service he approached Eira who had known him well since childhood. He said, with no pleasantries, 'Today we are remembering the man who was the discoverer of penicillin.' And walked away.

What really happened on the 3rd Sept 1928 is very difficult to disentangle. Richard Willcox's obituary (2) suggested that 'Pryce acted as a catalyst in the involvement of penicillin', which may be an opaque compromise capable of several interpretations. One is that it was Merlin Pryce himself who was the first to observe the phenomenon. Ronald Hare, who was a young research worker on the staff of the same laboratory, though not directly under Fleming, and had spent part of the summer of 1928 with Pryce appears to have formed this opinion. A belief cherished by such a distinguished bacteriologist can scarcely be ignored.

More recently, M. Lawrence Podolsky in his book *Cure out of Chaos* (12) has offered a similar description of the moment of discovery of the plate in Fleming's laboratory. Fleming's own words on the occasion of the

Nobel award are quoted by Podolsky. Fleming disclaimed that he had discovered penicillin: 'as a result of serious study ... and deep thought' and added: 'That would have been untrue and I preferred to tell the truth that penicillin started as a chance observation.' Podolsky goes on to paint a picture of Pryce picking out the crucial plate and, at the second time of asking, Fleming deciding to make the critical subculture.

This account of the discovery of the fungus-infected dish appears to accord with what Pryce himself claimed in his speech to the pharmacists of Kent at Eltham Green in November 1965. Both have provided an extra element of much more personal involvement than the original Maurois or MacFarlane versions. The paragraph in the *Kentish Times* is itself somewhat ambiguously phrased but one implication seems beyond doubt, namely that: 'There might have been no such thing as penicillin' had Pryce not been present in Fleming's laboratory that day. He does not claim to have done anything of a technical nature, but he 'talked' to Fleming, and that 'talk' stimulated his former 'Chief' to pick up the plate' - the crucial action that day, not once but twice - Pryce has not claimed to be the discoverer, but asserts that penicillin could not have been discovered without him. Is that meant to be a gentlemanly and cautious plea for recognition of his contribution or just a mild exercise in equivocation? In his letter to Hare on 18 July 1956 Pryce expressed his view that Fleming was a great dialectician.' It would appear that the pupil was similarly endowed.

EPILOGUE [GarethWyn Jones]

During his last illness in January 1999 one of my father's great concerns was that the manuscript of his work on the association between Daniel Merlin Pryce and the discovery of penicillin lay unfinished. I undertook to try and complete and edit his work.

My father appeared not to have reached any final analysis of the possible primary event nor the ensuring human drama. Indeed he may not have wished to do so, as no unambiguous resolution can be offered. Perhaps nonetheless this story cannot be left without some final weighing.

Several interpretations can be offered. On one hand Merlin Pryce's role could be seen as simply that of a passive observer who happen to make a social call on his old boss during the latter's fleeting visit to his laboratory during his extended annual holiday. By a remarkable coincidence this call coincided with Fleming's making and acting upon his historic observation thus creating the first 'penicillin culture'. Clearly Hare did not accept this view and is likely to have had a direct knowledge of the event of the summer of 1928.

The reference to Merlin Pryce acting as a catalyst is capable of several interpretations. Possibly, by refusing to accept that the 'Biggar mutants' were stable, he precipitated the discovery of penicillin — although the substance of this argument is vague. It might be construed as a 'negative contribution', his stubbornness simply forcing more plates to be prepared. However this is probably of being more relevant to the review, 'The Staphylococci', a section in *A system of Bacteriology in relation to medicine* published by Fleming in 1929 (13). Alternatively his catalytic role was that of a colleague who drew Fleming's attention ("prompting to him to pick up the plate" according to the report in the *Kentish Times*) to the crucial plate.

This alternative scenario is partly based on Mrs Jarman's testimony and is supported by the evidence in the *Kentish Times*, from Dr Walton and from the reactions of Prof. Hare. This hypothesis would suggest that the primary observation of the crucial plate fell to Pryce, either somewhat casually on Monday the 3rd September in Fleming's presence or, just possibly, prior to that date while he was attending to residual duties in a laboratory he had left several months previously. In either event, it would appear that he specifically drew Fleming's attention to the peculiarities of the infected plate but had not appreciated the crucial necessity of making a sub-culture. It is possible, given the importance of the precise temperature regime in early August of 1928 (vide 7,8) but unprovable, that Pryce in mid/late August had set the plate aside to bring to the attention of his mentor and friend. This interpretation would be strengthened if there were independent evidence of industrial unrest amongst the technicians referred to by Mrs Hilda Jarman.

Given the nature of Fleming's fleeting visit to London on the 3rd of September and the evidence adduced, this latter scenario or some minor variant of it, must be a reasonable possibility, perhaps even a probability.

If a more active, 'catalytic input' is accepted, this raises the question, why did Pryce disavow and minimise his possible role? In 1929 his refusal to include his name in the paper would have seemed a relatively slight, even

trivial, decision. (The evidence for this apparent refusal comes from the family while the Pryce-Hare correspondence only makes clear that he refused authorship of or acknowledgement in, the Staphylococcal review) (13). Certainly neither he nor Fleming could have been aware of the enormous implications of their fortuitous observation. As is clear from the correspondence with Hare, nearly 40 years later Pryce still harboured technical doubts. Also he felt, with characteristic modesty that his role, even if it had covered the primary observation, did not merit inclusion in a paper by an already illustrious senior partner. This correspondence also suggests that Merlin Pryce [and possibly also Fleming] did not fully appreciate the complex and particular microbiology which lay behind the development of the crucial plate. Possibly even in 1929 it was apparent to Merlin Pryce that his career lay in Pathology.

By 1940 and certainly in the post war decades, it would have seemed disloyal to his friend and admired colleague and indeed to St Mary's as an institution, had he sought to claim belatedly some proportion of the glory. Given all the evidence of his personal integrity and high moral standards, such behaviour would have seemed unethical and demeaning. It is not difficult to imagine that he felt that a discrete silence was called for on virtually all occasions. Crucially he clearly believed in his letter to Ronnie Hare [23 Jan 1967] that whatever the precise history of the plate and its interpretation, Fleming actually made the subculture and "DMP would not have subcultured that mould".

It would be a great insult to the memories of Merlin Pryce and Alexander Fleming and indeed my own father if recounting this fascinating story led to an unseemly battle for primacy between protagonists for and against Fleming and Pryce. They remained loyal friends and colleagues throughout their eventful lives. The story does however reveal the complexity and the humanity of scientific and medical discovery and the contributions of unsung and magnanimous individuals.

Correspondence

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TELEPHONE
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DEPARTMENT OF PATHOLOGY

13th February, 1956

Dear Hare,

I have, as I told you committed to paper some notes on this incident some time past, and I should be only too pleased to get them for you, The only hitch is Lady Fleming; she has apparently broached Andre Maurois to write this thing and wants some anecdotal stuff to make it interesting. I don't feel happy about that. This man may be capable of writing a nice little book, but I should have thought that the person to write the life of Flem would be yourself; you have known him a long time and I think it is important that the person who writes the biography should be somebody who knew him; and of course not only that, but you have the ability to write. (You may even feel a compulsion to be closer to the facts than A.M.) Meanwhile I shall give a few scrappits to Lady Fleming if I can recollect any, but I don't feel like putting myself in the hands of this polished French writer of English prose.

Yours sincerely,

(D.M.Pryce)

Professor R.Hare,
Department of Bacteriology,
St.Thomas's Hospital Medical School, S.E.I.

LETTER I

ST MARY'S HOSPITAL.

W. PARKES, D.S.O., M.C.
HOUSE GOVERNOR

W.2

TELEPHONE
PADDINGTON 9051

DEPARTMENT OF PATHOLOGY.

18th July, 1956.

When I worked with F. one of the things he did was to test the bactericidal resistance of the staphylococcal mutants produced by Bigger. Later when F. was asked to write the section on staphylococci he came along one day, and asked if these strains were permanent. Had I said 'yes' I would have been quoted in the article which was what F. wanted to do, "but I said I didn't think I had done enough work on this particular point. 'So F. had to repeat Bigger's work himself — because I had now left the Department. Sometime afterwards I went to see F. and jokingly he chided me for all the work I had caused him. Mutant strains produced by Bigger's technique are so striking, looking more like a mixture of contaminants and nothing like the original culture, that we naturally took to looking at the culture plates as we talked. F. had been doing a lot of work and the lysol tray was piled high with cultures ready to be thrown away. Among the plates we looked at was the famous penicillin plate. Several other plates were contaminated with colonies of yeasts and moulds but we went back to this particular plate because the lysis of the staphylococcal colonies around the mould had attracted F's attention. He took a plate up, looked at it, and after a while said, "That's funny." I don't know what was going through his mind, but, for my own part, I thought that the lysis was due to acids produced by the mould. I had seen staphylococcal colonies slowly autolyse on keeping, and develop daughter colonies, and I had presumed that the lysis in that case was due to acidity. But pandering to the great man I actually said "That's just how you discovered lysozyme." He made no comment, but with automatic hand he took his platinum loop and subcultured the mould into a tube of broth. I remember that he didn't just touch the mould but cut out a piece about 1 mm. diameter which floated on top of the broth. I think it is important that he not only observed, but immediately took action. Many who observe and may even feel the possible importance of an observation, do not take action but just wonder and - forget. And apropos of this occasion there is another incident which happened when I worked with him. Something had gone wrong with one of my cultures, I can't remember what, but I do remember his exhortation and advice to make use of one's mistakes. It was his attitude to life. There is, of course, nothing startlingly original in this, but nevertheless it was the attitude of a man who, if not in wordy argument, at least in his thinking and working was a great dialectician. DMP

LETTER 2

St. Mary's Hospital Medical School
DEPARTMENT OF PATHOLOGY
ST. MARY'S HOSPITAL
LONDON, W.2.
Ambassador 1280

23rd January, 1967

Dear Ronnie,

I was glad to see you at the meeting and sorry not to have had more time to talk. I am writing now because Len Crome said you had spoken to him about my letter. I was a little worried when I wrote to you after reading your typescript that you were belittling Flem too much. I think old Flem was truly great but not happy with his colleagues on account of his different social background. I hope you won't belittle him because even if he was a bit odd this was due as much to his colleagues as to him. I hesitate therefore to say what I think was the real explanation of the appearances on the penicillin plate but anyway here goes:

For some reason one of the things I did with staphylococci was to let them "go stale" (whether at 37° or room temperature I can't remember). Drying was prevented with plasticine sealing of the petrie dishes. After some weeks the colonies gradually lysed and became transparent. Later still, opaque white dots appeared in the lysed colonies which I thought were contaminants but which, of course, we now know would be due to the growth of mutants; I could find only staphylococci when I made films of the white dots - it struck me at the time as very funny for staphylococci to be contaminants of staphylococci. But those were early days (when one spoke of microbic variation and not mutation), and mutant dots (as in McConky coloured colonies) had not been described.

When we looked at the penicillin plate I thought to myself that the translucent appearance of the colonies surrounding the mould was due to an acceleration of the lytic process which I had previously seen with ageing. What actually I said to Flem however was "this is how you discovered lysozyme." He kept mum but took a loop and dug out a bit of the mould and floated it on top of broth. Since you wrote to me - or rather since I saw you at the meeting - I have begun to wonder whether the lysis of the colonies wasn't after all really due to spontaneous lysis of dying cells. As far as I can remember there was very little or no inhibition of growth. The colonies surrounding the mould were as large as those elsewhere but were transparent. It may be that I was right in thinking that the appearances on the plate were due to food exhaustion and/or pH changes, which of course would have been greater in the vicinity of the mould. These possibilities could easily be tested. The plate may have been above the lysol for some days* although this is unlikely. But I think that the contamination with the mould, and certainly its growth, took place after the colonies had attained their ordinary 24-hour size.

But even if the appearances had nothing to do with penicillin they lead to its discovery and that is the important thing. DMP would not have subcultured that mould.

I hope you are well and will write that book about Flem, and that it will present a nice picture of him. He was "the greatest." And let's see you soon.

With best wishes.

Merlin

* which w'd delay evaporation and the lysol fumes might possibly accelerate changes leading to lysis and to greater susceptibility to lysis about the mould.

LETTER 3

8 Warwick Square,
London S.W 1
Jan 31, 1967

Dear Merlin

I was very glad to get your letter. The version I sent you six months ago - although it was about the twelfth - was still only a trial trip and the main reason for sending it to you was for your recollections of (a) what part you played in the study of staphylococcal variants before you left for your holiday (b) the actual procedure employed by Fleming in his part of the work because his description in the original paper is so vague as to be almost valueless (for example, did he or did he not incubate at 37°C before leaving the plates on the bench, or did he just leave them, or did he know himself what he had actually done?) (c) the procedures that he went through when making the discovery (for example, was the plate one that had already been seen by him, put on the pile standing high and dry on the lysol bowl and then looked at again when you appeared on the scene, or was the story different from this?)

All these details may not appear to be very important but if you read the enclosed new version you will see why.

In regard to your fear that I may denigrate Fleming you must realize that I am not writing his biography. I am trying to put down on paper exactly what led to the discovery of penicillin, what he did with it when he found it and why he did not proceed further with it when Ridley left.

On all these matters, the official biography is not only worthless but misleading. It does not draw attention to the fact that the discovery of penicillin was an almost fantastic stroke of luck, it knows nothing about the fact that the temperature of Fleming's laboratory was a very important factor in the discovery, or the high probability that the mould came from LaTouche in the lab below. Worst of all, it tries to lay the blame for Fleming's inactivity on Wright who is supposed to have opposed him whereas it was almost certainly the instability of penicillin that defeated him.

Moreover, both Fleming and the Biography do less than justice to the work that Craddock and Ridley did. I do not know why but the two of them made really significant advances which should be put on record. In support of this, I have photostats of Craddock's notebook and Ridley has got his own notebook from Lady Fleming just recently. Practically all of this work seems to have been ignored by Fleming and the Biography. Indeed, they did so much that a few more weeks of work might have anticipated events at Oxford 12 years later.

I now come to the translucent colonies that appear in the neighbourhood of the mould and which you think, as indeed, did Fleming are due to acid or lysis by penicillin. I am very doubtful whether either is the real explanation for the following reasons

- (a) Fully grown colonies of staphylococci are not lysed by penicillin in any quantity.
- (b) Fleming's phenomenon can only be seen if growth of the staphylococci is delayed long enough (3-4 days) to enable the mould to grow and produce penicillin.
- (c) This requires a temperature below 20°C.
- (d) Staphylococci grow slowly at this temperature that even after 3-4 days they may be only colourless ghosts.
- (e) When the mould starts to produce penicillin, these ghosts do not develop further because the organisms are killed.
- (f) More distant colonies that looked the same but not under the influence of penicillin, begin to develop into more normal opaque colonies characteristic of the organism.

All this is explained in the enclosed typescript and I have photographs showing these changes.

On the other hand, the lysis you saw on your plates where penicillin was not involved, may well be a true lysis and quite possibly due to acid. But this is a different story even though the appearance of the colonies may look the same.

I hope I have made myself clear
Yours ever

LETTER 4

St. Mary's Hospital Medical School
DEPARTMENT OF PATHOLOGY
ST. MARY'S HOSPITAL
LONDON, W2.
Ambassador 1280

23rd May, 1967

Dear Ronnie,

Your second manuscript, which I mislaid, was found last night, and after reading the letter I couldn't sleep - even with the help of two Soneryl.

I am very worried about the 'down' you seem to have about Fleming. He was a good sort and I owe my present position more to him than to anybody else. He was disappointed that I didn't publish anything when I worked with him in 1927 and pleasantly surprised when I worked with him during the war and published that paper on tuberculosis. With regard to his scientific status, I regard him as one of the truly great, and I think you'll make a hash of things if you go on as you are.

