

## **Introduction:**

The study of the history of medicine was principally a creation of the nineteenth century, but before this many authors reviewed knowledge of their predecessors. The first to do this in nephrology was Alexander Schumlansky (1748-1795), a Russian working in France when in 1788 he published a book on the anatomy of the kidney *De structura renum*, which contained an comprehensive bibliography and review of previous work on kidney structure. We may take, rather arbitrarily, this work as the start of the study of the history of nephrology; although others might feel that Pierre Rayer (1793-1867) should have the credit for the voluminous historical sections of his *Traité des maladies des reins*, published in 1840.

Today articles and books relevant to the history of Nephrology are scattered amongst a wide variety of publications, including many journals outside Nephrology itself and sometimes outside medicine. Hitherto it has been difficult to establish what has already been done in the field, especially for the earlier years. None of the paper or computer bibliographies are anything like complete: MEDLINE (from 1966 onwards) and its corresponding *Bibliography of the history of medicine* and the Wellcome's *Current work in the history of medicine* (from 1954 onwards) are both woefully incomplete and do not have a section for Nephrology, which makes searching difficult.

In addition, there are many problems in deciding what to include in a bibliography of the history of Nephrology, because of the number of interfaces with other closely related areas which, if included, would make the task impossibly large. Where does the history of nephrology end and the general history of medicine, with its truly vast bibliography, begin? Clearly, the history of Nephrology must be part of the history of medicine itself, and most general works on the history of medicine contain some information relevant to it. Second, what exactly is "history" in the context of papers as usually published? Today, most published articles begin with a review of previous work, more or less complete, and usually recent (< 10 years). Some contain a more extensive review, and major review articles may contain more or less "historical" material, of varying age. Many published and unpublished theses (for example those published from Scandinavia) contain considerable historical bibliography. Some books and papers (especially from previous decades ago) have been included here because, although their primary purpose was not history, contain extensive bibliographies which are now useful as sources.

Then there is the extensive literature on the history of Urology and stone disease. Other potential areas of overlap include the history of transplantation (especially that of organs other than the kidney), hypertension in relation to the kidney, and so-called "toxaemia" of pregnancy is a subject in its own right but might be legitimately be included under the study of the history of Nephrology.

In general the history of what can be called "Urology" (including stone disease, except for some work on metabolic stones which impinge on urine chemistry) has been excluded; but selected references (especially where they deal with matters relevant to the kidney) have been included. Finally there is the overlap with the history of

transplantation, which encompasses mythology, transplantation immunology, plastic surgery, vascular surgery, skin grafting, endocrine transplants, and more recently heart, lung, pancreas and other organ transplants. What to include ? Most of the texts of transplantation which include histories of renal transplantation in general have been included, but others have been excluded. Any papers dealing specifically with transplantation of the kidney have been included. Thus the story of cardiac transplantation is not here, nor are Peter Medawar's memoirs and autobiography.

For the broader and more detailed history of these areas, the following may be consulted:

### **Urology**

Ballegger E (ed). *History of Urology*. Baltimore 1933.

Murphy LTJ. *History of Urology*. Charles C Thomas Springfield ILL, 1972.

Küss R, Gregoire W. *Histoire illustrée de l'Urologie de l'antiquité à nos jours*. Roger Dacosta, Paris, 1988.

### **Hypertension**

Postel-Vinay N (ed). *A century of arterial hypertension*. John Wiley, New York, 1996.

### **Toxaemia of pregnancy**

Chesley LC. A short history of eclampsia. *Obstet Gynecol* 1974; 43: 599-602

Purkerson ML, Verkedy L. A history of eclampsia, toxaemia and the kidney in pregnancy. *Am J Nephrol* 1999; 19: 313-319.

### **Transplantation**

Bollinger RR Stickel DL. Transplantation. Historical aspects. **In** *Text book of surgery. The biological basis of modern surgical practice*. Ed Sabiston DC Jr, Lyerly HK. Philadelphia, Saunders, 1994. P.383.

Küss R, Boyurget P. *An illustrated history of organ transplantation*. Laboratoires Sandoz, 1992.

