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LINDSAY SOCIETY FOR THE HISTORY OF DENTISTRY

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Hon. Editor	Mr G. F. Garnett Stanhill Hall Oswaldtwistle Lancashire BB5 4PP
Committee	P. Frost H. Noble W. T. Sholl

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Editorial

The history of the Dental Historian is encompassed in the Editorial of Number 33 when Christine Hillam looked back to the early days of the Journal and more particularly to her stewardship of issues 25-33. The Occasional Publications and Lilian Lindsay Memorial Lectures were also published under her guidance. Christine cannot be replaced and we are delighted that she is now Hon. Chair of the Society itself.

It is all too clear therefore why there was such a problem last September when the Editor's Chair fell vacant. Only a veritable tyro and a male at that would presume to take over from such an excellent and experienced predecessor.

However I have enjoyed receiving the Dental Historian for almost twenty years and I was convinced that it had to continue even if I had to assume the role of apprentice editor. My apologies to everyone for the rather thin Number 34. Although no apology is due for the quality of the papers presented by James Beaton and Robert Orchardson

I hope that Number 35 is acceptable and that we can build on the very steep learning curve that I am experiencing.

Like all editors could I make a plea for more contributors? Of course the full length paper is what we seek, but notes, queries, letters - anecdotes all help to make a journal of interest not just to the specialist historian but to members of the profession in general.

I am waiting to hear from you all.

MILESTONES IN DENTAL EDUCATION IN THE U.K.

Professor Sir David Mason*

Although there had been a significant number of books, publications and some lecture courses devoted to dentistry during the 17th and 18th centuries, it was not until the mid 19th century that formal dental education became established.

In the U.K. John Hunter's immense contribution to surgery and dentistry during the second half of the eighteenth century is well known. His first textbook, written in 1771, was *The Natural History of the Human Teeth*.¹ In this beautifully illustrated book he gives superb descriptions of the development of the teeth, jaws, articulation, their gross anatomy, histology and physiology. In 1778 John wrote another book on diseases of the teeth - *Treatise on Diseases of the Teeth*.² In this he described the early carious lesion and gave an excellent description of many important clinical topics including periodontal disease and pregnancy, periodontal disease and tooth deposits, trigeminal neuralgia and orthodontic problems and their treatment. He also described the transplantation of teeth and carried out a series of experiments on humans and animals in the vain

* Professor Sir David Mason, Honorary Senior Research Fellow, University of Glasgow Dental Hospital and School.

1. Hunter, J. "The natural history of the human teeth explaining their structure, use, formation, growth and diseases." London: J. Johnson, 1771.
2. Hunter, J. "A practical treatise on diseases of the teeth intended as a supplement to the natural history of those parts." London: J. Johnson, 1778.

hope of arriving at a reliable method for replacing lost teeth.

The fact that John Hunter had been so involved in dentistry and dental research, as well as biological and surgical research, had an important influence on the development of dentistry in this country through the Royal College of Surgeons of England, in particular, and subsequently via the other Royal Colleges of Surgeons, of Edinburgh, in Ireland and the then Faculty of Physicians and Surgeons of Glasgow.

John Hunter's example must also have had a profound influence on the young John Tomes who was to play the leading role in establishing dentistry as a separate profession in the next century. We know that Tomes conducted madder feeding experiments, similar to Hunter's, for the demonstration of deposition and resorption in bone. It is also of interest that in 1859³ Tomes was appointed treasurer of a College fund set up to move Hunter's body from St Martin's-in-the-Fields to Westminster Abbey, where it is now interred.

In the final half of the 19th century dental caries increased considerably in many countries due to the importation of sugar. There was a great need for dental treatment and better training of dentists. Formal dental education at a Dental School first started in America in Baltimore in 1839. It was at first a one-year course based on practical training and clinical practice and was not related to a university or medical institution. Later the dental schools, starting with Harvard in 1867, became part of the universities. In the U.K. the Medical Act of 1858 gave the Royal College of Surgeons of England the responsibility of introducing an L.D.S. Diploma. In 1878 the first Dentists Act extended this authority to the other Surgical Royal Colleges. Sir John Tomes was the leader of the movement which established formal dental education in the U.K. Un-

3. Cope, Z. "Sir John Tomes a pioneer of British dentistry." pp 39 and 97. London: Dawsons of Pall Mall, 1961.

fortunately the 1878 Dentists Act which created the Dentists Register failed to limit unqualified practice and rampant dental disease in the population became a matter of national concern in the U.K.

Fisher (1885)⁴ and Cunningham at the Cambridge Conference on the Condition of School Children's Teeth (1892)⁵ highlighted the need for dental care of children. The poor dental health of British soldiers serving in South Africa in the Boer War was reported⁶ and the Report on Physical Deterioration (1904)⁷ drew attention to the serious state of the nation's teeth. In 1917 during the Great War, the Acland Committee was established "to enquire into the extent and gravity of the evils of dental practice by persons not qualified under the Dentists Act 1878".

The Acland Committee Report (1919)⁸ recommended that unqualified practice should cease. There was a need to train more dentists and for higher educational standards for dentists. It recommended prevention and saw dental health as part of general health. There was a need for a public dental service for children in schools and clinics. Dental Schools were under-funded and among measures to rectify this it was suggested there should be an Annual Licence Fee for all dentists on the Register to support education and research. A Dental Board of the United Kingdom should be established.

4. Fisher, William MacPherson. "Compulsory Attention to the Teeth of School Children." *Br Dent J* 1885 8

5. Report of the Cambridge Conference on the Condition of School Children's Teeth. *Br Dent J* 1892 13 582-603

6. Newsholme, Arthur. "The Relation of the Dental Profession to Public Health" *Br Dent J* 1903 24 533-545

7. The Interdepartmental Report on Physical Deterioration. Cmd 2105. London: HMSO, 1904

8. Report of the Departmental Committee on the Dentists Act 1878. Cmd 33. London: HMSO, 1919 The 'Acland' Report.

The Acland Committee Report 1919 formed the basis for changes introduced in the Dentists Act 1921 which limited registration of dentists to those who had obtained an approved qualification except for "Dentists 1921". The Dental Board of the United Kingdom was created in 1921 with Francis Dyke Acland, a lawyer by profession and a Member of Parliament, as first Chairman but the Board was still under the jurisdiction of the General Medical Council.