Re the instability of Penicillin and its concentration: Craddock and Ridley failed to concentrate merely because the freeze drying technique had not then been invented. Raistrick also failed for the same reason, and without this technique Chain himself would have failed. It is silly to say that another fortnight's work would have made all the difference. But what I am worried about most is what you say about me. I did not fail to do what was required by Flem. I was asked to see if the Bigger variants differed bactericidally. Obviously they did but it was impossible to do this accurately because comparable suspensions could not be made, and Flem. was not at all worried about this. What he was concerned about and what he wanted to know when he was asked to write the staphylococcal section in the system of bacteriology was whether the Bigger variants were stable. I had left the department by this time and he came over to the blood lab. especially to see me about this. I was a very prim and proper little scientist at this time and I said I didn't think that serial subculturing had been carried on long enough to be certain. In view of Arkwright's work on microbial variation it must have been obvious to him that they would be stable and he almost begged me to say 'yes.' He merely wanted to do me a good turn and write that "according to Pryce these variants are stable" but I would not. It would take very little effort on his part to show that they were stable and he went away sad, not because of the extra work entailed but because I was so obstinate and wouldn't be helped. If in answer to his question I had uttered the single word 'yes' there would probably be no Penicillin and no modern surgery!

You are also wrong about the plate: the colonies were lysed and almost fully grown. I keep on telling you this. It's no good trying to reproduce the phenomenon until this fact is accepted. And please I beg you don't write anything about my holiday having anything to do with the matter. I had no holiday between jobs as the change over was in February.

Yours sincerely,

D. M. Pryce

Professor R. Hare,
3 Warwick Square,
S.W 1.

LETTER 5

8 Warwick Square,
London S.W 1
June 4, 1967.

My dear Merlin,

I am sorry I could not go to Elizabeth's private view but Carshalton takes so much out of me that once I am back in Town, I have more or less had it. But I went to see it today and thought it a great success. I particularly liked the water colours.

And now for your letter. I wish you would not persist in thinking I have a down on Fleming. I am merely trying to find out how he discovered penicillin. I don't think he himself knew because Holt tells me that he never succeeded in bringing the phenomenon off again. It can be imitated of course but that is not the same thing.

This is probably because he, like you, persisted in thinking that penicillin can attack fully grown colonies. But you know as well as I do that unless you start with such a colony and actually see it disappear, you cannot, in all truthfulness, say that has been lysed. I don't think either of you ever saw this. What you saw were what you thought were the end results of lysis. My thesis is that you saw colonies that had started to grow and then stopped. I can demonstrate this but I cannot demonstrate the former. Perhaps you can.

Now for your part in the discovery. You complain that I said you had failed Fleming by leaving him. If you will refer to the enclosed photostat of two pages from Mourois' Biography, you will see that this is more or less implied in the statements "Fleming therefore had to work again over the ground already covered by Price" and again, "he reproached Pryce for obliging him to re-do a long job of work". As Mourois must have obtained the information for this bit from you, I naturally thought that you had been studying the variant colonies in the same way as Fleming did and then suddenly stopped and went to Newcomb's department. As Mourois seems to have misrepresented you, I will of course omit all reference to this.

And then the holiday. I am grateful to you for telling me that you went to Newcomb's department in the February and not, as I thought in the July. All reference to the holiday will also have to be omitted. It spoils the story but I am not telling stories. I am trying to get at the truth.

I now want to ask a very important question. If you will look at the paper by Biggar which began it all and which is, I think, Biggar, Boland and O'Meara in the Journal of Bacteriology and Pathology 1927,30,261, you will see that they obtained many of their variant colonies by not incubating the plates but leaving them on the bench. As I suppose you must have been looking for such variants to do your bactericidal tests, is it possible that you did the same thing? After all, when one repeats another man's work one usually uses the same methods. Fleming may also have been doing this, but I have no means of finding out.

I know that all this happened a long time ago but if by chance you can remember whether *or not* this is what you (and possibly Fleming) did with your plates, it throws a flood of light on the discovery. It would take too long to give the reasons for this but I would like to know.

I hope this letter will not cause you too much emotion but you are the one person who can clear up these points.

Yours ever

LETTER 6

St. Mary's Hospital Medical School
DEPARTMENT OF PATHOLOGY
ST MARY'S HOSPITAL
LONDON, W.2.
Ambassador 1280

6th June, 1967

Dear Ronnie,

Once more unto the breach dear friends...!

Nobody believes that Penicillin lyses staphylococci and I do not for one moment believe that the lysis about the mould was due to Penicillin, but lysis of those colonies there most certainly was. Flem and I looked at the plate and I thought to myself that the lysis was due to a change of phi, but what I actually said was "that's how you discovered lysozyme." I was merely pandering to the old boy and I did not think that there was any great discovery at hand. But I'll tell you how a holiday was concerned in the work of the Dublin group. These people made their observations as the result of O'Meara taking a holiday and leaving his broth culture of staphylococcus to cook. The resulting mutations were so extraordinary that O'Meara was accused (I think by Boland) of mucking up his cultures by contaminating them. O'Meara was quite hurt and expostulated that it was impossible. He repeated the procedure and showed how the mutations were produced. When Flem asked me to repeat this work I did exactly what the Dublin people described in their paper - leave the culture to go stale. Flem did exactly the same thing. With regard to the statements quoted from Maurois, the repetition of the work by Flem was merely because I did not utter that word "yes" when asked if the mutations were stable. I would not say that they were because I thought subculturing of the strains would need to be carried further before one could be really sure. I doubt whether Fleming subcultured any further than I did but it should be easy to see whether he did by reading his contribution to the System of Bacteriology. I have just looked at Bigger's paper again and he says most of the strains were stable. Flem wanted me to say yes so that he could put my name in the article he wrote.

I hope this is of some use to you. With regard to the challenge - could I repeat the phenomenon? I am quite sure Ronnie that I could.

Yours sincerely

D. M. Pryce

Professor R. Hare,
13 Warwick Square,
S.W.1.

LETTER 7

8 Warwick Square,
London S.W 1
June 7, 1967.

My dear Merlin,

Thank you for your prompt reply to my letter. I think we had better stop haggling about lysis or otherwise of staphylococcal colonies. It seems to be getting us nowhere.

I am afraid that you have missed the point of my question about the way you and Fleming treated your cultures. I know and everyone else does that the discovery of penicillin depended on a phenomenon seen when a plate had been allowed to go stale as you express it; in other words, left on the bench for a long time. There has never been any doubt about this.

But perusal of the paper by Biggar et al shows that they did not incubate their plates. They merely put them on the bench and left them there. How in the early stage at least, of your and Fleming's work you were trying to confirm the findings of Biggar et al and most people in such a situation do the same thing as the other fellow. What I want to know is whether

(a) you/and/or Fleming incubated your culture plates at 37°C for 24 or 48 hours or so before leaving them on the bench

or

(b) left them on the bench without preliminary incubation as had Biggar et al.

In other words, all I want to know is the history of the first 24 or 48 hours of your plates. No more than that. Can you remember what you did so long ago or have you notebooks that might remind you?

Sorry to be such a nuisance but a lot hangs on it.

Yours ever

St. Mary's Hospital Medical School
DEPARTMENT OF PATHOLOGY
ST MARY'S HOSPITAL
LONDON, W.2.
Ambassador 1280

Professor R. Hare,
13 Warwick Square,
S.W. 1.

9th June, 1967

Dear Ronnie,

Sorry you are so annoyed. Of course we read Bigger's paper and repeated the work exactly as instructed. The Bigger mutations we used were produced by allowing broth cultures to go stale. The Dublin workers showed that mutations occurred whether the broth cultures were kept at incubator temperature or at lower temperatures but we worked at 37°C.

Bigger also investigated the mutation rate in what I think were confluent growths on agar but this was not repeated by us. I was personally interested in the aging of individual colonies and I think I was the first to see mutant daughter colonies* and the first to see Liesegang precipitation halos when the serum agar sometimes used contained antibody. This work, however, had nothing to do with either Flem or Bigger.

In answer to your specific questions:

- a) Our plate cultures were incubated at 37° C for 24 hours before putting them on the bench. This applied to explants from stale broth cultures and to cultures from colonies on agar.
- b) We did not leave any culture plates on the bench before incubating them at 37°C.

The famous penicillin plate was not what one might call a "Bigger plate" but an ordinary plate culture of the original staphylococcus.

Yours sincerely,

D. M. Pryce

Hr single colony plate cultures kept on the bench.

SWANSEA 54901

BECK LABORATORY,
SWANSEA HOSPITAL

[T. COL H. C. M. WALTON
11th March 1971

SWANSEA 68443

GALLEONS,
HIGHER LANE,
MUMBLES,
SWANSEA

My dear Professor

Discovery of Penicillin

Most of the doctors in South Wales know, because I frequently tell them, that you were the man who noticed the mould growing on the plate in that old laboratory overlooking Praed St.

Before both of us get too old to remember the details of the great moments in history, please can you tell me the words in which you told Fleming that the staphylococci were being inhibited by the penicillium?

My little contribution to the history is sitting with 'Beaky' Rogers in the old club about 1930. He was a member of the Rifle Club, and had developed a pneumococcal conjunctivitis for which Fleming had given him some of the impure fluid in which penicillium had grown. After a day or two of use, Rogers' eye was back to normal.

I hope you & Mrs Pryce keep well. I do not get to St. Mary's often nowadays, but hope to attend the annual meeting of the College of Pathologists next November. I hope I may see you there.

Best wishes,

Yours sincerely

Courteney Walton

Prof. D. M. Pryce,
11 Bromfield Rd.
LONDON W.9.

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Authors

Emyr Wyn Jones MD FRCP Hon LLD was Physician in Charge of the Heart Department of Liverpool Royal Infirmary for many years. He was President of the History of Medicine Society for Wales 1980-1986 and a prominent member of many cultural and medical organisations and societies in Wales. Author of a number of books and articles on aspects of medical history. Dr Wyn Jones died at the age of 91 on January 14th 1999.

R. Gareth Wyn Jones DPhil DSc FiBiol holds a chair in biological science at the University of Wales Bangor.

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Enrico Pieragnoli and the Prevention of Tuberculosis: Florence 1906

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SUMMARY

Tuberculosis (TBC) is today a health priority in Asia, Africa, and South America and a re-emerging social disease in the Western World. While the pharmacological therapy of TBC is nowadays well established, preventive measures are still under-powered and under-estimated. Current failures in the prevention of tuberculosis are even more surprising considering that, already a century ago, a comprehensive preventive of defence against TBC had been designed by clinicians and *ante-litteram* 'health care managers' such as Enrico Pieragnoli.

Pieragnoli was an Italian physician who lived in Florence between the XIX and XX century, and who, after many years of accurate planning, succeeded in 1906 in opening the first Italian tuberculosis preventive centre. Pieragnoli considered it his mission to 'fight' against TBC, a public enemy that was to be defeated using the weapons of global prevention; Pieragnoli had crystal clear concepts of prevention, of the predisposing factors to the disease, and of the need for aggressive treatment. He established his preventive institute with two main aims: the modification of the individual substratum in which the germs grew and the removal of contagion.

The prophylactic and diagnostic accuracy of his preventive institute are shown in a number of clinical documents containing objective body measurements (height, weight, thoracic circumference), quantitative clinical comparisons (intra- and inter-subjects) and field epidemiology. We may therefore conclude that the cornerstone of 'evidence-based' prevention of tuberculosis was present in Italy almost a century ago.

RÉSUMÉ

La tuberculose (TBC) est, de nos jours, prioritaire en ce qui concerne la santé des habitants d'Asie, d'Afrique et d'Amérique du Sud ; elle constitue en plus une maladie sociale renaissante dans le monde occidental. Tandis que la thérapie pharmacologique de la TBC est fortement établie, les mesures préventives restent excessivement faibles et sous-estimées. Les échecs actuels dans la prévention de la tuberculose sont autant plus surprenants étant donné que, il y a déjà un siècle, il existait une préventologie étendue de défense contre la TBC, conçue par des cliniciens et des 'directeurs de soins médicaux', pour ainsi dire, comme Enrico Pieragnoli.

Pieragnoli était un médecin italien qui habitait en Florence entre le XIX^{ème} et le XX^{ème} siècle. A la suite de plusieurs années de planification détaillée, c'était lui qui a réussi à ouvrir en 1906 le premier centre pour la prévention de la tuberculose en Italie. Pieragnoli considérait que c'était sa mission de lutter contre la TBC, ennemi public à vaincre en utilisant tout l'arsenal de la prévention globale. Pieragnoli possédait des idées bien claires concernant la prévention, les facteurs prédisposant de la maladie et la nécessité de thérapie agressive. Il a fondé son établissement préventif ayant deux buts : la modification du substratum individuel dans lequel poussaient les microbes et la suppression de la contagion.

L'exactitude prophylactique et diagnostique de cet établissement préventif est attestée dans certains documents cliniques qui contiennent des mesures corporelles objectives (taille, poids, circonférence thoracique), des comparaisons cliniques quantitatives (intra- et inter sujets) et de l'épidémiologie dans la domaine. C'est à conclure donc que la base de la prévention de la tuberculose fondée sur les preuves existait déjà en Italie il y a presque un siècle.

THE CONTEXT

Tuberculosis (TBC), also called 'the White Plague', has been the single most important cause of death in the developed world, and the scourge of early industrial society. Medical debate focused on some main questions - whether it was a hereditary disease, or a self-inflicted condition which poor people brought on themselves by

their squalid habits, or if it was the consequence of urban life and environment. The cause remained unknown until the German bacteriologist Robert Koch identified the tubercle bacillus on 24th March, 1882.

Sanatoria for sufferers of tuberculosis had already been developed before the recognition of the causative agent, as an extension of hygiene; they then spread all

over Europe and North America. Before the introduction of streptomycin and of BCG vaccine in the late 1940s, sanatoria remained the only 'curative' strategy for consumptives.

The concept of prevention was therefore of central importance in the struggle against TBC.

ENRICO PIERAGNOLI

Enrico Pieragnoli was born in San Miniato in Italy (Pisa) in 1857 and died in Florence in 1943. His first contribution to the study of TBC was in 1886, when he presented, before the Florence Society of Hygiene, a study on the contagion and prophylaxis of pulmonary TBC (1), just four years after Koch's discovery of *Mycobacterium tuberculosis*. Between 1886 and his death, Pieragnoli devoted his activity to the prevention of TBC. He was health director of the Demidoff Institute from 1896 to 1943, where he developed practices of hygiene and preventive medicine (2,3), and was later a member of the Preventive Antitubercular Union from 1924. In 1886 he formulated the idea of a sanatorium for children prone to TBC, in order to prevent the disease developing in adults. In 1900 a Promoting Committee for the foundation of a permanent sanatorium was established in Florence. Pieragnoli became the secretary of this Committee, which also included two other famous Florentine physicians, Pietro Grocco and Giuseppe Mya (4). The first was director of the Medical Clinic and a great expert in pulmonary diseases who founded in 1899 the Antirabic Institute, four years after Pasteur's discovery of the so-called 'virus fisso'. Giuseppe Mya was one of the pioneers of Italian paediatrics.

Florence was in the van of health care, drawing public attention to the adoption of precautionary measures. The diffusion of TBC in Florence, as in other cities involved in the process of urbanisation and industrialisation, constituted a sort of pathological geography. The sanitary conditions of houses and other living quarters and the density of population in different areas of the town showed a varying distribution of TBC and a selective mortality. TBC preferred the thickly peopled neighbourhood, raging in the poorest quarters of the town, where numerous families lived in unhealthy conditions.

Pieragnoli was aware of the social character of the disease, and directed his efforts towards the defence of those children who could escape it, if removed from their environment (5). The most innovative principle of Pieragnoli's activity was therefore the development of the prophylactic concept of hospital care. Before his

work, sanatoria were considered the only way to treat consumptives; only people who suffered from active tuberculosis were admitted to them. The fight against TBC had been a fight against the consumptive, who was isolated, lost his freedom, and was condemned to a period as a recluse. Pieragnoli succeeded in demonstrating TBC as a social disease, and his concept of prevention represents the very innovative aspect of his approach.

THE 'PREVENTORIO':

The Promoting Committee, consulted about the matter of setting up the prophylactic hospital, outlined the general principles inspiring its decisions (today we would call them guidelines).

1. The Institute was to be sited on a hill, in favourable climatic conditions;
2. It was to develop a defensive action against family (familiar) contagion with a highly prophylactic action against latent tuberculous forms;
3. The modification in the living conditions of children were expected to continue even after active immunisation was widespread;
4. An open-air school was necessary in order to take advantage of the curative action of air;
5. An agricultural colony was to provide occupation for the patients;
6. A seaside resort and a mountain health resort were expected to complete the programme;
7. After discharge the children had to be supervised, in order to control their health conditions and provide them later with suitable work.