Hamilton D. Reaching for the impossible: the quest for tissue replacement. **In** *Transplantation*. Eds Ginns LC, Cosimi AB, Morris PJ. Blackwell, London, 1999 pp1-19.

Brent L. *A history of transplantation immunology*. Academic Press, London, 1997.

Hamilton D. *Towards the the impossible: a history of transplantation*. Oxford University Press London, 2000 (in press)

- two encyclopaedic treatises which contain vast amounts of interesting material and many

*references to the available literature*

Other exclusions are:

(1) articles in what might be regarded as "standard" sources of medical biography such as *Munk's Roll* of the Royal College of Physicians of London, and the *Dictionaries of National and Scientific Biography*, the invaluable *Biographisches Lexikon der Vorherragenden Aetrze aller Zeit und Volker* of A Hirsch, nor to (generally anonymous) notices in obituary columns in medical or general publications such as newspapers and non-scientific journals, which can be accessed easily if the date of death is known. Review articles on the achievements of physicians who have contributed significantly to the development of Nephrology published as general articles in nephrology and other journals are, however, included.

(2) Articles on possible or probable renal diagnoses in the famous (Pepys, Mozart, Beethoven, Disraeli, Brunel etc.) have in general been excluded since usually they do not deal with the substance of the history of nephrology. For example there are more than two dozen papers guessing at (for it is no more than that) what may have caused the death of Mozart. Some articles in which the diagnosis is discussed in relation to contemporary medical practice and thought and which illuminate understanding of renal diseases at that the time have , however, been included.

(3) Primary sources. A *different* task, addressed in brief previously by Major and Bloomfield in this area amongst others (and probably deserving of attention again today) is to collect an annotated master list of key original papers for Nephrology ("Classics in Nephrology"). This is *not* the purpose of the list below, which deals with reviews of the *History* of the subject, and *not the primary articles* such as Richard Bright's *Reports of medical cases of 1827*.

In general, a limit of about 25 years has been imposed as the era before which "history" can be said to have begun. Therefore I have included no reviews (for example) on the discovery and understanding of endothelins, whereas histories of dialysis have been included.

### **Organization of the list**

This has been split into four approximately equal sections: Part I 1788-1974; part II 1975-1989; Part III 1990-1996; Part IV 1997-1999 encompassing over 1200 publications. The fact that these sections are of approximately equal lengths indicates the rapid increase in the number of publications on the history of Nephrology in recent years. The papers are divided into the following categories and within these arranged chronologically:

*General history of nephrology*

*Biographical studies*

*Nephrology in the ancient world*

*Nephrology in the middle ages*

*Renal structure and function (anatomy and physiology)*

*Uroscopy and urinalysis*

*Parenchymatous renal disease*

*Uraemia*  
*Hypertension*  
*Dialysis*  
*Transplantation*  
*Miscellaneous*

A difficult interface is that between biography and other categories. As a rule if the life of the individual is the central theme of the work, then it has been included under biographical studies. If the work is the main focus, then it is included in the relevant section. Thus it is usually necessary to search the "biographical studies" section when researching any given topic.

Any additions, corrections or comments would be gratefully received by:

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and will be added to the bibliography

### **Searching the bibliography**

I have not included an index with this bibliography, since as it is available on the web at the ISN website

[www.isn-online.org](http://www.isn-online.org)

it can be searched in this form or downloaded and searched for names and topics much more quickly using the search engine of the word processing package in use.

## Part I: 1788-1974

During this period - the “prehistory” of the history of nephrology, which only became established as a speciality in the 1950s and 1960s - at least the following 294 papers were published. It is certain that this part of the list is incomplete, since the Wellcome bibliography of work in the history of medicine was only systematised from 1954, and there is access for computer searching to the Index medicus only back to 1966. In neither case is it easy to search for nephrological topics.

### *General history of nephrology*

Rayer PFO. *Traité des maladies des reins (Treatise on diseases of the kidneys)*. Ballière, Paris 1837-1840. 3 vols and atlas.