Although the Dental School at King's College London was not founded until 1923, Samuel Cartwright who had been a Consultant Dental Surgeon (since 1844) was appointed Professor of Dental Surgery at King's College in 1860. In 1900 Birmingham introduced the first University Dental Degrees, followed by Liverpool, Manchester and Leeds in 1906. In 1920 the first University Dental Chair at a Dental School was established in Liverpool. The first higher Dental Diploma was introduced by the Royal College of Surgeons of Edinburgh in 1920 followed by the then Royal Faculty of Physicians and Surgeons of Glasgow.

The Dental Board of the United Kingdom funding of education and research in dentistry was to have a major beneficial influence on academic dentistry during the period 1921 - 1945. This financial assistance coming from the dentists annual retention fees showed an enlightened approach and reflected well on the profession. It enabled much needed senior teaching appointments to be made in many schools and supported through the Medical Research Council Dental Committee the early work of such famous names in dental research as Kilian Clarke (the first person to identify and describe *Streptococcus Mutans*), Fish, Mellanby and many others.

There were a number of notable milestones between the Wars 1919 - 1939. The International Dental Federation Commission on Education Report

was published in 1923⁹. William Guy of Edinburgh was the author. This report set out the views of teachers from different countries and described a model curriculum with a balance between basic science and medical knowledge on the one hand and the acquisition of technical and clinical experience on the other.

In 1931 the Education Consultative Committee of the Dental Schools of Great Britain was formed. This Committee brought together the Deans and Directors of Dental Schools. The Committee changed its name in 1937 to the Dental Education Advisory Council. (In 1993 it became the Council of Dental Deans.) The work of this Council was most valuable not only in bringing some cohesion to the Dental Schools but also in producing papers and data for the Teviot Report of 1944 which was to be concerned with post war reconstruction of the profession

In spite of the Acland Report recommendations, the changes in education and research which followed and the formation of the Dental Board of the United Kingdom, clinical dental practice remained essentially treatment orientated until the start of the National Health Service and was especially concerned with the relief of pain, extractions, provision of dentures and some restorative care. Regular restorative care or prevention was for a minority of the population. Dentistry was still suffering from the consequences of the focal infection theory described by the physician William Hunter in the *Lancet*¹⁰ in 1911. When treating any medical disease of unknown origin, teeth were often removed. This resulted in full extractions under general anaesthesia and the practice only stopped in the 1950's when it was realised that this treatment had little or no effect upon the diseases concerned.

9. Report to the Commission on Dental Education of the F.D.I. *Br Dent J* 1923 44 1226-28

10. Hunter, W. "Role of Sepsis and of Anti Sepsis in Medicine." *Lancet* 1911 i 79-86

The emphasis on treatment and manipulative skills of the time is well described and reflected upon in the writings of the dental historian, Menzies Campbell. In 1939¹¹ he wrote 'As honest men and women, we must straight away admit in our profession more notable advances have taken place relating to artificial teeth, fillings, and extractions than towards the preservation of the natural dentition free from caries.' He then made the prophetic statement 'Laymen will not continue to submit fatalistically to having teeth extracted and artificial substitutes inserted, until satisfied that all preventive measures have been tried and proved to be unavailing.'

In 1938 Sir Francis Dyke Acland the first Chairman of the Dental Board died and his successor was Edward Leo Sheridan a dentist from Dublin - the first dentist to be Chairman. Sheridan's term of office 1939 - 1944 was entirely during the Second World War. Dental Board Minutes of that time record how post war developments in education and clinical practice were being considered as early as 1941. These discussions were to lead to the Teviot Committee of 1944 and dentistry's participation in the National Health Service of 1948. The Teviot Report in 1946¹² addressed recruitment, legislation, the government of the profession, the use of dental auxiliaries and research and considered some of the related educational problems. It proved to be an important milestone in dental education; recommending that the Government, the Universities and the dental teaching hospitals should make available better educational facilities. There was a need for 'government assistance on the most generous scale'. Earmarked grants from the University Grants Committee (U.G.C.) should be made available. Dentistry should be treated not less favourably than subjects of the

11. Menzies Campbell, J. "Dentistry Then and Now." pp 182 - 183. Pub. Glasgow Privately 1981.

12. Teviot Report. Final Report of the Inter-Departmental Committee in Dentistry. Cmd 6727. London: HMSO, 1946.

oldest standing in Universities. Teviot thus paved the way for a graduate dental profession and suggested how postgraduate education should be developed as the responsibility of the state.

As tends to happen, only some of the forward-looking recommendations of the Teviot Report¹² were acted upon swiftly. Others relating to the lack of recruitment to the profession, research and legislation took the additional support of the McNair Report¹³ of 1956 to secure proper implementation and adequate funding.

The Dentists Act of 1956 established the General Dental Council. Those fundamental changes in dental education bringing it fully into the Universities and the recognition of the importance of dental care within the National Health Service followed by professional autonomy were heady days for the profession. The dental schools and hospitals recruited full-time teachers and research workers. Dentists obtained higher University degrees and gifted undergraduate students supported by the Nuffield Foundation were encouraged to intercalate an Hons B.Sc. degree¹⁴. In parallel with those developments in the Universities the Royal Colleges had developed a complementary role in postgraduate dental education establishing Fellowships in Dental Surgery in 1948 in England and Edinburgh. Sir Wilfred Fish and Sir Robert Bradlaw had been key figures in achieving those significant changes in professional development from their work in the Dental Board, Teviot Committee (Bradlaw), McNair Committee (Fish) and then in the newly established General Dental Council.