The establishment of the 'Preventorio' was preceded by the foundation of the first mountain health resort on the Pistoiese Appennines (Tuscany mountains), which went on working for many years. On 24th June, the Day of the Patron Saint of Florence, St John the Evangelist, the Preventive Sanatorium was opened in 1906. It was situated in Villa Ulivini near Vincigliata on a splendid green hill behind Fiesole. The villa was provided by the munificence of Miss Turton and Miss Bryant, two well-deserving English ladies. Many institutions contributed to the realisation of this project, to whom H.M. Queen Elena gave her support and her name (6,7). This hospital, the first created to help children threatened by TBC, was able to exploit its suitable position with a building structure which was adapted to the necessities of the children through the construction of terraces and play-spaces.

The therapeutic action included a food-cure, based on a rich diet programme, an open-air cure and sunbathing. Every effort was made to spare the strength of the children, who had to perform respiratory exercises to strengthen their lungs. Gardening, open air games, and hydrotherapy were integrated into a programme of hygiene and moral education.

On admission each patient was screened for past clinical history and examined to record physical findings. The relationships as well as the family living conditions and type of home were evaluated, and a complete clinical record made. Physical examination was divided into general and thoracic. In the first part of the examination, the nutrition state, the muscular status, and lymph node findings represented the cornerstones. The thoracic examination, apart from an accurate qualitative description, included quantitative parameters such as the measurement of the chest circumference and chest range of movement. These quantitative baseline parameters had particular relevance as they were checked daily during the whole period of hospitalisation, thus permitting an 'evidence-based diachronic analysis'. Together with thoracic measurements, height and weight were recorded daily for every patient. The availability of these anthropomorphic parameters made quantitative clinical comparisons possible, both for individual patients and for the total number. Blood analyses and pulmonary function studies completed the full clinical assessment made by Pieragnoli, constituting a real health achievement over the period it was performed. This quantitative evaluation also allowed Pieragnoli to evaluate accurately the importance of symptoms such as coughs and sneezes that had been previously overestimated. The nosography of pulmonary diseases adopted and remodelled in the Preventive Sanatorium allowed an extensive differential diagnosis to be made with respect to a number of forms of pneumonia.

The preventive and therapeutic approaches of Pieragnoli could not be based on specific drugs as we know them today, but on the removal of contagion and on the modification of the individual substratum in which germs grew. The counselling by Pieragnoli with regard to exposure to open air and sun baths was useful in general terms. The incidence of rickets was quite high in the poorest strata of the population at the beginning of the XX century, and the interventions suggested by the Institute were no doubt useful in 'treating' vitamin D deficiency. In the same way, a correct dietetic regime, an integral part of the preventive programme improved the health of the hospitalised children. Open air environment and respiratory training and hydrotherapy completed the circle of the preventive programme of Pieragnoli's centre.

CONCLUSIONS

The fight against TB in terms of prevention still today represents a major challenge for national health systems. This appears particularly true considering that mass migrations increase world-wide and that the poorest still remain those at the highest risk.

While the pharmacological therapy of TBC is nowadays well established preventive measures are still under-powered (an effective vaccine is not yet available), and under-estimated. The role of diet and style of life habits is not yet fully taken into account in many health programmes (8). This is even more astonishing if we reflect on the fact that, already a century ago a comprehensive prevention of TBC was programmed by such an early 'health care manager' as Enrico Pieragnoli.

Acknowledgments

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Henry Dunant and Norman Bethune: a Canadian surgeon who worked with H. Dunant at the Battle of Solferino

Paolo Vanni, I R. Ottaviani, 2 E. Guerin, 3 D. Vanni. 4.

SUMMARY

Following a description of both scenarios involved in the Battle of Solferino (1859), and the consequent horrors which spurred Henry Dunant to set up the International Red Cross organisation, for which he received the first Nobel Peace Prize in 1901, the present paper discusses the meeting between Henry Dunant and the Canadian surgeon Norman Bethune (1822-1892). During the days immediately after the battle, they worked together, and Bethune voluntarily operated on the injured soldiers, probably at the hospital of Brescia.

In the final part, we describe the life of Norman Bethune, grandfather of the famous Henry Norman Bethune, hero of Maoist China. Norman Bethune was not only a famous surgeon in Toronto, but also Dean of the Medical School at Trinity College in 1856, a colleague of Dr George Ansel Sterling Ryerson, (recognised as founder of the Canadian Red Cross), and other members of the First Central Council of the same organisation. We suggest that Dr Norman Bethune communicated his Italian and European experience with Henry Dunant the founder of the International Red Cross, to his colleagues.

RÉSUMÉ

Après un descriptif de la Bataille de Solferino (1859) et des horreurs qui l'on caractérisées, cet article le présente au lecteur les actions qui ont porté Henry Dunant à créer la Croix Rouge (pour laquelle il a obtenu, en 1910, le Premier Prix Nobel pour la Paix). On parle ensuite de la rencontre entre Henry Dunant et le médecin canadien Norman Bethune (1822-1892). Dans les jours suivant la Bataille de Solferino ils ont travaillé ensemble et Bethune a opéré les blessés à l'hôpital de Brescia, comme chirurgien volontaire.

Ensuite on décrit la vie de Norman Bethune, grand-père du fameux Henry Norman Bethune, héros national de la Chine à l'époque de Mao.

Norman Bethune était un médecin célèbre à Toronto; il était aussi titulaire de la Faculté de Médecine de Trinity Collège (1856). Ses collègues étaient le Dr George Ansel Sterling Ryerson, (qui aurait fondé le Croix Rouge Canadienne) et d'autres membres du 1er Comité de la Croix Rouge Canadienne. Les auteurs pensent que Dr Norman Bethune ait communiqué son expérience italienne et européenne en compagnie de Henry Dunant qui avait fondé la Croix Rouge Internationale.

The 10th December 2001 was the hundredth anniversary of the presentation of the award for the First Nobel Peace Prize which was made to the citizen of Geneva, Mr Henry Dunant, for the foundation of the International Red Cross Organisation. The life of this apostle of humanity is a long tale (he was to die in 1910 at the age of 82) of great success, but also of much and harsh suffering (1).

His idea was that on the fields of battle on land and sea, the injured soldier is no longer a fighter but simply an individual in need of medical assistance and loving care, in an epoch-making statement.

We can divide the history of Mankind into two eras; the period preceding the first Geneva Convention (August 1864) and the one following it. From that date onwards, Men became a little less animal-like and acquired spiritual values of Humanity and Love which helped them transcend their merely physical aspect (2,3).

In August 2001, the History of Medicine Group at the University of Florence under my co-ordination published the first Italian version of the *Memoires* which H. Dunant wrote in the last years of his life, to vindicate strongly his role as the creator and founder of the Red

Cross. This work complements another, better known work written by Dunant, *Souvenir de Solferino*, and translated into 20 languages (4,5).

Henry Dunant was born in Geneva in 1828 into a wealthy aristocratic family of Calvinist beliefs. Especially from his mother, he received an education based on brotherly love and spiritual values. His parents were wont to help the needy. They opened the gates of their estates to the orphans of Geneva so that they too could enjoy the air as well as the beauties of the garden. They accompanied their children to visit the prisoners of the Penal Baths at Toulon. H. Dunant spent a happy childhood and early adult life in the family, but it was quite solitary. At the age of 25, he was employed in the bank of a Geneva exchange-clerk and began his career as a business man. He visited Algeria and Tunisia, and wanted to make Tunisia the Garden of Europe; he was supported in part by Napoleon III in this idea. In June 1859, Dunant was in Italy where the Emperor was starting to move against Austria. The 24th June 1859 is an important date in the history of Italy, Europe, and indeed all humanity, if one thinks that the horrors and dreadful events of that date were to push H. Dunant to set up the *Convention pour l'amélioration du sort des militaires blessés dans les*

armees en campagne (Convention for the betterment of the fate of wounded soldiers on campaign), or in short, what was to become the International Red Cross Mission (6).

In the days following that terrible 24th June 1859 he was to meet the Canadian surgeon Norman Bethune (1822-1892), a descendent of the important Bethune family and grandfather of the more famous Henry Norman Bethune (1890-1939), physician and surgeon known as 'the Chinese/China man, given his collaboration with Mao Tse Tung during the war of 'liberation' of the Chinese people 1937-1939 (7). (Fig 1).

Both the *Souvenir de Solferino* and the *Memoires* are autobiographical works in which Dunant reveals his narrative ability and, especially *Souvenir de Solferino*, is a dramatic reportage of the horrors of the 1859 battle - at that time fire-arms had become more precise and deadly. Since the Crimean War the bullets, oblong-conical instead of the old spherical balls, the cannons and the guns lined with ever-increasing power of the powders, provoked ever more serious wounds and left no way out in a skirmish even at a distance (8). Solferino, for example, was a victory thanks to the lined French cannons which were able to strike the Austrian reserves as far back as the rear echelon. At the time of signing the Villafranca Peace Treaty Field-Marshal Hess, Major Chief of Staff to Emperor Franz Joseph, was said to have confessed that at the Battle of Solferino, the Austrians had 50,000 men out of action because, he was reported to have confessed, the lined French cannons were decimating his reserves. This Battle was very crude and cruel; it was undoubtedly one of the bloodiest of all battles fought in the 19th century, and Henry Dunant was a faithful reporter of the events.

Some 300,000 men fought on a front which was little more than 15 km long, from 6 o'clock in the morning until 9 o'clock in the evening when, finally, the troops of Vittorio Emanuele II, on the left wing of the allies, attacking from San Marino, crushed the stubborn and courageous 8th Corps of the Austro-Hungarian army commanded by General Benedek.

The description of the battle is indeed terrifying. We cite just two short glimpses which refer to a bayonet attack followed by a horse artillery barrage, as well as the gratuitous atrocity which followed:

'Ici e'est une lutte corps a corps, horrible, effroyable: Autrichiens et Allies se foulent aux pieds, s'entretuent sur des cadavres sanglants, s'assomment a coups de croisse, se brisent le crane, s'eventrent avec le sabre ou la bayonnette; il n'y a plus de quartier, e'est une boucherie, un combat de betes feroces, furieuses et ivres de sang; les blesses meme se

défendent jusqu'à la dernière extrémité, celui qui n'a plus d'armes saisit à la gorge son adversaire qu'il déchire avec ses dents.

La cavalerie française fond sur la cavalerie autrichienne: uhlands et hussars se transpercent et se déchirent; les cheveux excités par l'ardeur du combat participent eux-mêmes à cette fureur, ils se jettent sur les cheveux ennemis qu'ils mordent avec rage pendant que leurs cavaliers se sabrent et se pourfendent.

Plus loin c'est l'artillerie lancée à fond de train et qui suit la cavalerie; elle se fraie un passage à travers les cadavres et les blessés gisant indistinctement sur le sol: alors les cervelles jaillissent, les membres sont brisés et broyés, les corps rendus méconnaissable, la terre s'abreuve littéralement de sang, et la plaine est jonchée de débris humains.'

The evening of 24th June, 40,000 men - of whom 5,621 were Sardinians, 12,720 French and more than 20,000 Austrians - lay in a shattered landscape; lifeless bodies or poor suffering wounded waiting to be helped.

Thus, already the very night of 24th June, Dunant came face to face with the terrible horror:

'Le soleil du 25 éclaira l'un des spectacles qui se puissent présenter à l'imagination. Le champ de bataille est partout couvert de cadavres d'hommes et de chevaux; les routes, les fossés, les ravins, les buissons, les près sont parsemés de corps morts, et les abords de Solferino en sont littéralement criblés. Les champs sont ravagés, les blés et les maïs sont couchés, les haies renversés, les vergers saccagés, de loin en loin on recontre des mares de sang.'

The weight of casualties requiring treatment grew in a startling manner throughout the day. After just a few hours, the military ambulances were completely overcome with work and the military health service was found to be totally inadequate. At that point churches, convents, houses, squares, wide roads, all became improvised makeshift hospitals: from Carpendolo to Castelfreddo, from Medole to Guidizzolo and Volta and, especially, at Castiglione delà Stiviere. All became a huge crucible or melting pot of dead and injured. Up to the 29th of June, when the évacuation of the injured to the 'hospitals' of Brescia, Cremona, Bergamo, and Milan began in an organised manner, the 5,300 inhabitants of Castiglione had received more than 6,500 injured. Two to three weeks later, the appalling number of 30,000 wounded was reached here.

In H. Dunant's description it is, however, quite clear that the really tragic days were the first three after the battle: it was then that so many lives that could have been saved, were lost.

It was in this painful inferno that Dunant met military and civilian doctors, nurses, men, women and children, all

engaged in an immense task which was certainly beyond their means. Here, in one of the most beautiful passages of *Souvenir de Solferino*, is how he relates what we may call the 'universal' contribution of one and all, which Italians and other nationalities made to alleviate the sufferings of the wounded:

'L'Intendant general de Brescia et le docteur Guilla, directeur general des hopiteaux de cette ville, le docteur Comisseti, medecin en chef de l'armee sarde, et le docteur Carlo Cotta, inspecteur sanitaire de la Lombardie, rivaliserent de devouement et doivent etre honorablement signales apres l'illustre baron Larrey, medecin-inspecteur en chef de l'armee francaise; le docteur Isnard, medecin principal de premiere classe; montra une habilete remarquable et comme administrateur; pres de lui, a Brescia, se distingua M. Thierry de Maugras, et toute une phalange de courageux et indefatigables chirurgiens francais dont on voudrait pouvoir citer tous les noms; car, certes, si ceux qui Went peuvent pretendre a des titres de gloire, ceux qui guerissent, et souvent au peril de leur vie, meritent bien l'estime et la reconnaissance. Un chirurgien anglo-americain, le docteur Norman Bettun, professeur d'anatomie a Toronto, dans la Haut-Canada, vint expres de Strasbourg apporter son concours a ces hommes devoues.

'Des etudiants en medecin etaient accourus de Bologne, de Pise, et d'autres villes d'Italie. A cote des habitants de Brescia, quelques Francais en passage, des Suisses, et des Beiges, autorises par l'Administration, etaient venus aussi offrir spontanement leur services et visiterent les hopiteaux, se rendant utiles aupres des malades, et leur donnant de legers adoucissements tels que des oranges, des sorbets, des limonades, du tabac!

Help by one individual stands out above the rest: Dr Norman Bettun, Professor of Anatomy at Toronto; he was, as was the norm for anatomists at the time, a trained surgeon. It was this fact which led to our research at the Institute for the History of Medicine at the University of Toronto, directed by my host Professor Edward Shorter. He clarified in no uncertain terms who Dr Norman Bethune was and his role in founding one of the Medical Faculties in the University; Henry Dunant wrote his surname as Bettun instead of Bethune since he belonged to a noble family which goes back to the time of the Counts of Artois:

The family name of Bethune is derived from the city of that name in the ancient Province of Picardie in France. It was called by the Romans 'Betunia in Gaul'. It was the chief city of a barony belonging to a family descended from the Counts of Artois. Since the eleventh century, they have been known as the BETHUNES of PICARDIE. Family names were unknown prior that date.

HISTORY OF THE BETHUNE FAMILY

Mrs J.A.Weisse. (9,10)

In 1428, a member of the Bethune family from the French line went to Scotland and became related to the house of Balfour. An extremely long genealogy of almost three centuries follows, and ends with a nineteenth century Canadian emigrant from Scotland. He was a certain John Bethune, a Presbyterian minister in Glangarry and Montreal. He married Veronica Waddin and they had a large family of nine children. The eldest of these, Angus Bethune, married Louise MacKenzie and to them was born Norman Bethune, the surgeon of Solferino named by Dunant. Norman Bethune married first Janet Nicholson, by whom he had two children, and the second of these, Malcolm - a Presbyterian minister - married Elizabeth Ann Goodwin, by whom he had two children; the second of these was the Dr Henry Norman Bethune, hero of the Peoples' Republic of China and collaborator of Mao-Tse-Tung.

Norman Bethune, the subject of our paper, was born on 13th August 1822 at Moose Factory, Ontario. His father Angus became a famous business man and politician, and was Director of the Bank of Upper Canada. The family moved to Toronto, where he enrolled his son Norman at the Upper Canada College. Norman studied for a diploma in Arts at King's College in Toronto from 1842 till 1845, then from 1845 attended the College Medical School. Finally he moved to London, where he became a surgeon in 1848.