Tome I, Altérations de l'urine: historique pp 216-224; Plaines des reins: historique pp 254-7; Commotion et contusion des reins: historique pp 273-274; Néphrite simple: historique pp 334-40. Tome II: Néphrite albumineuse: historique pp 503-567 (*by far the most important section- see Berry D, Mackenzie C, Cameron JS. London, Wellcome Foundation 2000 (in press), for a translation of this section into English and a commentary*). Tome III Pyélite: historique pp 195-240 (*Includes a history of renal lithiasis*) pp 195-240; Kystes des reins: historique pp 513-515; Tubercles des reins: historique pp 627-633; Strongles des reins; historique 729-730.

- credit must be given to Pierre Rayer for first having systematically reviewed and analysed papers in the area of renal disease in these historical sections of his book. His work forms the essential starting point for analysis of earlier literature; there is no other contemporary account, nor was one to emerge for almost 100 years

Haeser H. Zur Geschichte der Bright'sche Nierenkrankheit (The history of Bright's disease). Janus, Breslau 1848: 3: 371-372.

Falk C Ph. Zur Geschichte der Brightschen Nierenkrankheit von (Jahre?) bis zum Jahre 1847 (The history of Bright's disease up to theyear 1847). Janus, Breslau, 1848: 3: 133, 456 (1931 reprint).

- two early German histories of the subject which probably draw on Rayer as a source.

Major RH. *Classic descriptions of disease, 1<sup>st</sup> ed. 1932, 2<sup>nd</sup> ed 1939, 3<sup>rd</sup> ed 1945*. Charles C Thomas Springfield IL.

- this contains translations of Dekker's description of heating urine, of Bright, etc.

Major RH. Notes on the history of nephritis. Bull Med Hist 1949; 23: 453-460

- a key paper which for the first time traced early descriptions of nephritis from William of Salicet back to Rufus of Ephesus

Haberling W. Geschichliches über Erkrankung und Verletzungen der Nieren (Historical

observations on renal disease and injury to the kidney). *Med Welt* (Berlin) 1935; 9: 1449-1451.

Fishberg AM: *Hypertension and nephritis*. Lea & Febiger, Philadelphia 1932.

- each chapter in Fishberg's classic book contains an extensive historical review and thus was one of the principal sources to historical material at the time. It ran to 5 editions, the last published in 1954. Unfortunately it is a hard and rather boring read, perhaps because it is so inclusive and even-handed.

Rothschuh KE. Zur Geschichte der Nierenpathologie (On the history of renal pathology). *Verh Deutsch Arch Pathol* 1965; 49: 11-14.

Garretón Silva A. Cuarenta años despues de F. Widal y Fr. Volhard: un ensayo acerca de los progresos de la nefrología. (Forty years after F. Widal and Fr. Volhard: an essay on the progress of nephrology). *Prensa Med Argentina* 1966; 53: 396-412.

Tareev EM. Poliantseva LR. Osnovnye etapy razvitiia nefrologii v Sovetskom Soiuze (The main stages of development of nephrology in the Soviet Union). *Terapev Arkhiv* 1967; 39: 10-15.

Shul'tsev GP. 50 let Sovetskoii nefrologii. (50 years of Soviet nephrology). *Sov Med* 1967; 30: 6-12.

Lemieux G. L'evolution de la Néphrologie et son essor au Canada. (Evolution of nephrology and its development in French Canada). *Union Médicale du Canada* 1968; 9: 1545-1547.

Belloni L. Die Eroberung des Nephrons. (The conquest of nephrons). *Berl Med* 1965; 16: 92-100.

Hansen H, Susser M. Historic trends in deaths from chronic kidney disease in the United States and Britain. *Am J Epidemiol* 1971; 93: 413-424.

Bleker J. (Eds Rothshcuh KE, Tiellner R). *Die Geschichte der Nierenkrankheiten (The history of renal disease)*. Boehringer Mannheim, Mannheim, 1972. pp 147.

- The most comprehensive modern history of the whole of Nephrology yet written, although now much in need of revision. Unfortunately, no translation into English is available.

Burch GE. Contributions of the biological sciences to human welfare. 3. Clinical medicine. *Fed Proc* 1972; 31: 33-70.

Arneil GC. Kidney diseases in children. Forward. *Nephron* 1973; 11: 67-70.

- the history of paediatric nephrology has not yet been dealt with extensively; this is the first of only very few papers.