12. Teviot Report. Final Report of the Inter-Departmental Committee in Dentistry. Cmd 6727. London: HMSO, 1946.

13. McNair Report. Report of the Committee on Recruitment to the Dental Profession. Cmd 9861. London: HMSO, 1956.

14. Mason, D.K. and Scully, C.M. "The Intercalated Honours B.Sc. for Dental Students." *Br Dent J* 1987 162 366-368

In 1965 the government set up the Royal Commission on Medical Education under the Chairmanship of Lord Todd which reported in 1968. The 'Todd Report'¹⁵ described the need for a continuum of education with general professional training and continuing education following the undergraduate course. It also recommended that general medical practice should be regarded as a speciality. 'We think that primary medical services in this country will for the foreseeable future, continue to be based upon general practice but in a form very different from that of the traditional single-handed practice or small partnership. We believe that general practice will be a satisfying and challenging speciality. We see in the future a general practitioner providing care for the families and individuals in the local community, working with a group of colleagues (each, probably, with a personal interest in a particular speciality) aided by proper diagnostic services, ancillary staff and efficient practice organisation, and co-operating closely with other agencies. We see him, moreover, playing a responsible part in the hospital and other health services, and recognised as a specialist in his own right by virtue of his unique and essential contribution to medical care.'

The Teviot (1944)¹² and McNair (1956)¹³ reports had stressed the need for improved Section 63 courses for general dental practitioners and opportunities for better training of hospital trainees leading to consultant appointment. Unfortunately, dentistry was excluded from the Royal Commission on Medical Education which reported in 1968 and therefore general dental practice was not included in the major improvements in training and status recommended for general medical practice. Between 1968 and 1980 different views were expressed by the General Dental Council¹⁶ and the British Dental Association^{17,18}

15. Todd Report. Report of the Royal Commission on Medical Education. Cmd. 3569 London: HMSO, 1968

16. General Dental Council. Implications for Dentistry of the Royal Commission on Medical Education and related questions. London: General Dental Council, 1972.

on the way forward and these will be of interest to dental historians. The B.D.A. Working Party Reports of 1969¹⁷, chaired by Mr R. Allen and in 1976¹⁸, chaired by Professor H. Tonge, made constructive suggestions on how dentistry should change its approach and how dentists should be taught. Indeed in the Report of 1976¹⁸ was the statement 'It seems to us that the traditional objectives of dental undergraduate education of producing dentists ready immediately for independent practice, must now be discarded. The expansion of dental knowledge, and the need for dentists to be more broadly educated, particularly in subjects aligned to medical studies, makes the objective unattainable except in an unreasonably lengthened course. We believe that there is an urgent need for detailed study of the feasibility of introducing a vocational pre-registration training period, such a study to be undertaken by the schools, the UGC, the GDC and DHSS jointly.'

The Nuffield Foundation set up an inquiry into Dental Education in 1977 which reported in 1980¹⁹. This was followed rapidly by the Dental Strategy Review Group Report 'Towards Better Dental Health'²⁰ which was recommended by the Royal Commission on the NHS in 1979. It would be difficult to over-estimate the importance to dentistry of the Nuffield and Dental Strategy Review Group Reports, the former on dental education and the latter relating more to changes in clinical practice. Why were they so important? Because taken together, they were responsible for fundamental changes in undergraduate and postgraduate education which would prepare the dentist and the dental team for a new approach to clinical practice based on prevention.

17. Report of the Working Party on Dental Education. *Br Dent J* 1969 127 591-596.

18. Dental Education. A report of the Working Party. *Br Dent J* 1976 141 19-24

19. An Inquiry into Dental Education. A report to the Nuffield Foundation, 1980.

20. The Dental Strategy Review Group. Towards Better Dental Health. London: DHSS, 1981.

In undergraduate education improved broader pre-clinical education and better courses on human disease were suggested. In the clinical course the need for prevention, working with other members of the dental team and a 'whole patient care' approach were emphasised. There was a need to lengthen the period of basic dental education and this resulted in the new 5-year undergraduate course.

In postgraduate education they stressed the need for vocational training following graduation and improved opportunities for continuing education. There was a need to recruit more teachers and trainers from general dental practitioners and community dentists to augment those hospital or academic staff already involved. A national and regional administrative structure for postgraduate dental education was essential and in each region a focus for postgraduate activities was required such as a postgraduate dental centre or a dental unit within a postgraduate medical centre.

In 1983 the Government decided there should be a cut of 10% in the student entry to U.K. dental schools. In 1987 the Government and the profession agreed that, to achieve a desirable level of supply of dentists, it was necessary to reduce intake of the dental schools by a further 10% from 1988²¹.

In 1998 almost all of the recommendations of Nuffield and Dental Strategy Review Group have been implemented. The improvements in undergraduate education followed by mandatory vocational training and continuing professional development are widely accepted. The expansion of vocational training to general professional training is being considered and the various components of the continuum of dental education are being evaluated.

The increased use of dental auxiliaries and the development of the dental

21. Dental Manpower: Report of the Departmental Review Group on Dental Manpower. London: DHSS, 1987.

team which was envisaged by Nuffield and Strategy Review Group has not yet been implemented. The second Nuffield Foundation Report on the Education and Training of Personnel Auxiliary to Dentistry (1993)²² focussed on the type of auxiliary required and on how the dental team concept could be developed further. It observed how in comparison to other aspects of health care there appeared to be considerable under-utilisation of auxiliary personnel. The report also asked why oral health care services were so separate from other health care services?

Certainly there is an increasing awareness that dentistry has become oral health care which cannot be separated from health care in general²³. In the future teamwork and integration of health services will be facilitated by the information technology and communications revolution. In dentistry much research is urgently required to establish common criteria for diagnosis and treatment and to develop secure user-friendly electronic exchange of information which could involve dentists, professions complementary to dentistry, other health care professionals as well as patients. Dental Informatics is a new and important area for academic dentistry as we enter the new millennium. There is no doubt future milestones in dental education will relate to how such basic changes in education and clinical practice are resolved²⁴.