Bethune returned to Toronto in 1849, and in the summer of the next year, (11) together with Drs Hodder-Bowell, Badgley-Hallowell, and Mitchell, founded the third School of Medicine of Toronto, which they named 'The Upper Canada School of Medicine'. The other two schools were J. Ralph's Toronto School of Medicine and King's College. King's College later became the University of Toronto Medical Faculty. Bethune's 'Upper Canada School of Medicine' never actually got underway; however with the Baldwin Act of 1849 Trinity College was laicised and the Bishop, John Strachan, accepted that Bethune and his colleagues establish the new Trinity College Medical Faculty. Lectures there began in 1850.

We found the *Circulars of the Medical Faculty of Trinity College* and, on all of them, the name of Norman Bethune, its Professor of Anatomy and Physiology, appears exactly as reported by Henry Dunant.

For six years this group of rampant, qualified doctors, who defined themselves as 'devout Anglicans', made up

the Faculty of Medicine of Trinity College. Nonetheless, they did not get what they expected. There was no specific recognition on the part of the School directors, nor was there any inkling of a fixed or stable salary: the money they received came exclusively from the 'fees' paid by the students, of which there were not many. In the academic year 1855-56, precisely when Bethune was Head of the Faculty, an incident occurred. In an advertisement under the name of the Faculty, published in a Toronto newspaper called *The Leader* by professors of the Medical Faculty, even those students who did not swear to the 39 Articles of the Church of England were to be admitted. Until then, this had been an obligatory requirement for all those wishing to be enrolled at Trinity College, a confessed Anglican University.

The reaction of the Board was immediate. The professors of the Medical Faculty were asked officially to rectify the advertisement. The entire Academic Body, with Norman Bethune at its head, resigned and so the first Medical Faculty of Trinity College closed (13).

In 1853 the Medical Faculty of the University of Toronto had also been closed. Hence in 1856 Bethune and his colleagues went over to the Toronto School of Medicine run by Dr J. Ralph as part of Victoria University.

In the late 1850s Bethune returned to Europe. He went to Edinburgh, where in 1860 he became a Fellow of the Royal College of Surgeons (14). The previous year he had been in Strasbourg in France for specialist studies, and it was from there that he set out for Solferino and met Dunant in June-July.

Norman Bethune returned to Toronto in 1860 and became Professor of the Principles and Practice of Medicine at Victoria University. When the religious barriers were dropped towards the beginning of the 1870s, we find him again at the newly re-founded Trinity College Medical Faculty. Here he taught the Principles and Practice of Surgery and Clinical Surgery until the academic year 1880-81 (15, 16). In the Annual Announcement for the Academic Year (*Annus Academicus*) 1881-82, his name does not appear in the list of Professors at Trinity College. There must have been an important meeting between Bethune and Dr George Ansel Sterling Ryerson. Ryerson was born in Toronto on 21st January 1855; he too was a descendant of an important Canadian family, the 'Ryerse Ryerson family.' He, having become a doctor and a medical officer in the Royal Canadian Army Medical Service, was officially recognised as the founder of the Canadian Branch of the British Red Cross Society (17).

Ryerson in his famous memoirs *Looking Backward*, he tells how he was the first to use a Red Cross flag (Fig 2) which he himself had made during the 1885 North West rebellion. (The figure shows a wrong date as courteously pointed out to me by Professor Godfrey, author of the text cited (18) at Fish Creek and Barouche on page 87 of the memoirs). (19)

In chapter 12 of Ryerson's memoirs he relates how, on 16th October 1896, on his return to Canada after holidays in Spain, and having stopped in London to get the proper permits from the British Red Cross, he was able to officially set up the Canadian Branch of the British Red Cross. He is at pains to point out that 'the Canadian Red Cross was the first colonial branch to be established in the British Empire.' The Canadian Red Cross was immediately active during the American-Hispanic War of 1898, and later in the second South African War (the Boer War) of 1899-1902 (20). G.S.Ryerson died in 1925 having dedicated his whole life to the idea of the Red Cross.

In 1880 Ryerson had been a colleague of Norman Bethune at Trinity Medical School. He lists all the names of those elected to membership of the Canadian Branch - Dr J.A.Temple, Surgeon Major Dr Grasset, and those included in the First Report of the Canadian Red Cross Society in the Boer War. Both Temple and Grasset were members of the Medical Faculty at Trinity, the former in the Academic Year 1872-1873 and the latter in the year 1877-78. It is difficult to imagine that Norman Bethune did not talk to them of his European experiences and of his meeting with H.Dunant at Solferino; as far back as 1864 the Red Cross was a world-wide reality and Henry Dunant was recognised — prior to his financial downfall - as its sole founder.

'Memorie LC 4. At that time, in 1867, everyone knew that I was the founder of this organisation; for many years it was called "Opera de Duvant." On the other hand, I always thought that the whole of Europe had undertaken, as it were, public debt of world-wide proportions on behalf of the Convention and the Red Cross. It took a while for it to be properly understood.'

In the Academic Year 1881-82, Norman Bethune disappeared from the list of professors at the Medical Faculty of the Toronto College. Nonetheless, he remained consulting professor at the Toronto Hospital. In 1888, we find him once again in the company of Dr Ryerson, Dr Grasset and Dr Temple (21). This establishes a long period of familiarity and inter-action with the so-called 'founder' of the Canadian Red Cross, Dr Sterling

Ryerson, and with two other members of the First Committee in the first year of its foundation. Unfortunately none of Dr Bethune's writings has been found in the family archives. His last years were marked by sadness, similar to those of the forgotten and impoverished Henry Dunant, for Norman Bethune became an alcoholic, and was assisted, initially, by his favourite son Malcolm. Later, when he remained alone, he went into a home for incurables (22).

There had been an artistic side to Norman Bethune, which we found in some of his sketches which reveal his creativity and technique in drawing (Fig 3). His personality was a complex and fascinating one, and his famous nephew always spoke of him with great admiration.

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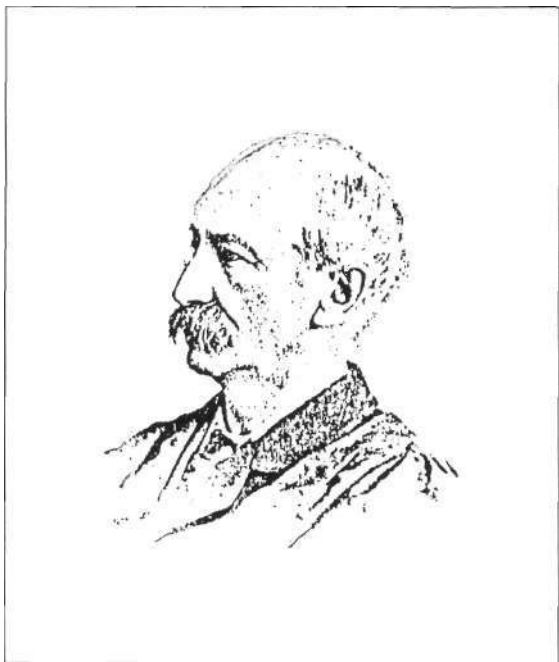
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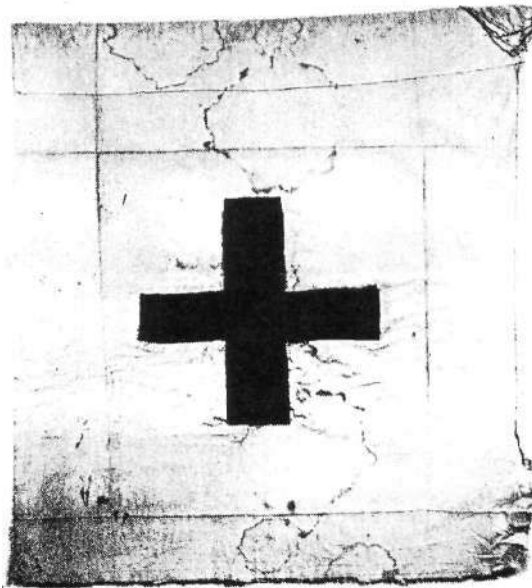
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Norman Bethune (1822-1892), the grandfather.
Portrait by kind permission of Miss Felicity Pope.



The supposed flag of the Canadian Red Cross used by Dr George Sterling Ryerson at the Battle of Fish Creek and Batouche, 1885, on the basis of the correction suggested personally by the author.



Drawing marked 'The Exam' by Dr Norman Bethune. By kind permission of Miss Felicity Pope.

The self-presentation of the Halle medical professor Friedrich Hoffmann (1660-1742) mirrored by his autobiography

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SUMMARY

The lost autobiography of the famous Halle medical professor Friedrich Hoffmann (1660-1742) was recently located in the *Manuscripta borussica* collection of the Berlin State Library Manuscript Department (*Handschriftenabteilung der Staatsbibliothek zu Berlin*). The autobiography shows new details about his life and work as well as his strategy to shape the picture of his personality for posterity.

RESUME

Friedrich Hoffmann (1660-1742) était un professeur de médecine célèbre à l'université de Halle. On a découvert que son autobiographie perdue se trouve dans la collection *Manuscripta borussica* au Département des Manuscrits de la Bibliothèque de l'État à Berlin (*Handschriftenabteilung der Staatsbibliothek zu Berlin*). Son autobiographie comprend des détails nouveaux en ce qui concerne sa vie, son œuvre et sa stratégie de procurer l'image de sa personnalité pour la postérité.

I wish to express my gratitude to Dr. Renate Schipke, Berlin State Library, Manuscript Department, for her help concerning the description of the autobiography, as well as Paula E. Chadderton BA(Hons) LLB for her help with the translation into English.

INTRODUCTION

The Halle medical professor Friedrich Hoffmann was one of the most outstanding physicians and scholars in early modern Europe. In medical history, he is traditionally mentioned together with his colleagues Georg Ernst Stahl (1660-1734) and Herman Boerhaave (1668-1738) as one of the three great system-builders of the early eighteenth century.¹ His significance for the history of science is illustrated by his incorporation into the *Dictionary of Scientific Biography*¹ as well as the translation of his *Fundamenta medicinae* into English by Lester S. King.¹ Nevertheless, knowledge on Friedrich Hoffmann's work is sparse. Already Karl Eduard Rothschild commented with regret that there are only few biographies about Hoffmann and that no thorough modern biography has been written so far.TM Werner Piechocki who published Hoffmann's testament regretted that Hoffmann's autobiography was lost.TM Recently, this text was located in the *Manuscripta borussica* collection in the Manuscript Department of the Berlin State Library. It contains hitherto unknown material on his life, his family and his work.

The autobiography is mentioned in the standard biography by his pupil Johann Heinrich Schulze (1687-1744) which was published in Latin in 1740^{vi} and in German in 1741.TM Schulze maintained that the autobiography had been made completely accessible to him.TM Also Friedrich Eberhard Rambach (1708-1775) extensively used the autobiography when he prepared the *Kurze Nachricht* about Hoffmann's life,^{1*} which was published in 1760. Rambach had been deacon in Halle from 1740 until 1745 and had known Hoffmann personally.TM How the autobiography then became a part of the collection of the Royal Library, nowadays Berlin

State Library, is unknown. Werner Piechocki mentions that it had been in the possession of the von Bredow family in the late 19th century.¹ However, it is also possible that the autobiography was incorporated into the Royal Library holdings prior to 1818. Then Friedrich Wilken (1777-1840), head of the Royal Library from 1817 until 1840, began indexing the *Manuscripta borussica*TM of which the autobiography is now a part.

The main topics covered in the autobiography are quite typical for 18th century scholarly autobiographies. These include details of ancestors, birth and baptism, youth, education, travel, career, marriage, cases of birth, illness, and death, self-characterisation, constitution, habit and publications.^{**1} The autobiography belongs to the class of autobiographies that demonstrate a growing self-confidence of scholars in the 18th century. The latter is exemplified by bio-bibliographical articles in works such as *Das jetzt lebende gelehrte Deutschland* (1724)^{iv} by Christian Polycarp Leporin and *Das Jetzt-lebende gelehrte Europe* (3 parts, 1735-1740) by Gabriel Wilhelm Gotten.^{**} Gotten incorporated responses by scholars to his request for details of their autobiographies. In the first part of his work about half of the articles were based on autobiographical material.^{***}

As stated in the preface, Hoffmann dictated his autobiography instead of writing it down himself. Accordingly, several different handwriting styles can be found. The first part of the curriculum vitae may have been written down in the 1720s.TM Obviously, then some space was left for later additions before stating Hoffmann's merits, but not enough. Therefore, his curriculum vitae was written in two parts. Events of the year 1732 and later years are considered in the second part.^{***m} Certainly, there were additions in the early

1740s,** and the final revision of the autobiography is likely to have been taken place around the time of his death. The preface is dated on 3rd September 1742, about two months before Hoffmann died.^x Hoffmann's testament is included as well as the epitaph inscriptions. Table 1 shows a description of the autobiography, whilst table 2 summarizes its contents.

ASPECTS OF HOFFMANN'S SELF-PRESENTATION

Even if an autobiographer does his best to report his life honestly, the inherent feature of this writing genre is that the person concerned reflects on the main events of his life thereby interpreting and making sense of them. The author often wants to present his life coherently, pointing out its essential features. This is clearly shown by Ingrid Aid-linger^{**1} - to cite just one example from the abundant literature on autobiographies. Hoffmann obviously took a great effort to pass his merits to posterity as completely as possible.^{**11} His family history as well as his life, works and merits are considered in great detail. At least parts of it, such as some of the statements given in the chapter on the six greatest adversities of his life were not intended for later publication. Rather, they served as a justification for his actions. Generally, the autobiography emphasises his success as a physician and scholar and portrays him as a good Christian. It also shows his strategy to transmit a picture of his life to posterity.

HOFFMANN AS A SUCCESSFUL MEDICAL PRACTITIONER AND SCHOLAR

Hoffmann's undoubted success as a physician allowed him to present himself as a model for others. Aside from his well-known education and career, the autobiography covers his character, principles of medical practice, and his experiences.

Hoffmann characterised himself as an ambitious^{**1n} personality who had no disposition for poetry, music, oration, travel or painting. Instead, he had felt more attracted to profound studies such as mathematics, medicine, theology and metaphysics, and especially great zeal for the study of medicine.^{**1n}

Hoffmann reiterated principles that he had also stated similarly before in lectures to his students.^{**n} His life served as advice to follow his example - never to treat or advise patients without examination and consideration of their medical history,^{**n} not to accept patients who changed doctors easily and did not differentiate between a physician and an empiricist,^{**TM} who did not pay appropriately,^{**TM} or those with incurable diseases.^{***} Hoffmann stated that he had never

turned his medicine into subservience to patients (servitium).^{***} From Hoffmann's point of view, it was worthwhile relying on few self-prepared drugs whose effects he knew well instead of precarious treatment procedures.^{***1} The appropriate conduct of life often helped more than drugs. Wells and spas also played an important role. Hoffmann emphasised that he had visited the most famous wells in Germany and been an expert in chronic diseases.^{***n}

Hoffmann portrayed his colleague Andreas Gundelsheimer (died 1715) as his antagonist and as a real scoundrel. Gundelsheimer had been his worst enemy at the Prussian court between 1709 and 1712. According to Hoffmann, Gundelsheimer's treatment included bloodletting, purging and giving vomitories repeatedly in acute as well as in chronic diseases, sometimes all together on one day, so that the patients who were already weak, were weakened even further.^{***8} Of great concern to him was that Gundelsheimer had contributed to the death of a patient during his time at the Prussian court by prescribing an incorrect treatment. Hoffmann's version of the conflict, as given in his autobiography, states that he had felt the necessity to intervene according to the best of his knowledge and conscience. Gundelsheimer, however, bribed experts from three universities who had been asked for their opinion, and achieved that Hoffmann was sent back to Halle University.^{***TM}

Hoffmann pointed out his high reputation amongst the nobility and upper classes in society who could choose whom they consulted. In order to demonstrate his success as a doctor, he drew up a list of ten pages with nobles who had consulted him. Hoffmann arranged their names by rank commencing with emperor Charles VI (1685-1740) before naming numerous kings, electors, dukes, princes and earls. Thus, the list was comprised of more than hundred names. Similar lists exist in order to demonstrate his scientific network - more than hundred erudited and famous scholars with whom he had been in professional contact,^{***n1} including Herman Boerhaave^{***TM} and Gottfried Wilhelm Leibniz (1646-1716).^{***n1n} Furthermore, Hoffmann listed numerous scholarly works where his theories were acclaimed,^{***1*} and the names of several pupils who served as his assistants.^{*1} The international scientific network as well as the reception of Hoffmann's theories and the future career of Hoffmann's pupils merit further research.