22. The Education and Training of Personnel Auxiliary to Dentistry. A Report to the Nuffield Foundation. 1993.
23. Mason, Sir David. "The Changing Role of the Dentist." *Br Dent J* 1994 176 5-9
24. Mason, Sir David. "General Dental Practice - Challenge and Opportunities." *Br Dent J* 1995 179 350-354

THE DEVELOPMENT OF DENTAL SCHOOLS - AN EVOLUTIONARY HYPOTHESIS

David A McGowan*

A career spent in three Dental Schools along with professional contact as an examiner, adviser or at least conference delegate at every school in the UK and Ireland has let me to speculate on the origins and development of those unique institutions. International visits to a variety of overseas schools from the oldest at Baltimore, USA, to the then youngest at St Augustine, Trinidad, and from the sun-baked palatial at Riyadh to the freezing down-at-heel at Sofia, have added contrast and context.

I suggest an evolutionary hypothesis in the hope of drawing out common factors influencing the development of our dental schools which can be recognised and accounted for in planning their future in an ever more rapidly changing world. Sir David Mason has presented the political milestones but my evidence is more concerned with bread and butter operational matters such as finance and staffing.

I have presented my hypothesis as a diagram which attempts to incorporate a number of interwoven factors and which I fancifully labelled with terms appropriate from palaeontology (fig 1).

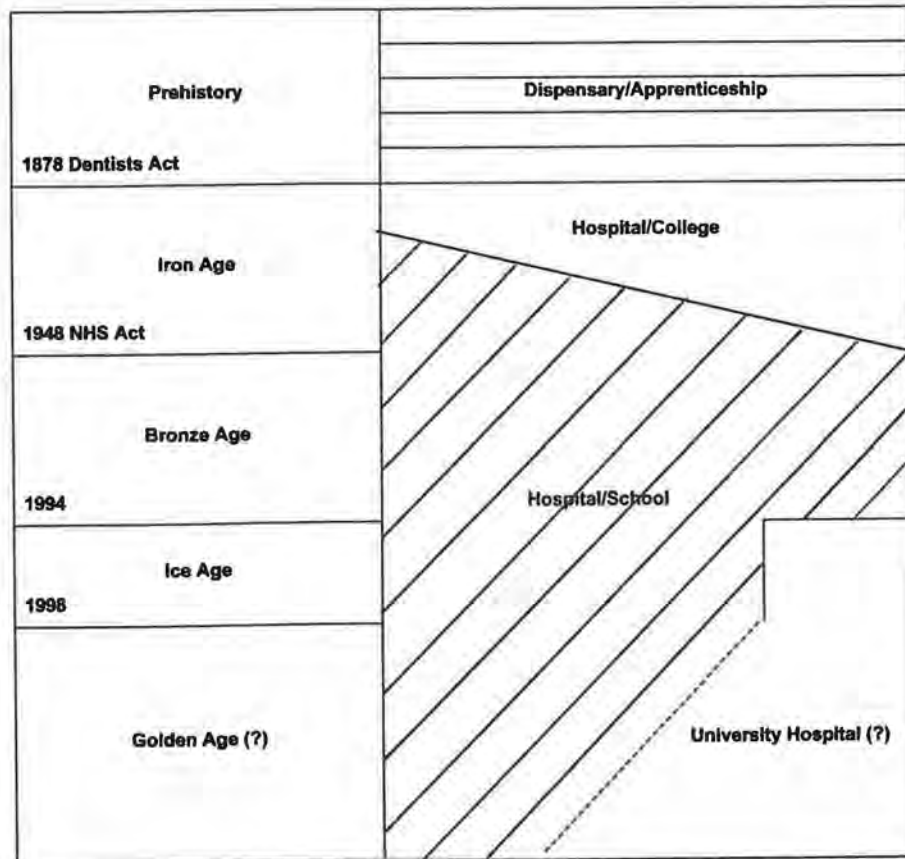
In what I have termed "Pre history", before the first Dentists Act of 1878, dentists learned entirely by apprenticeship and often began as "mechanics" before progressing to clinical tasks. The origins of our present day dental schools lie in the dental dispensaries which existed in many of the major conurbations before 1878. They existed to deal with the dental needs of the poor and indigent and were expressions of Victorian charity. They were largely altruistic in motive, though there was probably some gain in status for the middle-class professionals who gave their services for little other reward, and in particular involvement aligned them with medical charity.

The coming of the 1878 Act provided a market for dental training and the schools were founded to train students (and established practitioners who wished) for the newly created LDS qualifications of the Royal Surgical Colleges.

* David A McGowan, MDS, PhD, FDSRCS, FFDRCSI, FDSRCPSG Professor of Oral Surgery, Glasgow Dental School, 378 Sauchiehall Street, Glasgow, G2 3JZ

Figure 1

The development of Dental Schools - An evolutionary hypothesis



The staff were part-time practitioners, unpaid local worthies who enjoyed passing on their knowledge and skills to the young and thereby enhancing the status of the profession and their own position with it. It is indicative that the Dental Hospital and School in Glasgow was open for patient attendance in the early morning and in the early evening so that the teachers could attend their own patients at their practices during normal working hours. This Hospital/College phase lasted for a very long time - till 1948 in the case of Glasgow and Edinburgh, and the emphasis on dental mechanics' training, on the transfer of skills, on the preparation for practice and the emulation of the successful practitioner was paramount. I have used the term "the Iron Age" to symbolise the rough and purposeful attitudes of the teachers and the rigid educational style of those days. Deans were to be obeyed and students spoke only when spoken to.

Other influences, however, were becoming apparent from the later part of the last century. Universities began to be involved in dental education starting with Birmingham in 1890 and a few leaders emerged who had a more intellectual approach to preparing minds as well as hands and who had the curiosity to seek answers to clinical questions through research. Gradually the Hospital/College mode was replaced by the Hospital/School where dental education, alongside medical education, became dominated by the Universities and students were prepared for their degrees (though till very recently many still appeared for a College LDS as an insurance against "failing finals" or an escape route for those who had).

The foundation of the National Health Service in 1948 had a profound effect on the Hospital element of the Dental Hospitals and Schools. Funding was now derived from the taxpayer via the Treasury and dental staff were granted identical opportunity, salary, and status to their medical colleagues. The few pioneering full time teachers, including some posts created by the intervention and subvention of the Dental Board of the United Kingdom in the '20s and '30s, were expanded into a staff, full and part-time, who now began to train and practise as specialists and reach consultant rank. The leadership of the schools passed to a new group of Professors/Dean/Directors establishing themselves with greater or lesser degrees of authority within the Medical Faculties of the Universities. I have described this as the "Bronze Age" to signify the glimmers of illumination which came from the growth of scientific training of the staff which accompanied, and was sometimes impeded by, the growth in specialist training. This now became the particular concern of the Colleges in substitution for their previous dominance of primary qualification.

Over the next 50 years schools grew in size and complexity. The single Professor (usually of Dental Surgery) was joined by others who had risen from the ranks and earned their recognition through training and study for the FDS

and the PhD. The schools became multi-departmental and the educational provision segmented into specialisms each vying for curriculum time. It was for part of this period an unequalled opportunity for growth, and those with imagination and vision took full advantage while others remained trapped by their past and changed little. Influenced particularly by changes in medical education, schools began to see their mission as the provision of basic education as a foundation for professional development and more recently life-long learning. Full-time teachers predominated and the residual cadre of "visiting practitioner" teachers were not always well used nor well integrated. Postgraduate continuing education grew apace and drew in many active practitioners who might otherwise have contributed to the school.

Later, contraction and re-appraisal in response to acute funding pressures and increased financial realism have led to mergers into broader areas or divisions, and a retrenchment of the proliferation of Professorial Departments.

The intense financial pressures of the mid '90s squeezed the Dental Hospitals and Schools from two directions at once. In better times it had been possible to play one paymaster against the other but now both coffers were empty. What began as an invigorating cold shower became a veritable "Ice Age" characterised by rigidity, the dominance of the accountant and the "bottom-line", and an emphasis on the cost of everything and the value of nothing. Fortunately political changes may now provide the opportunity of a thaw and the novel development during these hard times of some schools into "University Hospitals", with a single united funding stream under a single Head, giving formal recognition to the interdependence of clinical practice and service provision with education and research, and holds the prospect of a better future.

Perhaps future historians will see our time as the beginning of a Golden Age - or am I being unrealistically optimistic. Certainly, the end of the futile battles over funding streams which all ultimately come from the same source - the taxpayers pocket, must be welcomed. However, it will be unlikely to be enough and we must look further afield for ideas on funding which can be integrated with our UK traditions.

The early dental schools were funded by pupilage fees and from charitable support, public and private. 1948 brought in State funding and produced a dependency culture which has now to be re-examined. Free treatment has always been the pay-off for submission to the treatment of students, albeit closely supervised by staff, and the few limited attempts to charge directly have proved expensive to administer and produced a limited return. Abandonment of the principle of free treatment would preclude any revival of the contribution of charitable funding. Staff intramural private practice earnings would be unlikely to make a significant contribution, though they might help collect and retain skilled spe-

cialist staff and thus help with the burden of staff costs - which, as in other service organisations, is the largest element.

Our graduates, who see their education as a right, do not respond well to the US tradition of Alumnus pay back even when offered involvement and influence in return. We will have to seek more earnings from research which have so far been often outweighed by the losses on over-stringent self-castigation in the Universities Research Assessment Exercises. Will we see a return of the significant role of the part-time practitioner/lecturer? Involvement in Vocational Training, development of Specialist Practice and the long overdue development of Academic Departments of Dental Primary Care could all contribute to a new professionalisation of this traditional contribution.

This has been a sketchy and speculative presentation but it may stimulate some interest in the history of our Schools. Much of what I have said is personal opinion which awaits the gathering of evidence, and perhaps the distancing of time from contemporary events, but the study of recent history has its own fascination and perhaps will provide some illumination for the next generation as they voyage into the uncharted waters of the new millennium.

TOUCH AND GOE: TOOTHDRAWERS IN ENGLAND

D J Timms*

A propos Dr Hargreaves engrossing 3rd Lillan Lindsay Memorial Lecture and with special reference to dentists who have sought additional pursuits to augment their income. Few can have exploited a coffee house as a diversification, yet in 1695 Don Saltero's Coffee House and Museum was opened at 18 Cheyne Walk, Chelsea [1,2], the museum tag was due to the large collection of odd curiosities accommodated therein. John Salter had been valet to Sir Hans Sloane (1660-1753), physician, traveller and collector while his Spanish appellation has been attributed to Vice Admiral Munden who served many years on the Spanish Station and contributed sundry items as had Sir H. S.

Sir Richard Steele [3] described Salter as crying on the avocations of barber and dentist. In the Weekly Journal of 22 June 1723, will be found a poetical announcement of the treasures on view at this establishment and the landlord's surgical skills. Here are the 2nd and 6th. (last two lines), verses as they specifically relate to the topic under discussion:

Through various employs I've passed –
A scraper, virtuoso, projector,
Tooth-drawer, trimmer and at last,
I'm now a gimcrack whim collector.
And in requital for a timely favour,
I'll gratis bleed, draw teeth and be your shaver.

Salter's death is not known precisely but his daughter (Mrs Hall) continued the business, the coffee side if not the dentistry, until the early 1760's. The house and museum contents were sold in 1799 and the building pulled down in 1866.

* D J Timms, L.D.S., D.Orth., Department Oral Surgery, Royal Hospital, Preston PR2 4HT

1 Timms, J. Curiosities of London. Virtue & Co. Ltd. London, Vol. IV p.269, Undated

2 Old and New London. Ed. E.Walford. Cassel, Petter and Galpin, London, Vol. V pp.61-64, Undated.

3 Steele, Sir R. The Tatler, No.34, June 1709.

From Naturalist to Scientist: The World of F H Balkwill 1837 - 1921, the Pioneer of Dental Articulation.

W T Sholl*

"A close observance of the methods of Nature will often give hints to the practical mechanic, and also raise the dignity of his work."
F.H.B. 1886.

Object

This essay explores how it was that a provincial, private dentist came to describe and understand mammalian dental anatomy and physiology and apply it by inventing a bite frame (anatomically correct articulator) and face bow a generation before anyone else.