HOFFMANN AS A FAITHFUL CHRISTIAN

Although Halle was a stronghold of Pietism,^{*11} and Hoffmann himself has been numbered among the Pietists, the autobiography does not show the structure

of a Pietist autobiography with features such as a time before conversion, the event of conversion and life in grace afterwards.

Hoffmann's foreword at the beginning as well as the epitaph inscription at the end of the autobiography dedicate his life to God. Typically for 18th century autobiographies, the motivation given in the foreword was not to praise himself, but to praise and glorify God's kindness, mercy and grace, and to give his descendants an example. They also were to trust in God alone in all circumstances during their life.^{xi} Hoffmann maintained that he had held the Bible in higher esteem than all other theological and moral writings^{xii} and had abstained from joining any particular separate religious group (*sectirung*).^{xiii} As his favourite theological authors he mentioned the Protestant writers Martin Luther (1483-1546), Philipp Melancthon (1497-1546), Johannes Brenz (1499-1570), Georg Calixt (1586-1656), Johann Arndt (1555-1621) and Philipp Jakob Spener (1635-1705).^{xiv}

A very important motive for him was that episodes of suffering were the best medicine for human mind and nature (*medicina animae et corrufitae humanae naturae*). He had borne them in his devotion to God.^{xv} Hoffmann mentioned six episodes of suffering - the death of his parents and eldest sister, his conflict with the Jena medical faculty after his graduation in medicine leading to his relocation to Minden, his brother-in-law falling into disgrace at the Prussian court, the conflicts with his colleagues Christian Thomasius and Georg Ernst Stahl, and finally, most importantly, the intrigues by his colleague Gundelsheimer at the Prussian court leading to the most devastating defeat of his career. In Hoffmann's interpretation, all these events finally served

to lead him closer to God, and they had positive consequences for his future life.

A PICTURE FOR POSTERITY

Hoffmann's autobiography gives an impression how he orchestrated the picture of his life for posterity. The autobiography was the main source for the official biography written by his pupil Johann Heinrich Schulze. It was published whilst Hoffmann was still alive. Thus we can safely assume that the biography did not contain anything contrary to Hoffmann's wishes.

Two decades after his death, the picture for posterity was again shaped by confidants. In large parts, Rambach's *Kurze Nachricht* in 1760 closely follows the autobiography in many details. The jealousy of senior professors at the Jena Medical Faculty in 1681^{xvi} and the events at the Prussian court between 1709 and 1712 were not seen appropriate for publication by Rambach. The conflict with the philosophy professor Christian Thomasius (1655-1728) is mentioned, but only the scientific part about the foundations of mechanical philosophy, not the personal side of the conflict.^{xvii} Rambach left out that Hoffmann derogatorily remarked on Thomasius' envy and that Thomasius finally received a rebuke by the Prussian court.^{xviii} The autobiography can be seen as the foundation for a successful strategy to shape the memory of posterity. Later authors could choose which parts of the extensively published material they wanted to include into their contribution. If found, a critical assessment of Hoffmann's life by contemporaries would give us better insight into less pleasant features of his character. Until now, a successful life and career has been complemented by a successful implementation of a picture for posterity

Table I
Description of the autobiography

location	Berlin State Library, Manuscript Department
signature	Ms. boruss. quart. 108
author	Friedrich Hoffmann (1660-1742)
title	<i>Particularia vitae et familiae meae</i>
language	German, partly Latin technical terms
foliation	leaves Mil , 1-128 inserted slip 20a old foliation: leaves 1-19, 34-138, 140-143 text loss leaves 21-33 wrong old foliation: 103 on the back of leaf 102
location of origin	probably Halle/Saale
time	18th century, foreword dated 3 September 1742
size	22,5 x 16,5 cm
writing	several hands German current style, 18th century
binder	dark brown calf leather with decoration frame gilt edged text block spine with paper tag: <i>Nachrichten von der Hoffman[^] - schen Familie</i>
pictures	leaf IIr: copper engraving: Friedrich Hoffmann, age 66 years leaf IIIr: coloured copper engraving: coat of arms of Wolfgang Hoffmann in 1607 (pasted in, numbered 70)
literature	Schulze, Rambach, Piechocki (see notes)

Table 2
Contents of the autobiography

heading	foliation	foliation (old)	comment
<i>Particularia vitae et familiae meae</i>			title
foreword [no heading]	lv	lv	foreword dated 3rd September 1742
portrait	Mr	llr	copper engraving: Friedrich Hoffmann, age 66 years
coat of arms	lllr	lllr	coloured coat of arms of Wolfgang Hoffmann in 1607
<i>Grundliche Nachricht vom Geschlechte und Verwandschafft derer Hoffmanner</i>	1 r-18r	1 r-18r	family history
<i>Nachricht von meinem seeligen Bruder Herrn Augusto Hoffmann</i>	19r-20v	19r-[20v]	report on the life of Hoffmann's brother August Hoffmann
rebound note <i>P.M.</i> [pro memoria]	20a		note that the reports on the Knorre family [Friedrich Hoffmann's maternal relations] were taken out text loss leaves 21-33 (old foliation)
<i>Leben und Wandel Herrn Friedrich Hoffmann Konigl. PreuB. Hoffraths und Professoris Medicinae Primarii aufder Universitaet zu Halle</i>	21r-37v	34r-50v	first part of Hoffmann's curriculum vitae (until 1732)
<i>Merita in Academiam Fridericianam</i>	38r-39v	51 r-52v	merits concerning the administration of Halle University
<i>Merita mea exigua in rem medicam et physicam</i>	40Y-41 v	53r-54v	miscellaneous discoveries and achievements
<i>Elogia quibus a laudatis viris, maxime medicis scripta mea passim laudata sunt</i>	42r-45v	55r-58v	list of works of famous scholars where Hoffmann's writings were praised
<i>Recensitio locorum ex scriptis quibusdam publicis ubi de nostris tractatibus honorifica fit mentio</i>	46r-48r	59r-61 r	references of works where Hoffmann's writings were praised, includes copy of letter <i>Litterae Leibnitii ad Dn. De Fuchs mei commendatitiae</i> [47v]
<i>Besondere Nachricht von meinem seel. GroB-Vater Andreas Hoffmann</i>	49r-51 r	62r-64r	report over the deceased grandfather Andreas Hoffmann
<i>Von Verwandschafft meiner lieben Frauen</i>	52r-53v	65r-66r	report on the relations of Hoffmann's wife
<i>Von meinem Ehestand</i>	54r-56r	67r-69r	report on Hoffmann's marriage
<i>Kurtze Nachricht von meiner lieben seel. altestenTochter Johanna Dorothea Hoffmannin Leben und Wandel auf dieser Welt</i>	57r-60r	70r-73r	report on the deceased eldest daughter Dorothea Hoffmann

Table 2 continued
Contents of the autobiography

<i>Nachricht von meines liebsten seel. Sohnes Friedrich Ernst Hoffmanns Leben und Wandel in dieser Welt und freudigen seel. Abschiedhis</i>	61 r-66v	74r-79v	report on the deceased son Friedrich Ernst Hoffmann and death
<i>Nomina, qui in 8. filii mei memoriam quotannis orationes habuerunt, et singuli 10. imperiales acceperunt</i>	67r	80r	names of persons who delivered speeches in memory of Hoffmann's deceased son
<i>Ode Welche der Herr Doctor Jacobus Van den Velde jetziger Professor Med: in MarpurgAo: 1702 aufmich gemacht</i>	68r-68v	81r-81v	ode by Dr. Jacobus van den Velde
<i>Catalogus virorum, natalium splendore et eruditionis gloria conspkuorum, quibuscum commercium litterarum aluit FRIDERICUS HOFFMANNUS</i>	69r-71v	82r-84v	list of scholars with whom Hoffmann stood in professional contact
<i>Specification der mir dedkierten scriptorum und dissertationum</i>	72r-72v	85r-85v	works and dissertations dedicated to Hoffmann
<i>Carmen welches der seel. H. Probst Lkhtscheid auf die Invention meines Lebens-Balsams verfertigt</i>	73r-73v	86r-86v	poems on Friedrich Hoffmann
<i>Nachricht von meinen Scriptis, Bibliothec und curiosis</i>	74r-74v	87r-87v	orders and report concerning printing of catalogues of Hoffmann's books
<i>Von einigen Adversitaeten die mir in meinem Leben zugestoBen</i>	75r-82v	88r-95v	report on some adversities in life (death of parents and sister, conflict with Jena medical faculty, brother-in-law in disgrace, conflicts with Georg Ernst Stahl, Christian Thomasius, Andreas Gundelsheimer)
<i>Nachricht betreffend meine Leibs-Constitution, Studia, VerfaBung des Gemuths, Leben und Wandel</i>	83r-88r	96r-101 r	description of character as well as principles in medicine and religion
<i>Nachfolgende nachdenckl. apophthegmata habe pflegen in die Stammbucher geschrieben</i>	89r-89v	102-103	list of sayings
<i>Continuatio curriculi mei vitae ad p. 50</i>	90r-1 00r	104r-1 14r	second part of curriculum vitae (1732 onward)
[addendum, without title] <i>Ich habe hiermit auch melden wollen ...</i>	101 r	1 15r	supplementary remarks
<i>Ordo Dnn: Pro-Rectorum Academiae Fridericianae a prima eius Fundatione</i>	103r	1 17r	list of pro-rectors since foundation of Halle University until 1741
<i>Specification derer, die mir einige Scripta dediciret</i>	104r-104v	1 18r-118v	works with dedications (continuation of p. 72v)
<i>VerzeichniB der Nahmen derjenigen die sich bey mir aufgehalten und bey meiner Arbeit mir an die Hand gegangen</i>	105r-105v	1 19r-1 19v	list of names who served as sich Hoffmann's assistants

Table 2 continued

Contents of the autobiography

<i>Benennung einiger vornehmen Personen, theils nicht, theils meine Frau zu Gevattern gebeten</i>	106r-107v	120r-121v	names of persons who asked die Hoffmann to become godfather or Hoffmann's wife to become godmother
<i>Mein Testament, welches ich d. 24 Junii 1738. der Universitaet uebergeben</i>	109r-114v	123r-128v	provisions of the testament handed over to Halle University on 24 June 1738
<i>Nachricht von der Verwandtschaft meines Schwieger Sohnes, des Herrn Geheimten Rath Schmalz</i>	116r-118r	130r-132r	report on the relations of Hoffmann's son in law
<i>Specification derer hohen Standes Personen, die Sich meines Rathes und Kur bedienen</i>	119r-123v	133r-137v	list of nobles who consulted Hoffmann
[without heading] <i>D. Burgmannus in tr. succinctum ...</i>	125r-125v	140r-140v	Hoffmann positively mentioned by Peter Christoph Burgmann, Herman Boerhaave and Johannes Wigan
<i>In dem uralten Holtzwirthischen und Hoffmannischen Erb-Begrabniß auf dem Gottes Acker habe mir ein schbnes epitaphium von Marmor setzen laßen worinne diese Schrift enthalten ist</i>	126r-126v	141r-141v	epitaph inscriptions
<i>In vorbesagten Erb-Begrabniß oder Schwibbogen sind oben an die Decke diese Spruche geschrieben</i>	127r	142r	verses from the Bible at the ceiling of the burial-place
<i>Verzeichniß der in diesem Bande befindlichen Materien</i>	128r-128v	143r-143v	table of contents

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- ^{xvi}Niggel, *Geschichte*, p. 22.
- ^{xvii}On p. 32r, one part of the events of the year 1724 shows a different handwriting. Pages are given according to the new foliation indicated in table I.
- ^{xvNi}One part of the year 1732 is treated on leaf 37v, the next part from leaf 90r onwards.
- ^{""}See for example Hoffmann, *Particularia*, p. 104v. After works covering the years until 1738, additions followed in another handwriting between 1740 and 1742, and a further addition in 1742.
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- ^{xxviii}Hoffmann: *Particularia*, p. 85r.
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'Hoffmann, *Particularia*, p. 86v.

"Hoffmann, *Particularia*, p. 75v.

"Rambach, *Kurze Nachricht*, pp. 29-30.

"Hoffmann, *Particularia*, pp. 76r-76v.

€ €€ **"With much nausea, loathing, and foetor": William Harvey, dissection, and dispassion in early modern medicine⁹**

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SUMMARY

In early modern England accumulating knowledge of normal and morbid anatomy through dissecting the human body not only led to a better understanding of nature, but also defined the identity of the people who engaged in this activity. This essay analyses the relationship between systematically dismembering the dead and how this pursuit shaped the attitudes and emotions of early modern medical men toward the living. I focus on the most famous anatomist in early modern Britain - the discoverer of the circulation of the blood, William Harvey (1578-1657). (1).

RESUME

Durant la periode moderne de l'histoire anglaise, [l'accumulation de connaissances sur l'anatomie saine et morbide, grace a la dissection du corps humain, a non seulement permis une meilleure comprehension de la nature mais a egalement contribue a defenir l'identite de ceux qui s'impliquaient dans cette activite. Cet essai analyse les relations entre le demembrement systematique des morts et la maniere dont cette pratique a faconne, a l'epoque moderne, les attitudes et les sentiments des hommes de medecine a l'egard du vivant. Dans mon etude, je me suis concentre sur l'atomiste le plus celebre de cette epoque, le decouvreur de la circulation du sang, William Harvey (1578-1657).

WILLIAM HARVEY, ANATOMIST

As a medical student at the University of Padua, Harvey was exposed to methods of dealing with death, nakedness, and the destruction of the human body in the sanitised milieu of the theatre of anatomy and the chaotic wards of local hospitals. He found the dead body to be both a practical, loathsome, experience and yet a source of enormous theoretical fascination and satisfaction. Harvey would go on to carry out and witness many private dissections, including those of his father and sister. In anatomical lectures to the College of Physicians he matter of factly included the 'huge colon in father' and 'large spleen in my sister 51b.' as case material to illustrate certain medical anomalies. (2).

William Harvey (1578-1657) came from a merchant family in London, attended Gonville and Caius College Cambridge as an undergraduate, and received his MD. from the University of Padua in 1602. Harvey then set up practice in London, becoming a primary physician to Saint Bartholomew's Hospital and a Fellow of the College of Physicians. In 1616 he was appointed to the post of Lumleian Lecturer in Anatomy to the College, and most winters for the next 28 years he held a five-day demonstration dissection of a body. Harvey became physician extraordinary to King James I and physician-in-ordinary to Charles I, until the king's untimely decapitation in 1649. In the Lumleian lectures to the College of Physicians Harvey sought to provide his peers with the anatomical education he had personally acquired at Padua. As was becoming increasingly common in European dissections, Harvey both lectured and dissected simultaneously and occasionally identified

dead patients and their diseases. Among the autopsies Harvey referenced were those performed upon the bodies of his father, sister, and cousin's husband, the Earl of Leicester's daughter, Lord Chichester, and the cadavers of the sick-poor at St. Bartholomew's Hospital. With the President of the College of Physicians, John Argent, Harvey examined the meninges of Argent's daughter, and the heart of Argent's relative, Sir Robert Darcy. This tradition of anatomy in the family and naming his corpses probably represented an increasing familiarity with handling bodies and a desire to advertise the use of anatomy to households and individuals. It perhaps even acted to encourage autopsies as an ordinary and desirable part of medicine.

In *Exercitatio anatomica de motu cordis et sanguinis in animalibus* (1628) William Harvey told his readers that he had reached his conclusions about the circulation of the blood, 'by autopsy on the live and the dead, by reason [and] by experiment.' (3). As is well known, Harvey's observations of the circulation of the blood met with a mixed response at best. He reportedly told the diarist and gossip-hound John Aubrey 'that after his booke of the Circulation of the Blood came-out, that he fell mightily in his practize, and that "twas beleevved by the Vulgar that he was crack-brained; and all the physitians were against his opinion...."'. (4). However, by 1653 Harvey was being lauded in verse by Commonwealth poet Martin Lluelyn, as the wielder of a knife that had made 'living laboratories of the beasts' for, 'there thy Observing Eye first found the Art /Of all the Wheels and Clock-work of the Heart.' In similar vein in 1656, John Collop declared before the College of

Physicians, that Harvey needed 'not a club, but only his dissecting knife to slay the seven-headed hydra of error.' (5).

In just over twenty years Harvey had been elevated by his peers from 'crack-brained' to the founding father of English anatomy. This was as much due to his invention of a successful method of practising human dissection and animal vivisection that could be easily replicated, as it was to the discovery of the circulation of the blood. In London from the late 1630's, and later at Oxford during the siege from 1642-6, Harvey accumulated admirers who individually and then collectively undertook research projects in anatomy. Physicians such as George Ent, Francis Glisson, Nathaniel Highmore, Thomas Wharton, Walter Charleton, William Petty, and Thomas Willis, investigated anatomy through repeated dissections of felons, vivisection of animals, and postmortems on private patients. They made visible and published the 'new knowledge' of which Harvey had spoken, and linked it to fevers, ferments, and diseases. (6).

William Harvey may well have witnessed a dissection whilst a student at Gonville and Caius College, Cambridge. However, the roots of Harvey's later investigations lay in the education he received in medical Galenism and the humanist tradition of anatomy whilst a medical student at the University of Padua from 1599 to 1602. (7). By the later sixteenth century the idea of anatomy developed by Vesalius had become firmly fixed at Italian universities. The authority of anatomy was established through a carefully managed public spectacle, pedagogical techniques whereby anatomy was promoted as a distinct discipline within the medical tradition, and a detail of description of the body by the lecturer as the authoritative source of knowledge. Harvey's first exposure to the systematic medical dismemberment of the human body probably occurred within the purpose-built theatre of anatomy at the University of Padua. There, Harvey would develop certain mechanisms of mental adjustment and defence during his early clinical training. (8).

The theatre was built in 1593 in the shape of a funnel and, although only 10 by 7.5 metres across, had room for two to three hundred standing spectators. Harvey was the head, or Chancellor, of the English nation of students at Padua, and would presumably have sat in the second or third tier. (9). Conditions during the public anatomies Harvey witnessed would have been overcrowded and dark, while the smell emanating from the cadaver and the crowd must have been oppressive.(10). Yet continental anatomy theatres were meant to be harmonious spaces where the body could be presented

in a pleasant fashion to the audience of future physicians as the foremost example of the wisdom of God. As Johannes Vesling, Professor of anatomy at Padua during the 1640's, stated in the preface to his anatomy book:

'I framed this small [sic] Work, in the manner as we shew it in publick Dissections of the Body of Man: I avoided Controversies, which belong rather to Contemplatists, than the Theatres of Anatomists, which were built to behold, not to dispute in.' (11)

While no firsthand accounts of the public dissections at the University of Padua apparently exist for the later sixteenth century, the seventeenth-century medical student John Finch (1626-82) left behind a fascinating description of such events .(12). Finch was related to William Harvey and his father, Heneage Finch, witnessed Harvey's will. (13). John attended the University of Padua with his friend Thomas Baines. In one of his notebooks Finch copied out a Latin poem written by Baines in 1662 in praise of their Paduan professor of anatomy, Antonio Molinetti. (14). Baines first commented upon 'the many stupendous things we have seen in the bodies which you apply your hand. (15).

'But hear, kind Father, the gentle complainings of thy children....you solve all enigmas and you weave knots. We cease to wonder at man; but a new labour arises: we begin to be amazed at Molinetti alone. While you search the supple pathways of the blood, its nimble course, its slippery passages, behold our own blood seized with ecstasy, halts inert in our veins . . . you do not dissect bodies, Molinetti, but adorn them. You bring them into the Theatre cleansed from all dirt, perfectly in limb, and the obedient muscles are freed at your touch; thus you show yourself not an anatomist, but, what is far greater, a god.'(16).

Baines' gentle satire highlights the largely ceremonial role public anatomies played at early modern Italian universities. Yet he makes a more serious point regarding the presentation of the body itself - sanitized, and seemingly at the command of a somewhat jaded anatomist, the cadaver was presented devoid of its former humanity to the students in the audience.(17). Essentially, Molinetti was teaching the necessity of adopting a mask of emotional equanimity in the face of dismembering a former living body. In this he was more than successful, for in 1659 when Finch was appointed Professor of Anatomy at Pisa due to the influence of the Duke of Tuscany, he was lauded for being the ideal Harveian anatomist — 'keen in mind, a lynx with the knife, clever with a learned tongue, you cut everything, you see everything, and you are silent about nothing.' The sharpness of Finch's mind, knife, and tongue,

represented the emotional honing his head, hands and heart had received as a student of Molinetti's.

However, while these ceremonial dissections enabled Harvey and his peers to isolate their feelings to some extent from the stimuli (cadavers) which threatened to provoke feelings of disgust, when exposed to the more chaotic clinical rounds and post mortems at the Hospital of San Francesco which adjoined the University of Padua, such distance was far less achievable. Interestingly, in comparison to the experiences of seeing dissections in an anatomy theatre, little research has been done on the role of bedside encounters and patient autopsies in affecting the emotional stance of future physicians. (18).

Whereas the body was treated as an object of fascination and even veneration in the anatomy theatre, the bodies of hospital patients often caused a sense of loathing and fear. As a medical student following the great Fabricius or some other professor around the crowded wards of San Francesco, watching them first treat, then dissect patients, Harvey would have been exposed to methods of dealing with death, nakedness, and the destruction of the human body. However, his memories of the Paduan hospital, along with his later experiences as the primary physician to St. Bartholomew's Hospital in London, suggest that there were some medical situations in which Harvey could not overcome his disgust. (19).

Whilst discussing differing types of liver abscesses, some 'Hard from tension....like a heape of pus of pale yellow colour....' Harvey commented, 'I observed these things in the hospital (of Saint Bartholemew's) as well as in the hospitals of Italy with much nausea, loathing, and foetor. I have forgotten many things.' (20). No doubt the dissection of the abdominal region presented Harvey with the prime example of the cadaver as an aesthetically repulsive object, '1st. lower venter, nasty yet recompensed by admirable variety....' he wrote in his lecture notes. As the largest cavity in the human body, fluids naturally collected there and nondescript organs such as the soft and slippery intestines would be full of undigested food and faecal matter at times. When opened, this would result in a horrendous stench. Moreover, in the summer heat of Italy, rancid fat must have flowed through the hands of the dissector as he worked in the abdominal region. The physician Thomas Wharton, an admirer of Harvey, performed an autopsy on a judge in the summer of 1673 in Cornwall. 'Despite the smell soe violent and offensive to us all' he opened the body 'being overborne with the curiosity of finding something of the realtyes of the cause' (of plague). (21).

The body had been laid unsalted in an upper room of a pub, and the fat around the omentum flowed through Wharton's fingers during the first incision. Accumulating knowledge of normal and morbid anatomy not only led to a better understanding of nature but also defined the identity of the people who engaged in this activity. To gain self-knowledge through anatomy was to achieve certain social attributes - for physicians and surgeons the value of curiosity was reinforced and confidence gained to intervene in the body of their living patients. Such attributes could be symbolically passed on through gifts of material possessions once worn and handled by a successful anatomist. In his will of 1657, Harvey bequeathed 'to his loving friend Mr. Doctor Scarborough his velvet gown and all his little silver instruments of surgery.' (22). Scarborough replaced Harvey as Lumelian Lecturer in Anatomy and Surgery to the College of Physicians in 1658. The diarist Samuel Pepys attended one of Scarborough's lectures on February 27, 1682-3:

'About eleven o'clock...I walked to the Chyrurgeon's Hall, we being all invited thither and promised to dine there...As the Anatomies were a public show. After dinner, Dr. Scarborough took some of his friends and I went with them, to see the body of a lusty fellow, a seaman, that was hanged for a robbery. I did touch the body with my bare hands; it felt cold, but methought it was a very unpleasant sight..Thence we went into a private room, where I perceive they prepare bodies, and there were the kidneys, ureters, etc., upon which he read to-day, and Dr. Scarborough upon my desire and the company's, did show very clearly the manner of the disease of the stone and the cutting, and all other questions that I could think of.' (23).

Satisfied in his curiosity regarding the operation for the stone which Pepys himself had recently suffered through, he returned to the dinner table. There Pepys and the medical men fell to discussing hanging, pain, and blood circulation. Pepys later wrote in his diary, 'that all the Doctors at table conclude, that there is no pain at all in hanging, for that it do stop the circulation of the blood, and so stops all sense and motion in an instant.' (24). Here we see Pepys juxtaposing the evidence presented by his feelings in seeing the body - 'methought it an unpleasant sight' - and the authoritative statements of the doctors - 'there is no pain in hanging' - to reach a state of uneasy medical detachment.

Pepys' experience at the Surgeons' Hall mirrored that of the young Harvey in the hospital of San Francesco. As Harvey had learnt to suppress his sensual response to the smell and appearance of dying patients and corpses alike, by elevating autopsy and the rule of

reason, so Pepys had to be assured by the medical men gathered around that his reaction to the body was theoretically fallacious and emotionally incorrect. In achieving this state, Pepys temporarily accepted the vision of a community of medical practitioners who used experiential knowledge in certain ways to define both their studies and themselves. They simultaneously praised the objective art of anatomy and marginalised the subjective voice of the patient.

In December of 1651 John Finch wrote from Paris to his sister Anne Conway: 'I was on Saturday with Sir Kenelm Digby where I had some philosophical discourse: and he heard of your marriage, but wondered with me at your story of Dr Harvey. I must confess I have scarce faith enough to believe he would cutt himself but rather believe he voided the stone you speak of than cut out; for I doe not see it was possible for him in two days to be able to goe abroad otherwise.' (25).

What does this tell us of the personality of William Harvey? Finch's disbelief in the story of Harvey operating on himself for bladder stone seems predicated on the notion that Harvey would not have been walking around a mere two days after the operation, rather than the fact that he would not have 'cutt himself to begin with. Such stories regarding the bizarre nature of those who dissected for a living were beginning to circulate in early modern Europe.

As Katherine Park observes, beginning in the 1530's a haze of unsavoury stories on the topic of vivisection gradually collected around the names of famous anatomists. (26). Intriguingly, Park also noted a willingness on the part of anatomical authors to boast of their illicit behaviours in procuring cadavers and so fan the rumours of vivisection. It was Vesalius who marks the real turning point:

'One of the most surprising aspects of his great treatise *On the Fabric of the Human Body*, (1543) compared to the works of his predecessors, is his lack of respect for persons and his candid pride in the acts of daring and deception required to obtain what he considered an adequate supply of cadavera. He and his students forged keys rifled tombs and gibbets and stole in and out of ossuaries in a series of night time escapades that he recounts with evident relish and amusement.' (27).

Similarity, the young Felix Platter gleefully recounts his role in 'every secret autopsy of corpses' while a medical student at Montpellier in 1554. He refers to the repulsion 'I had felt at first when I came to put my own hand to the scalpel', but admits this quickly passed. (28).

Soon Platter could aid in the grave robbing and dissection of a 'student we had known.' However, as with Harvey, the smell of rotting cadaver lingered long in Platter's memory : 'the lungs were decomposed and stank horribly, despite the vinegar that we sprinkled on them.' (29).

A hundred years after Vesalius, the Danish Royal anatomist Thomas Bartholin gloomily recounted the horrors of a career of dissecting:

'Neither in our age nor any former one will you readily find an eminent anatomist who has placed domestic ease before the rigors of travel, although it must be warned that the goal sought will not always be a happy one. Zerbi barborous in diction but not in knowledge, was wickedly slain in Thrace....Vesalius was compelled to go to Jerusalem not for expiation of a crime but... because he sought the cause of a disease in a cadaver of which the heart was still beating. Carpi was driven into exile by the Bolognese not because he dissected live men...but because he seemed to have done so by reason of his numerous dissections.... Hence almost everywhere anatomists have been victims of misfortune, and if some have been able to avoid these snares that have been debilitated by the stench of cadavera so that few can hope to reach a venerable age....Finally if spared, they complete the journey and grow old at home with Galen, with no reward except wearied and bloody hands, and those empty.' (30).

Here was the anatomist as hero and martyr with his 'wearied and bloody hands,' scorned by his fellow countrymen and destined to live out his life in poverty. Notable in Bartholin's description of the anatomist is the stress on the *manual* nature of the work and the foul conditions under which they laboured. Moreover, Bartholin draws attention to the misunderstanding those who dissected were subject to, and so echoes Harvey's words that other physicians perceived him as 'crack-brain'd' when he first published *De motu cordis*. New to the seventeenth century was the celebration of competent and incompetent anatomists in verse, as previously seen in Baines' poem to Molinetti at Padua. The focus of much of the doggerel was the masculine bravery - or lack thereof — of certain dissectors. In Cambridge Dr. Thomas Clayton (1575-1647) arranged for his eldest son, Thomas (1612-93) to succeed him as the Tomlins Reader in Anatomy, although he was clearly unsuited for these posts, 'being posses'd with a timorous and effeminate Humour, [he] could never endure the sight of a mangled or bloody Body.' (31). Clayton was subjected to scurrilous student songs:

Well noble Knight our Anatomiste
 Take my advice. Bee pleas'd to desist
 from reading. And mistake no parte
 No not a liver for the hart
 As last you did. Trade not in blood
 Be advised by your friends, o good
 Sr Thomas. (32).

William Petty (1623-1687) the son of a Romsey Kent clothier and graduate in medicine of Leyden University, deputized for the squeamish Thomas Clayton. As one of the early admirers of Harvey's accomplishments, Petty had already undertaken anatomical research in Paris and London during the late 1640's. As with Harvey there soon arose a mythology surrounding Petty as an anatomist of some bravado. According to John Aubrey, 'Anatomy was then but little understood by the university, and I remember he [Petty] kept a body that he brought by water from Reding a good while to read upon some way soused or pickled.' (33).

Elegies were composed reflecting the character of those who anatomised. In 1677, Nathaniel Williams published an elegy for another of Harvey's followers, Thomas Willis, including this verse. Its portrayal of the wonders anatomists reveal, and the final anatomy their own bodies make, echoes the mixture of unease and fascination for dissection seen in medical students of the period:

Thou knew the wonderous art,
 And order of each part....
 In the whole lump, how every sense,
 Contributes to the health's defense.
 The severall, Channels which convey,
 The vitall current every way,
 Trackst wise Nature every where,
 In every region, every sphere,
 Fathomest the mistery
 Of deepe Anatomy.
 The unactive carcasse thou hadst preyed upon,
 And stript it to a skeleton,
 But now alas! the art is gone,
 And now on thee,
 The crawling Worms experience their Anatomy. (34).

The references contained in Willis' elegy to the relentless and predatory nature of anatomists and the ultimate futility of such detailed knowledge of the corruptible body were not lost on the critics of dissection-crazed physicians. Perhaps reflective of the fact that the Royalist Harvey's programme of sustained anatomising was taking hold, wholesale attacks on the

art of anatomy were launched during the Interregnum as part of the campaigns to reform medicine. In *Mataeotechnia medicinae praxeos: the Vanity of the Craft of Physick*, (1651) the self-avowed 'Chymiatrophilos,' Noah Biggs attacked the cruelty and uselessness of Anatomy:

To what ends tends the Anatomy of these two thousand years, with those tedious lectures, if the sanation of diseases, be not more happier at this day, then of old? What means that tearing and Cadaverous dissection of bodies, with that curious inspection and inquisition into the capillary veines, if we may not learn by the Errors of the Ancients, and if we may not make an emendation of those things that are past.' (35).

For Biggs anatomy was the inhuman art:

'For there is nothing more hard, more inhumane and full of Cruelty, among all humane Arts, through so many ages undertaken and usurp'd then that art, which by a concentrick subscription doth make new experiments by the deaths of men where the Earth covers the vices, the errors & frauds of its professors....' (36).

Similarly the London physician Gideon Harvey (no relation to William) in a savage satire of the monopoly of the College of Physicians in 1683 entitled 'The Conclave of Physicians, *Detecting their Intrigues, Frauds, and Plots, Against their Patients*', compared anatomy to the practice of cannibalism. Gideon Harvey referred to the College as 'The Conclave of Physicians to the Venetians,' managing thereby in one fell swoop to attack English physicians in particular, and Roman Catholicism in general:

'Their immolations are celebrated chiefly in the Winter upon Dogs and Cats by the younger fry, and sometimes upon humane bodies performed by the Hangman, their subservient Officer, which being conveyed to their Chauncel, the Cardinals in their turn fall hewing and slaying these Carcasses like Cannibals, to the intent all Spectators (to whom at such Festivals free egress and regress is granted) may behold them sitting in their Pontiscalibus, and making a pretended narrower search into the parts of mans body, insinuating thereby to these gazers their incomparable Skill and Learning, not without a plain Innuendo, that they should send for them in time of Sickness.' (37).