Background

Natural Philosophy, now called the Physical Sciences, was undergoing a profound revolution in the first half of the nineteenth century. The great leader of physiology was Johannes Muller 1801-58 of Berlin who connected the philosophy of truths of chemical physics, comparative anatomy, physiology and embryology. The sister science to physiology was morphology, a term first introduced in 1817 by Johan Goethe 1749-1832. He taught at Weimar during the occupation by Napoleon. He clearly recognised the adaptive influence of the environment. Robert Chambers 1802-88 wrote *Vestiges of Creation* in 1844-53 emphasising the growing powers of organisms themselves. However, it was Charles Darwin 1809-82 who, by publishing *The Origins of Species by means of Natural Selection* in November 1859, propounded the theory of evolution itself. The principle had been established that form followed function which was precisely what Balkwill did with his dentistry.

Balkwill's Achievement

The opening statement is taken from Balkwill's paper presented to the Odontological Society of Great Britain on 4th June 1866. His own definition of physiology was the science of the physical machinery of life. He sought function rather than similarities and differences and described what each feature on a tooth did and how it related to action and effect, such as grooves, marginal ridges, cusps and fossae. He described the lower arch as a moving anvil articulating with the hammers of the upper teeth's cusps, showing how all the different shapes and sizes of teeth in

an arch functioned as one, guided by the canines. He replaced the blacksmith's tongs with his biteframe and set the teeth at 26 degrees having calculated the condylar paths between 22-26 degrees. He carried out 'gothic arch tracing', criticised the morphology of manufactured porcelain teeth and identified what is now described as the Bennett shift.

Formative Years

Francis Hancock Balkwill was born into a well to do Quaker family on 11 July 1837 at 3, Portland Square, Plymouth in Devon. His parents, Joseph and Ann ran a druggist and chemist business. A previous partner, Cookworthy, had discovered china-clay in Cornwall near St. Austell and begun the first manufacture of hard porcelain in Britain in 1768. His patents were later taken up by Minton, Spode and Coalport in the following century and porcelain teeth were made from this process.

Balkwill had two younger sisters and two elder brothers whom he followed into the family firm after his education at Queenwood College, Hampshire. However, he decided that three was a crowd and became a pupil to C.S. Bate in 1857 at the late age of 20 years. Due to his previous knowledge of pharmacy, he only served two years for his dental apprenticeship. Bate was described by Balkwill in his memoirs as 'a rising naturalist' as he had just been elected a Fellow of the Royal Society. Some fifteen fellows were elected each year from about sixty applicants and it was a considerable honour and recognition of his work when the status of dentistry was barely a trade.

Charles Spence Bate 1818-89 had succeeded to his father's dental practice in Plymouth and was to have a profound influence on the young Balkwill. Both took and passed the very first LDS(London) examination in 1860, believing in the necessity of formal education for dentistry and the dangers of charlatans and quacks. They were pioneers of their times. Balkwill's pharmacy training alone would have allowed him to register as a dentist eighteen years later under the Dental Act 1878. It is still the case that a pharmacist may extract teeth as long as no anaesthetic is employed!

Bate went on to found the Western Counties Dental Association of registered dentists but the Act failed to stop unregistered practice. This was one of the main reasons stimulating the formation of the British Dental Association which adopted Bate's Association as a branch. Bate was its first president in 1881. (Balkwill took the chair in 1888). As the first provincial president of the BDA itself, he took the AGM at Plymouth in 1883 and read a scientific paper on the progress of dental surgery from John Hunter to John Tomes (who was present). The benevolent fund was instigated at that meeting.

Bate had a wide circle of acquaintances outside dentistry whom he introduced to Balkwill. The Royal Society of London for the Promotion of Natural Knowledge had undertaken to obtain ALL scientific works from 1800 onwards.

* W.T.Sholl, M.A. U.Sussex, B.D.S., U.Lond., L.D.S. R.C.S.Eng., D.G.D.P.(U.K.)

The Society had been housed in Somerset House with the Royal Academy by George III. It is still a sumptuous palladian square on the embankment of the Thames at Westminster. In 1857 the Government moved the R. S. to Burlington House, Pall Mall, to make way for 'the people's registry', national census had started in 1801.

Frequent meetings took place between Bate, Balkwill and friends and involved Charles Darwin FRS, P.H. Gosse FRS, a professional who inspired Charles Kingsley and Thomas Edwards, a fellow of the Linnean Society recording the vast expansion of animal and botanical knowledge (most drugs were herbal). Thomas Huxley FRS was also a visitor at Plymouth. He strongly advocated Darwin's views and, amongst many honours such as president of the R. S. and British Association, was Hunterian Professor of comparative anatomy at the Royal College of Surgeons.

Balkwill's World

To the Victorians, transport by steam ship, steam railways, the penny post 1840 and the electric telegraph 1837 opened up undreamt opportunities for communication, transport and exploration of the earth. It was as exciting and novel as high tech space exploration today but involved more people of all classes. Vast areas of the globe were unknown. National time, based on the Greenwich Royal Observatory, became a practical reality and was used for global navigation as chronometers developed and the Empire expanded, making Great Britain the most powerful and influential nation on earth.

Balkwill was born in the same year that Victoria came to the throne and by the end of her reign in 1902, the population of Britain had quadrupled to 32 million people and she was Empress to 400 million souls, a fifth of the people on earth. Britain imported raw materials and exported manufactured goods, colonists, technology, science and art, democratic law and government, a non-authoritarian protestant Christianity, education and English. The preface to a dictionary of 1847 states, 'In this age of intellectual improvement, when the spirit of examination and inquiry pervades in a great degree, it is essential that works of this description should keep pace with literary and scientific improvements'.

The Great Exhibition of 1851 at Crystal Palace brought the world, and mass market methods, to London. These methods enabled the demands of many more people to be met but, at the same time, stimulated craftsmen to compete against the perfect repetition of manufactured objects. Dentistry, now organising itself alongside many other modern professions, adopted Mr. Goodyear's moulding process for vulcanised rubber for denture bases from 1855 instead of carved ivory or swaged gold. With mass produced porcelain teeth 1844 and general anaesthesia 1846, which enabled the masses to be relieved of their painful and septic teeth, thousands of people were saved from septicaemia and certain death and provided with relatively cheap full dentures.

From Naturalist to Scientist

Balkwill took a different course. His interest in natural history led him to become President of the Plymouth Literary and Scientific Association and ornithological and mammalian curator at Plymouth Athenaeum. He corresponded with Sir William H. Flower, conservator of the Huntedan museum and professor of comparative anatomy and physiology and also director of the natural history department of the British Museum (before the present building in Kensington of 1881). He was also in touch with Turner at Edinburgh.

All Balkwill's scientific work in natural history was based on skeletons and teeth. He devised and used methods to articulate dried skeletons of various creatures for display. By piercing bones with his dental drill and joining them with drawn copper wires he learnt how skeletons functioned. He also made considerable observations on local wild life, which was far more abundant at the time, especially on his frequent fishing trips to remote places made available by the railway.

As a practising Quaker, Balkwill was happy to accept the theory of evolution, apply it to his scientific work and use it on human beings as a dentist. The Society of Friends had no teaching of theology or divinity, no rites and rituals but a belief in the Holy Spirit of God guiding each individual in freedom through the Scriptures. The Quakers to their credit were anti-slavery from 1727 and were instrumental in the abolition of the slave trade by Britain and her Empire from 1807, as a Christian duty.

Balkwill's dentistry

As a practical mechanic, Balkwill created as much as possible himself. His home was full of hand carved ivory, including a bust of his wife, Mary Newman whom he married in 1869. The bust is now in the Victoria and Albert Museum demonstrating the magnificent quality of his work and a bronze replica is still retained by his family. He records that dentures were made by creating plaster 'moulds' of the mouth into which molten zinc was cast to create dies several pounds in weight. Gold plate was swaged and annealed into the shape of a denture base and teeth were attached by metal claws soldered on. The teeth were often human, 'Waterloo teeth' 1815 were sold in sets up to 1865. Balkwill preferred to carve his own preferably from hippopotamus ivory as this was the best quality and least likely to stain in the mouth. Should a patient lose or break a tooth, he simply made another! He made his own gold plate by clipping gold sovereigns (he regarded them as his own money) and weighing to eighteen carat by proportion with granulated scrap silver, bought in Troy ounces and not Avoirdupois, and pure copper. He melted the mix in a crucible on a small coke furnace, with a piece of charcoal to keep out the gases, poured it into a skillet and passed the ingot through a rolling mill to gain the right thickness.

He probably took the face bow reading and bite with the gold base which he mounted on his bite frame, carving the ivory teeth to articulate for that patient. Conservative dentistry was performed under rubber dam using cohesive gold and he noted that by keeping his drill sharpened, he could perform Hüllihen's operation - making a hole to the pulp chamber through the softer neck of the tooth in order to relieve pressure and pain. His grandson, Robert, recalls the sickening lurch he felt from the use of a treadle drill in his mouth! For extractions, Balkwill noticed that cocaine always worked well on smokers, he was one himself. His patients sat upright on a leather chair and he designed and built his own operating light. It was an oil lamp with reflectors to concentrate its light into the mouth. The copper reservoir bowl was soldered to a vertically sliding brass rod held securely in a tube set into a very heavy wrought iron base.

He retired in 1895 due to Dupuytren contracture and carried on his researches from a cottage in Yelverton called 'Haaf' after his children Harriet, Ann, Alfred and Francis. Alfred took his LDS RCS in 1907 and carried on the practice at 3, Prince's Square, Plymouth which was later completely destroyed by bombing in World War II, losing almost all the records of FHB's career.

Conclusions

Balkwill was part of the social elite responsible for contemporary research and its intellectual application. His paper of 1866 was lost to the mass market of vulcanite mouldings and manufactured porcelain teeth. It was not until his findings were rediscovered in this century that his work was appreciated (Gysi 1912).

His ethics were those of a Quaker, his science that of a naturalist, form and function. His understanding was that of evolution where form follows function and his skill was to create the bite biologically for each patient. He was probably the first dentist to realise that natural history, previously the study of all the concrete sciences, had become the science of living things i.e. modern biology with the concepts of evolution, heredity and the environment. He was the first to apply this to mechanical dentistry and promoted the need for education in dentistry on a broad base. His methods are still in use today, world wide, and it was fitting that his death, at the ripe old age of 83 years on 11th March 1921 was the very year that the Dental Act made his beloved dentistry into a learned profession.

"The dignity of his work has indeed been raised by a close observance of the methods of nature".

Acknowledgements

The author is indebted to Robert and Roger, Balkwill's grandsons and to Priscilla and Jasper, Robert's children for allowing access to their private family archives, for their constructive co-operation and permission to publish. Without their help, this history would have been lost.

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Legends for the Illustrations

1. Talbotype photograph of Francis Hancock Balkwill
2. Silhouette illustration of Balkwill's parents, Joseph and Ann
3. Silhouette illustration of Balkwill with his two elder brother c 1840
4. Bronze replica of his ivory bust of Mary Newman, his wife
5. Balkwill's standard lamp operating light, now converted from oil to electricity

BOOK REVIEW

W. John S. Kerr*

Histoire De L'Orthodontie Ses origines, son archéologie et ses précurseurs, by Carlos Gysel, Société Belge d'Orthodontie - Belgische Vereniging voor Orthodontie, Av E Mesens 78, 1040 Bruxelles, Catherine Press, Brugge, 1997. ISBN 90-803977-1-7 Hardback

Orthodontists will be surprised to open a history of orthodontics which does not mention Edward Angle, except in the introduction. This is because Carlos Gysel's extensive and academic work of more than 800 pages terminates in the middle of the 19th century. Its purpose is to trace the origins and precursors of orthodontics. What will delight specialists in this area is that each chapter contains a bibliography at the end and the last 50 pages of the book comprises an index of relevant texts and page referenced names and subjects mentioned in the work. This more than makes up for the only minor criticism of the presentation; the lack of a chapter index at the beginning.