Gideon Harvey bitterly concluded that the illusion of anatomical research was created to attract customers and create public displays on 'safe' bodies - dead and therefore incurable, rather than living and sick - thus demonstrating the new attractions of dissecting physicians. (38).

Ultimately, in *The Art of Curing Diseases by Expectation*, 1669', Gideon Harvey blatantly attacked the father of anatomy himself, claiming that William Harvey's

anatomical proficiency did not guarantee his therapeutic skills. Gideon listed a number of cases where William Harvey had misdiagnosed patients' ailments and erred greatly in prescribing:

'One Mr. Farwell, Barrister of the Temple, was Patient and Complainent of a painful disease in his belly....Dr. Harvey ingrossed to himself the speaking part (a noisy 'Consult' of doctors were present) by reason of his extraordinary claim to Anatomy...after a long contrectation of all the abdomen, did very magisterially and positively assert all his symptoms to arise from an Aneurism of an artery, and therefore incurable, as being too remote to come at, wherein all, except Dr. Bates, very readily concur'd, though it was a most absurd offer in opinion, as I ever yet heard.' (39).

Gideon Harvey concluded that Harvey's practical mismanagement of cases stemmed from hubris based upon his anatomical pretensions. (40).

'No doubt but Dr. Harvey in Anatomy, and happiness of theoretic discoveries might justly pretend the precedency of all his contemporaries; and others before and since have also arrived to a great proficiency in cat and dog-cutting, also calf-head and sheeps-pluck dissecting; yet few of 'em when concerne in practice, were gifted with sagacity to know diseases when offered to their view, much less capable of curing them; in which curative particular the thinking Physician has the advantage, though the prating Physician by his pretended Anatomy ingrosses the opinion of mankind.' (41).

For Biggs and Gideon Harvey, anatomy was a 'prating art' much like quackery where practitioners dazzled the public with sleight of hand and empty rhetoric. Yet there was also a more serious accusation concerning the fundamental inhumanity of any physician who has learnt to 'do no harm' to his patients through long training in dissection and vivisection.

Contemporary reflections of Harvey's relations with patients are few and infrequent, however, but to a large extent they appear to back up his critics' complaints. In November of 1635 the Barber-Surgeons' Company called one of their members before the Court of Assistants, a William Kellest, for failing to present a case to them that resulted in the death of a 'maide.' Kellest appears to have accused Harvey of causing the woman's death by failing to diagnose a skull fracture and treating her for vomiting, 'by reason of the foulness of the Stomacke, and to that purpose prescribed physick by Briscoe the apothecarye.' (42). Even the diarist John Aubrey who knew Harvey firsthand and thought of himself as one of his friends confirmed that:

'All his profession would allow him to be an excellent anatomist but I never heard any that admired his therapeutique way. I knew several practitioners in this towne that would not have given 3.d [threepence] for one of his bills [prescriptions] and that a man could hardly tell by one of his bills what he did aime at.' (43).

The fame of Harvey's work led prominent physicians and surgeons to champion a more anatomical approach to understanding and treating the body. Concurrently, Harvey's reputation led to more cosmopolitan and Continental practices coming into vogue whereby autopsy and dissection were increasingly accepted by the wealthy and powerful. His stress on relying on the eyes rather than texts to reveal the truth (autopsia) was also crucial in constructing the image of the dissecting-medical man who was, 'keen in mind, a lynx with the knife, clever with a learned tongue, you cut everything, you see everything, and you are silent about nothing.'

Anatomical knowledge which raised a physician above his non-anatomically minded peers, while seeing and then constantly performing dissections and postmortems, allowed Harvey and his admirers to continually rehearse a certain emotionless response to suffering in living bodies. Yet these rehearsals were not often successful, for Harvey or his disciples. The activities of Harvey, his peers and followers did not escape the notice of the public and a particular stereotype emerged of a stoic, but flamboyant and deeply troubling, anatomist-physician. Critics of dissection-crazed medical men compared anatomy to the practice of cannibalism and suggested that those who frequently cut on the dead lost, or perhaps never even learned, a humane bedside manner toward the living.

As physicians sought to become more refined in the later seventeenth century and distance themselves from the blood and gore of dissections, vivisections and post-mortems, William Harvey's legacy was eagerly embraced by the surgeons. It would include a set of attitudinal norms towards both bodies and patients — an idealised mixture of objectivity, practical insensibility, and pathological hunger, best described as medical dispassion.

References.

1. This essay is based on a paper presented at the 19th Congress of the British Society for the History of Medicine, Birmingham, England, September 6-9, 2001.
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3. William Harvey, *Lectures on the Whole of Anatomy: An Annotated Translation of Praelectiones Anatomiae Universalis*, CD. O'Malley, F.N.L. Poynter and K.F. Russell, UC Press, 1961, pp.76. & 99.
4. John Aubrey, *Brief Lives*, edited by Andrew Clark, 2 vols., Oxford: Clarendon Press, 1898, Vol. I, p.300.
5. Robert Frank, *English Scientific Virtuosi in the 16th and 17th Centuries*, Los Angeles: William Andrews Clark Library, 1979, p. 100.
6. George Ent defended the circulation of the blood in *Apologia pro circulatione sanguinis (1641)*. Francis Glisson wrote a clinical treatise on rickets *De rachitide (1650)* and the liver *Anatomia hepatis (1654)*. Nathaniel Highmore's *Corporis humani disquisitio anatomica (1651)* supported Harvey's anatomical method, while Thomas Wharton's *Adenographia (1656)* detailed new discoveries on the glands. Walter Charleton's *Oeconomia animalis (1659)* discussed physiology. Thomas Willis in *Diatribae duae (1659)* applied anatomy to fevers and ferments.
7. See Peter Murray Jones/Thomas Lorkyn's Dissections' **1564/5** and 1566/57', in *Transactions of the Cambridge Biographical Society*, Vol 9, pp 209-229. Jones concludes : It is clear that in the 1560s at least dissection did take place, and was attended by men who went on to become leaders of the medical profession, (p 226).
8. On Harvey's time at Padua see G.Berti-Bock, L.Premuda, F.Vial, R.Rulliere, 'Le séjour de William HARVEY a Padoue.' In *Histoire des Sciences Med/cales*, Vol 14, pp 317-324, and Gwyneth Whitteridge, *William Harvey and the Circulation of the Blood*, London, Macdonald, 1971.
9. Arturo Castiglioni, 'The Origin and Development of the Anatomical Theatre to the End of the Renaissance,' in *Ciba Symposia*, Vol 3, May 1941, pp 826-844. Also see Th. H. Lunsingh Scheurleer, 'Un Amphitheatre D'Anatomie Moralisee,' in *Leiden University in the Seventeenth Century: an Exchange of Learning*, Th. H. Lunsingh Scheurleer and G.H.M. Posthumus Meyjes (eds), Leiden University Press, 1975, pp 217-277. The theatre at Leiden was much larger, better lit, and airier than at Padua.
10. See Jerome Bylebyl/The School of Padua. Humanistic Medicine in the Sixteenth Century,' in Charles Webster (ed), *Health, Medicine and Morality in the Sixteenth Century*, Cambridge: Cambridge University Press, 1987, pp 361-3, for more details on Padua. Also see Giovanna Ferrari, 'Public Anatomy Lessons and the Carnival in Bologna', in *Past and Present*, I 17, Nov. 1987, pp 50-106, and Jan Rupp, 'Matters of Life and Death: the social and cultural conditions of the rise of anatomical theatres, with special reference to seventeenth century Holland,' *History of Science*, Vol 28, 1990, pp 264-287 and idem, Michael Foucault, 'Body Politics and the Rise and Expansion of Modern Anatomy,' *Journal of Historical Sociology*, Vol 5, March 1992, pp 31-59.
11. I. I. Johannes Veslingus, *The Anatomy of the Body of the Man, wherein is exactly describes every part therof, in the same manner as it is commonly shewed in Publick Anatomies*, London, 1653. Vesling's work was translated from the Latin by Nicholas Culpeper.
12. However, see R.Eriksson (ed.), *Andreas Vesalius' First public anatomy at Bologna 1540. An eyewitness report by Baldasar Heseler, together with his notes on Matthaeus Curtius' Lectures on Anatomia Mundini*, Uppsala: University Press, 1959.
13. Heneage Finch became Lord Chancellor and Earl of Nottingham.
14. The Venetian Molinetti succeeded Vesling in 1649 as Professor of Anatomy at Padua.
15. Archibald Malloch, *Finch and Baines: A Seventeenth Century Friendship*, Cambridge: Cambridge University Press, 1917, p. 15. Malloch provided both the Latin and the translation. '*Stupenda vidimus!...Molinette sic decet queis admove manum...!*' p. 14.
16. *ibid*, '*Sed filiorum sentias clemens Pater/Dulces querelas quae vagientes proferunt/Enigmaes omnes solvis, et nectis nodos/Desinimus admirari hominem, at novus labor/Incipimus unum obstupescere Molinettum/Qui flexuosos sanguinis dum tramites/Agilemque cursum permeatus lubricos/Scrutaris, en sanguis correptus extasi/Stat piger in venis, nescitque progredi/Quis cum stupore viderat motum suum...Dissectiones laudent queis placent tuas/Parcius oportet istas: nam me iudice/Non dissecas Molinette sed adomas corpora/Et sordibus remotis, in crus integrum/Producis in Theatrum et sequaces musculi/Solvuntur ad tactum; sic non Te Anatomicum/Praestas sed id quod abunde magis est, Deum'* p 15.
17. *ibid*, p 27. Baines was chosen Professor of Music at Gresham College as successor to William Petty in 1661. In the same year Finch and Baines were made Fellows Extraordinary of the Royal College of Physicians and in 1662 Finch became one of the doctors of Catherine of Braganza. Malloch surmised that many of these honours were due to Finch's relation to Harvey.
18. See Andrea Carlino, *La Fabbrica Del Corpo: Libri e dissezione nel Rinascimento*, Torino: Giulio Einaudi editore, 1994.
19. Bylebyl confirms that there were daily hospital rounds with formal discussion of major cases in the late sixteenth century at the hospital of San Francesco, p 364. Unfortunately, I have been unable to locate further accounts of clinical experiences in hospitals of this period.
20. C.D O'Malley, F.N.L.Poynter, and K.F. Russel, *op. cit.* p 106.

21. Letter 31, letterbook of Thomas Wharton, *Royal College of Physicians*, MS 640.
22. Burton Chance, 'Charles Scarborough, an English Educator and Physician to Three Kings,' *Bulletin of the History of Medicine*, Vol 12, 1942, pp 274-296. Quotation from p 274.
23. *ibid*, p 282. Unfortunately, Pepys did not record attendance at any other anatomies.
24. *idem*.
25. Conway Letters: *The Correspondence of Anne, Viscountess Conway, Henry More, and their friends, 1642-1684*, Marjorie Hope Nicolson (ed) Yale University Press 1930, p 60. Nicolson noted that this story appeared nowhere else.
26. Catherine Park, 'The Criminal and Sainly Body: Autopsy and Dissection in Renaissance Italy', in *Renaissance Quarterly*: 47 (1994) pp 1-33. There is a large and growing literature on death and dying, and on cruelty towards criminals and the poor, etc, in this period. However, my focus is on doctors' attitudes towards their patients rather than these larger themes in English culture.
27. *ibid*, p 17.
28. '8e/oved Son Felix :*The Journal of Felix Platter a medical student at Montpellier in the Sixteenth Century*, translated and introduced by Sean Jennett', London: Frederick Muller Limited, 1961, p 89.
29. *ibid*, p 90.
30. *Thomas Bartholin, On the Burning of His Library and on Medical Travel*, translated by C.D. O'Malley, Lawrence: The University of Kansas Libraries, 1961, p 52.
31. Kenneth Dewhurst, *Willis' Oxford Lectures*, Oxford Sandford Publications, 1980, p 402. Clayton was a devout Royalist, the Master of Pembroke College and had succeeded his father-in-law to the post of Regius Professor. The quotation regarding Clayton's son comes from Anthony Wood, *Athene Oxonienses*, 2nd ed, 1721, Vol 2, p 807.
32. Dewhurst, p 403.
33. *ibid*, p 404. In 1651 Petty left Oxford to serve as Physician-in-Chief to Cromwell's army in Ireland.
34. Aubrey, p 176.
35. Noah Biggs, *Mataeotechnia medicinae: The vanity of the craft of physick: or, A new dispensary....* London, 1651, p 9. Biggs' identity has never been established; however, see Harold J. Cook, *The Decline of the Old Medical Regime in Stuart London*, Cornell University Press, 1986, p 122. Cook explains that Biggs' work 'was addressed to the Parliament, which, Biggs said, had been directed by Cromwell to undertake the reform of all the professions.'
36. Biggs, p 14.
37. Gideon Harvey, *The Conclave of Physicians, Detecting their Intrigues, Frauds, and Plots, Against the Patients....* London, 1683, The Introduction, p 8. Gideon Harvey (c 1640-1700) was born in Holland and probably obtained his MD in France. In 1675 he became physician-in-ordinary to King Charles II. In 1683 Harvey was satirised in a 30-page work, *Gideon's Fleece', or the Steur de Frisk, an heroic Poem. 'Written on the cursory perusal of a late Book call'd The Conclave of Physicians by Friend to the Muses.*
38. For more on Gideon Harvey and other critics of William Harvey's discovery of the circulation of the blood, see Robert G. Frank, Jr, 'The Image of Harvey in Commonwealth and Restoration England,' in *William Harvey and His Age: The Professional and Social Context of the Discovery of the Circulation*, Jerome Bylebyl (ed), Baltimore: The Johns Hopkins Press, 1979 pp 103-143, especially pp 132-3.
39. Harvey, *The Conclave*, p 17.
40. *ibid*, p 180.
41. *Memorials of Harvey*, J. A. Aveling (ed), London J & A Churchill 1875, p 17. The quotation is taken from Gideon Harvey, *The Art of Curing Diseases by Expectation*, Chapter XXII.
42. Aveling, p 16.
43. *idem*.

The Royal College of Physicians of Edinburgh's 300-year relationship with print on paper

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SUMMARY

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It is very likely that digital resources will be the primary source materials of the historians of the future. After 550 years, printing on paper is no longer the only means of information transfer. This paper summarises some of the new ways of digitally disseminating medical information before using the example of a Scottish professional society to show the importance of that extraordinarily successful method of information transfer - printing on paper using movable types. The paper aims to show how a seemingly simple, comparatively low technology, process has driven a lot of the decisions of the Royal College of Physicians of Edinburgh and provided a reliable means to document those decisions for over 300 years.

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RESUME

Il est fort probable que les sources principales des historiens dans le futur seront en forme de ressources digitales. Après plus de cinq cents ans, l'imprimerie n'est plus la seule façon de transmettre les informations. Cet article présente un résumé des techniques nouvelles par lesquelles la dissémination des informations médicales sont transmises avant de montrer comment une société professionnelle écossaise a eut une réussite remarquable en disséminant les informations, en utilisant les techniques permettant la reproduction d'un texte par impression de caractères sur papier. Cet article cherche à nous montrer comment, ce moyen apparemment simple et d'une technologie non compliquée avait influencé plusieurs décisions du Royal College of Physicians d'Édimbourg et fut le moyen dont elles ont été documentées pour la plupart de trois cents ans.

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THE DIGITAL PRESENT

Communication methods change. The telegraph and telephone led to a decline in letter writing. The rise of email and text messaging has meant that communication through writing is popular again. In 2002 some would say that, as a means of information transfer, printed books are anachronistic. It is certainly true that other ways to disseminate medical information are well established. And because medicine has always been bibliographically well served it was well placed to take advantage of the remarkable changes in information transfer in the last 20 years as the computer revolutionised the dissemination of knowledge. The printed *Index Medicus* started in 1879, its computerised descendant - the National Library of Medicine's *Medline* database now contains references to 12 million journal articles, many have abstracts and an increasing number are linked to the full text of the 4000 medical journals indexed. *Medline* is up to date and (thanks to the United States Government) it is universally and freely available to anyone in the world who has access to an Internet connected computer. The computer doesn't even need to be static as laptop or palmtop computers can be used to log on to the database.