The origins of orthodontics are traced from the Egyptian and Greco-Roman periods and include such curios as an apparatus worn by flute players to prevent distension of the cheeks whilst playing, still in use in the 17th century. Perception of facial proportions, orientation and aesthetics as depicted by artists from the Renaissance to Albrecht Dürer are presented. The latter is rightly lauded as a pioneer of anthropology and his geometric drawings of facial and body proportions in all their variations are described and illustrated. The origins of cephalometry are traced to Leonardo da Vinci in the late 15th century through Pierre Camper to 1815 and the publication of "Cephalogenesis" by von Spix. The study of skeletal growth both normal and abnormal is another major topic dealt with including the classical longitudinal study of height by de Montbeillard of his son Philibert.

Gysel shows convincingly that prior to the publication of "Le Chirurgien Dentiste" in 1728 by Pierre Fauchard there was little being practised of what today we understand as orthodontics. At this time the term "Orthodontics" had not been devised and "déplacement des dents" or "displacement" was used, a term which also included reimplantation. The origin of the term "Orthodontics"

is controversial; Nicolas Audry (1740) was the first to be credited with the term "Orthopedie". "Redressement des dents" was also in use in the early 19th century, literally "re-straightening". Joachim Lefoulon is thought to have been the first to publicise the term "Orthopedie Dentaire" (1839) and he subsequently proposed the term "Orthodontosie" (1841), from which developed the terms "Orthodontia" and in the 20th century "Orthodontics". Lefoulon is a name which permeates several chapters and it is interesting to note that he advocated expansion of the dental arches for the relief of crowding, in certain cases, using an arch made from gold fashioned in a horseshoe shape either placed labially or lingually – plus ça change ...!

Themes are generally the subjects for chapters or chronology. However, Pierre Fauchard, Robert Bunon and John Hunter, amongst others, rightly merit chapters in their own right.

The text includes a remarkable number of illustrations including an appendix of around 100 pages of "complementary illustrations". Each section provides fascinating reading and the text is liberally laced with quotations from the personages under discussion which brings alive the period in question. This book will prove of most value as a reference text, not only for those orthodontists with a passing interest in the origins of their speciality, but also for those historical enthusiasts who wish to research any area covered in more depth. Regrettably the author died shortly before publication of what is a fitting monument to a great dental historian.

* Professor W. John S. Kerr The Dental School University of Glasgow, Glasgow G2 3JZ

OUT AND ABOUT

The Editor's Endpiece

Some readers of the *Dental Historian* will know that as President of the British Dental Association I kept a diary. Published in the BDA News it recorded the day to day events of my year in office. Patients, surgery anecdotes, meetings attended, colleagues and their foibles all made their appearance in the record. After writing some notes on the Lindsay Society Meeting in Glasgow in September '98 I was delighted to receive a brief letter from Ronald A Cohen. He complimented me on taking up the editorship of the *Dental Historian* praised Christine Hillam's stewardship of the publication and then went on to invite me to visit him sometime so that as a fellow bibliophile I could view his collection of early dental texts and artefacts.

The dust cover of *The Advance of the Dental Profession-A Centenary History of the British Dental Association* describes Ronald Cohen as the doyen of dental history in Britain. That was written twenty years ago so quite how to describe him now when he is aged 92 and as alert as ever when discussing his beloved books and favourite topics is a challenge in superlatives I shall not attempt.

In April Pat and I were to attend the South Wales Branch Annual Meeting in Cardiff and I realised we had the opportunity to visit Ronald and his librarian sorry I should say wife Muriel at their home in Leamington Spa while en route to Cardiff. Muriel kindly invited us to stay for lunch and with a glass of good red wine we delved for an hour or two into some of Ronald's finer treasures.

The study is a large airy room in the fine Victorian house which Ronald has occupied since 1936. A large table occupies the centre of the room ideal for the large books, papers and artefacts which are stacked and stored all around. My *Classics of Dentistry* {in facsimile} Collection pales in comparison when Ronald informs me that he has all the originals and I very soon find myself handling copies of Berdmore, Hunter, Fauchard and the rest.

A tentative enquiry about Thomas Bell, zoologist, co-worker with Darwin and dentist to Guy's Hospital soon has Muriel delving in the catalogue and sure enough evidence is produced of British Quadrupeds, Stalk-eyed Crustacea and other more esoteric publications of this Victorian scientist and early leader of our

profession. Bell was a member of the first Board of Examiners for the LDS at the Royal College Surgeons in 1860. Ronald reminds me that in his later years Bell moved house to the 'Wakes' at Selborne and there at the age of 85 produced his classic edition of Gilbert White's *Natural History of Selborne*.

As Ronald has recounted in *Aesculapius* {*Journal of the University of Birmingham Medical and Dental Graduates Society*} he began studies at Birmingham Dental Hospital in 1926 and his collection of Dental History commenced at that time. Obviously collecting is a genetic pre-disposition confirmed when he told me that his brother in his time had also made a large collection of cricketing memorabilia.

What is he currently working on? This is quite a problem. He has a good deal of correspondence to deal with on a world-wide basis. In two large boxes in the study large envelopes contain the notes for about 10 topics still in preparation. Some have been gestating for 10 years or so, the work of a serious historian cannot be rushed. By now I am beginning to browse over the book shelves. Some of the more modern books are present. Sir Zachary Cope's study on John Tomes is dismissed as hardly doing justice to such an important figure. However Ronald recounts the visit of Cope to explore the graves of Tomes' family and the quest for the over-grown grave of Tomes' first child.

The next treasure I stumble on is the programme for the BDA Annual Conference of 1911 and a handsome bound programme it is too. I wonder if anyone has a collection of conference programmes? That would indeed give a fascinating insight into the topics which have engaged our attention over the last 120 years.

Country Life is a glossy publication which graces the waiting rooms of our more up-market colleagues. It has a column entitled National Treasures which celebrates craftsmen who care for lost arts and crafts of national significance. Ronald and Muriel are the custodians of a collection of Dental History which must be ranked as of international significance. Ronald himself is national treasure! His knowledge of his subject is unsurpassed. It was a great privilege to visit them both and I am certainly looking forward to his next publication.