In 2002 anyone with access to a computer can access an enormous amount of information. This is a

revolutionary period and it can be difficult to imagine how knowledge was disseminated internationally before the widespread use of computers. However computers are not perfect. Their drawbacks include - their reliance on electrical energy, their complexity, they suffer from the frequent connectivity difficulties and they are fragile.

The digital products of computers differ from analogue media as they are not inextricably bound to their containers. So preserving them is not necessarily a matter of preserving their containers as it is in the analogue world. With digital data, a machine needs to be between the data and its human interpreter, which adds another layer of complication.

Digital information is at risk because it is recorded on a transient medium, in a specified file format, and it needs a transient coding scheme (a programming language) to interpret it. The sheer number of digital documents is also a large problem. Digital documents may seem easy to store, back up and restore but they can be very difficult to find on a hard drive, particularly when the document's title has been forgotten. Their sheer number is also a disadvantage, it can be tempting to keep so much that the costs and problems of data organisation render an archive virtually useless. This problem is magnified by the huge issues connected with the preservation problems associated with the ever-changing information available on the Internet.

THE PRODUCT OF AN EARLIER TECHNOLOGICAL REVOLUTION

The printed book shares some of the drawbacks listed in the previous paragraph. However it is instructive to speculate on what features of printing on paper with movable types, public relations advisers and advertising agents would be enthusiastically advocating if printing was the new technology. They might point out that books are sturdy, have no power requirements and the information contained within a book's durable covers/containers can be accessed easily from the index at the back. They might also point out that although printed documents can be highly complex objects their structure does not need to be understood for their preservation, only for their interpretation. It is also evident that books can be subject specific, are easily transportable and have a long life.

Books printed on good quality, acid free paper can certainly last. The earliest printed book in the Royal College of Physicians of Edinburgh Library is Benvenuto Grassi's *De Oculis*. (1) Written in the Middle Ages this work was regarded as the classic text on cataract operations for over 500 years. The College's copy was published in Italy in 1474 - when James III was on the Scottish throne, Edward the 4th was the English king and Caxton had just printed the first book in England.

The Internet's international coverage is also not new. A very representative example of the sort of easily transportable knowledge source you can find in the College Library is a book, published in 1579, containing two works. The book was printed in Antwerp on one of the 20 presses owned by the great publisher, printer and bookbinder Christopher Plantin. Plantin's printing business (at the sign of The Golden Compass) was the most successful of the time. He took great care with the production of his publications, which often contained many good quality illustrations. Plantin published a wide range of material including a multi-lingual Bible and a vast array of scientific and medical books including works by Vesalius and Valverde. The first work within the volume's vellum cover is the first textbook on tropical medicine *Aromatum Simplicium*. (2) It was written by Garcia da Orta, a Portuguese physician, who practised in Lisbon before moving to Goa where he started a botanical garden. Da Orta's book contains the first European account of the Indian materia medica as well as an early account of cholera. Nicolas Monardes wrote the second work *Simplicium Medicamentorum*. (3) Monardes, who graduated in medicine at Seville, was probably the most successful, sixteenth century, Spanish physician. His works were translated into Latin, Italian, French, Flemish, German, and English. Monardes' volume contains an enthusiastic advocacy of *tobacco*, which he recommends as a treatment for toothache and carbuncles and as an

antidote for some types of poison. So today, existing in 21st century Edinburgh, there is a volume which was published in 1579, by a Dutchman in Antwerp containing the work of a Portuguese doctor writing in Goa about an Indian subject. It also contains the writings of a Spanish doctor on an American plant. And thanks to the clues on the title page it is known that a Scot bought it in Paris.

The story of how this book got to the College in Edinburgh illustrates the transportability of the medium. The first record of a book purchase in the College Minutes is in 1705 when the College bought the library of the deceased Laird of Livingstone for 300 merks Scots. (4) The Laird of Livingstone (Patrick Moray) had died while buying books and visiting botanical gardens in Europe. Sir Robert Sibbald, the founder of both the College and its Library was a great friend of Moray and he may have been instrumental in buying Moray's books for the College. In 2002 Moray's books are dispersed throughout the library but they can still be identified by the signed title pages on which Moray also noted the date and place of purchase. Although the book was bought 126 years after it was published it was almost certainly not an antiquarian purchase - knowledge still had a long shelf life in the 17th century. The travels of Monardes and Da Orta's book did not end once the book had crossed the sea and arrived in Edinburgh to join the growing library of the College Fellows. Earlier in this paper some of the advantages of books compared to digital devices were listed. However printed books do have disadvantages which include the major problems associated with transporting them and the even bigger difficulties connected with storing them.

THE COLLEGE STORES THE PRINTED BOOK

On the 29th September 1696, 9 Fellows gathered to hold one of the 19 meetings that the Royal College of Physicians held that year. The College had started in 1681 to raise standards and from its inception used books as a means to achieve this. The importance the College placed on books can be discovered from the minutes "On this day it was agreed to minute the instruction that every Intransigent be required to present a book- one or more as they please to the College library"(5)

During its early years the Fellows of the newly formed College did not have premises to meet in so the College meetings were held initially in the homes of the founding fellows. Presumably the College's books travelled with the Fellows and, like their owners, did not have a permanent home. The 1701 minutes certainly reveal that expenses were incurred in repairing the "presses" for the books damaged by fire and the transporting of books.(6) The College's wanderings ended when they

first rented a room before buying their first property in Fountain Close off Edinburgh's then fashionable Cowgate in December 1704.

By 1766 the growing library (well over 2000 titles) was outstripping its deteriorating accommodation. The Fellows debated what to do. Should they repair Fountain Close or move to a new site? The collapse of the Fountain Close Hall's roof concentrated minds. The books were hastily transferred to a room in the Edinburgh Royal Infirmary, which was close by in High School Wynd. College meetings were then held in various places. It was during this period of wandering in the middle of the 18th century that some of the most precious botanical books arrived in the collection. In March 1768, an Honorary Fellow of the College, the first Scottish born, British Prime Minister, John Stuart, 3rd Earl of Bute wrote to the College asking whether the books he had sent by carrier had arrived. The College President, Sir Stuart Thriepland replied almost 2 months after Bute's original letter.

"By particular desire of the Royal College of Physicians in Edinburgh, I beg leave to trouble your Lordship with their most grateful acknowledgements for the elegant and genteel present of Books, you have been pleased to honour us with; they are both useful and ornamental to our Library..... The College thought it improper to interrupt your Lordship's attention from affairs of greater moment by intimating the arrival of each volume. The whole Books shall have, and most deservedly, a proper place in the Library or Hall, which the Physicians are about to build and which they intend to make as genteel and elegant a piece of Architecture as the College funds will permit" (7)

The books remained in the Royal Infirmary for fifteen years until when they were moved to James Craig's purpose built George Street Hall. Unfortunately the principal apartment designed to hold the books was not ready for another eight years. It seems that the great cost of the exterior of the building had exhausted the College's finances. Cost cutting measures had only limited success and the College's finances did not improve until 1842 when they accepted the Commercial Bank's offer to buy the George Street premises. The books were on the move again - this time to the West End of George Street where temporary accommodation was found at number 19. The College then bought No 9 Queen Street. Once the site was cleared their architect, Thomas Hamilton started building what they hoped would be more practical premises featuring lots of room for books. The Queen Street Hall was completed in 1846 and the book-space did last almost thirty years until 1875 when a "New Library" designed by David Bryce was opened to hold the expanding collection.

CONCLUSION

The College's experience shows that printed works and their appetite for storage space can drive organisational decision-making. And it is not just space for formally published documents. The Patrick Moray example and the communication between Lord Bute and Sir Stuart Thriepland show that details preserved in communications (by accident or design) reveal much about the past. There are of course ways that new technology can be used to preserve the past. For instance, the College use the medium of digital video to do this and since 1995 video interviews have been used to capture the recollections of 29 Fellows. Information about this and other initiatives can be found on the College website. (8)

In 2002 The Royal College of Physicians of Edinburgh contains a remarkable record of medical knowledge printed using movable types on printed paper. Printed books, which many take for granted, have driven many of the policies of the College. The information within them was crucial to the Fellows as a professional body. The storage of them has had a major influence on the College's current buildings and on the College's previous homes.

The printed book is unlikely to drive College policy to such an extent ever again but it does remain a resource to be preserved and exploited and today's digital technology can be used to contribute to this.

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3. Monardes, Nicolas. *De simplicibus medicamentis es Occidental! India delatis, quorum in medicina usus est*, Christopher Plantin, Antwerp, 1574.
4. *College Minutes*, 8, XI, 1696.
5. *College Minutes*, 29, IX, 1696.
6. *College Minutes*, 16, VI, 1701.
7. Stuart Thriepland to Earl of Bute, draft letter, *College General Correspondence*, May 4 1768.
8. <http://www.rcpe.ac.uk/index.html>

Illustrations

1. Title-page from Da Orta, Garcia. *Aromatum, et simplicium aliquot medicamentorum apud Indos nascentium historia*, Christopher Plantin, Antwerp, 1574.
2. Title-page from Monardes, Nicolas. *De simplicibus medicamentis es Occidental! India delatis, quorum in medicina usus est*, Christopher Plantin, Antwerp, 1574.

News from Member Countries **Nouvelles des pays membres**

SUISSE

En automne 2001, la Faculté de médecine de Genève a fêté son 125^e anniversaire. Si l'Académie de Calvin a été fondée à Genève en 1559, ce n'est en effet qu'en 1876 qu'une faculté de médecine lui a été intégrée. Les commémorations de ce événement ont fait l'objet de plusieurs manifestations dont une série de conférences tenues du 15 octobre au 6 décembre 2001.

A cette occasion, la Faculté a patronné la réédition d'un livre fondamental pour l'histoire de la médecine à Genève. Cet ouvrage du Dr Léon Gautier (1853-1916), édité depuis longtemps épuisé. On en trouvera une analyse dans ce numéro de *Vesalius* à la rubrique Book Review.

Chaque institut d'histoire de la médecine de Suisse organise tout au long de l'année des colloques et séminaires que nous ne pouvons énumérer en détail. Signalons cependant la mise sur pied d'un cours intitulé 'la phénoménologie et les approches cognitives de l'homme' organisé conjointement dans le cadre d'un DEA par les départements de philosophie des facultés des lettres de Genève et Lausanne et par l'institute Romand d'histoire de la médecine. L'Université de Genève organise également cette année un cours public d'histoire des sciences biomédicales sur le sujet 'Introduction à la philosophie de la biologie' traité en huit leçons par le Pr Jean Gayon (Université Paris I, Panthéon Sorbonne).

Enfin, rappelons que - comme chaque année automne — la Société suisse d'histoire de la médecine s'est réunie, cette année à Davos, du 20 au 21 septembre, avec comme thème 'Histoire du traitement de la tuberculose.'

Roger Mayer

Book Review

La médecine à Genève jusqu'à la fin du dix-huitième siècle;
Léon Gautier

Genève 2001, Réédition de l'édition de 1906. Avant-propos de Jean Starobinski. Introduction de Micheline Louis-Courvoiser et Vincent Barras, 696 p. Georg Éditeur, 46 chemin de la Mousse, CH-1225 Genève. ISBN 2-8257-073 1 -7. CHF 70. Euros 40.

L'ouvrage du Dr Léon Gautier (1853-1916) est un grand classique de l'histoire de la médecine à Genève. L'édition originale de 1906 était épuisée depuis longtemps et elle vient d'être rééditée sous les auspices de la Faculté de médecine. Ce fort volume, de près de 700 pages, représente une somme inégalée d'informations qui nous font parcourir - en neuf chapitres - tous les aspects de l'histoire de la médecine à Genève, depuis les réglementations de la pratique de l'art de guérir jusqu'aux les épidémies de lèpre et de peste. Au fil du récit, de nombreuses personnalités sont évoquées — dans des biographies toujours bien documentées - tel Calvin au XVI^e siècle et ses Ordonnances sur la médecine, promulguées après sa mort. Ensuite est relatée l'évolution qui se fait au XVII^e siècle, puis le Siècle des Lumières, qui verra Genève devenir une pépinière de médecins célèbres, dont le très fameux Théodore Tronchin. Un dernier chapitre est consacré à la variole, de l'inoculation jusqu'à la vaccination, dont le médecin genevois Louis Odier — qui créa le terme 'vaccine' - fut un précurseur à l'aura internationale. Ce livre, irremplaçable pour l'étude de la médecine à Genève, est complété par une liste exhaustive du Corps médical genevois durant ces trois siècles, par une bibliographie de leurs oeuvres et il se termine par un dossier reproduisant nombre de pièces importantes et - naturellement — par un index alphabétique des matières et des noms. La réédition de cet ouvrage - d'une érudition sans faille et cependant très agréable à lire — ne devrait manquer dans aucune bibliothèque d'historien de la médecine.

Roger Mayer

Médical History Conférences and Meetings

<i>Conférence</i>	<i>Date</i>	<i>Contact/web site</i>
USA -Washington Anatomy and Art	Until 31st July, 2003	www.nlm.nih.gov / dream_anatomy_educator@nlm.nih.gov
University Collège London & Wellcome Trust, London International Health Programmes in SE Asia : a Reappraisal	7th March, 2003	Registration détails from Miss Sally Bragg, 24 Eversholt Street, London NW1 1AD. s.braagg@ucl.ac.uk
Moscow - Second Congress Confédération of Médical Historians (KIM)	14-17th May, 2003	Contact : licht(5)aha.ru
American Osier Society Edinburgh	21 -25th May, 2003	Secy: Dr Charles S. Bryan, cbryan@richmed.medpark.sc.edu
Canada - Montréal 3rd International Network for the History of Hospitals Conférence	19-21st June, 2003	Annmarie.adams@mcgill.ca
Turkey - Bursa. 3rd National Congress of Médical Ethics, Mudayana-Montania Hôtel	25-28th June, 2003	Congress président Aysegul Demirhan Erdemir, Kongre@burkon.com , www.burkon.com/biyoetik
United Kingdom -York British Society for History of Science, annual conférence	17-19th July, 2003	gbunn@onetel.net.uk www.bsbs.org.uk/york2003
United Kingdom - Reading 20th BSHM Congress	4-7th September. 2003	Organiser : Mr Dermot O'Rourke, 38 Stanhope Road, Reading RG2 7HN dermot@ouvip.com

Letter to the Editor

Dear Editor,

The Obstetric heritage of Jean-Louis Baudelocque

It was exciting to read the *historical review* on Jean-Louis Baudelocque by H.L. Houtzager in *Vesalius* 2002: 8: 58-9. Jean-Louis Baudelocque was born in the village of Heilly in Picardie, in France, in **1746**. His father was a surgeon. After completing medical training in Paris, Baudelocque established himself in both the academic and private practice of obstetrics. After the French revolution he was appointed professor of obstetrics at the Ecole de Sante and the Director of Maternity in Paris. His reputation was such that he was chosen by the Emperor Napoleon Bonaparte to attend his wife, Empress Marie Louise.

Although Baudelocque's main achievement was the establishment of a training centre for midwives in France, there were other contributions which placed him among pioneers of his subject. He was one of the first authorities who originally defined caesarian section as *'that operation by which any way is opened for the child than destined by nature.'* Baudelocque emphasised the importance of the 'touch' method in obstetrical examination. He wrote: *'Touching, considered relatively to the art of midwifery, is not confined to the introduction of the finger into the vagina, but comprehends also the application of the hand to the abdomen of the woman.'*

'It is by the former that we discover the state of the neck of the uterus, in situation, etc.; but it is by the latter that we must judge the volume of that viscus, of the height of its fundus, its obliquity etc' Later, he introduced a pelvimeter for external measurement of the pelvic diameter: *'one can determine, within one or two lines, to what degree the superior strait is abnormal in this regard, by measuring the thickness of the woman from the middle of the pubis to the last vertebra...'* The external conjugate of the pelvis became known as the Baudelocque's line. It was used until modern radiology showed poor correlation with international pelvic diameters.

Samuel Lurie MD,
Department of Obstetrics and Gynaecology,
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Application for membership **Formulaire d'adhésion**

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