Tareev EM. Razvitie nefrologii ot S.P. Botkina do nashikh dnei (The development of nephrology from SP Botkin to the present day). *Klin Med (Mosk)* 1972; 50: 6-12.

Ramachandra K. *History of medicine relating to kidney disorders of the urinary tract* University of Madras, Madras, 1973.

### ***Biographical studies***

Smith R. Ed Coleman JJ. The life and works of Thomas Graham, D.C.L., F.R.S., illustrated by 64 unpublished letters. John Smith, Glasgow, 1884.

Christison R. *The life of Sir Robert Christison, Bart. Edited by his sons.* 2 Vols. Blackwood, Edinburgh. 1885

- *this deals only with the earlier stages of his career, but covers his visit to the Paris schools and the years working on the kidney.*

Acland TD. A collection of the published writings of William Withey Gull, Bart., M.D., F.R.S., physician to Guy's hospital. New Sydenham Society, London 1894.

-*as well as the papers this contains an extended biography of Gull - laudatory in tone, as the author was Gull's son-in-law, and with no mention of the subject's controversies*

Wilks S, Bettany GT. *A biographical history of Guy's Hospital.* Ward Lock, London, 1911.

- *this book contains biographies and evaluation of the work of Bright, Gull, Sutton, Owen Rees, Golding Bird and Mahomed amongst others, by authors who knew most of the subjects personally.*

Thorpe E. Thomas Graham. In: *Essays in historical chemistry.* MacMillan, London, 1911 pp 206-229

Garrison FH. Richard Bright's travels in Lower Hungary, a physician's holiday. *Bull Johns Hopk Hosp* 1912; 23: 173-182.

- *an extensive account of Bright's travels, probably the first in English. A number of previous and subsequent accounts in Hungarian are reviewed by Nagy (1997) (see Section IV).*

Wegelin C. Prof Dr Theodor Langhans. *Korblatt Schweiz Aerzte* 1915; 45: 1654-1659.

Hedinger E. Theodor Langhans. *Zentrabl Allg Pathol* 1916; 27: 1254-1258.

- *Langhans, although more famous for his description of giant cells in granulomas, described acute glomerulonephritis in 1879 with great accuracy and pathological insight*

Lombard WP. The life and work of Carl Ludwig. *Science* 1916; 44: 363-375.

Robinson V. *The life of Jacob Henle*. Medical Life Company, New York, 1912.

Donley J. A note on the last illness and post mortem examination of Marcello Malpighi. *Ann Med Hist* 1921; 3: 238-240.

Hale-White Sir W. Richard Bright and the discovery of the disease bearing his name. *Guy's Hosp Rep* 1921; 71: 1-20.

Hale-White Sir W. Bright's observations other than on renal disease. *Guy's Hosp Rep* 1921; 71: 143-157.

- *these two articles review Bright's work in great detail and with Thayer's work of 1927 form the classical analysis of his contribution.*

Rochester de L. Richard Bright of Guy's hospital. *Ann Med Hist* 1923; 5: 301-305.

Hale-White W. Golding Bird. Assistant physician to Guy's Hospital 1843 to 1854. *Guy's Hosp Rep* 1926; 76: 1-20.

Barkley AH. Richard Bright. *Kentucky Med J* 1926; 24, 337

Dale HH. Arthur Robertson Cushny 1866-1926. *Proc Roy Soc B*. 1926 100: xix

Chance B. Richard Bright: an ophthalmologist's appreciation. *Ann Med Hist* 1927; 9: 332-336.

- *reproduces Liebrich's first illustration of retinitis albuminurica*

Thayer WS. Richard Bright. *Guy's Hosp Rep* 1927; 77: 253-301.

- *one of the most complete articles on Bright and his work*

Hale-White Sir W. Bright's two earliest medical papers. *Guy's Hosp Rep* 1928; 78: 18-34.

Kabanov NA. [Bright and his teaching]. *Klinicheskaya Meditsina* 1928; 15: 1017-1029. (in Russian).

Pleadwell FL. That remarkable philosopher and physician, Wells of Charleston. *Ann Med Hist* 1934; 6: 128-142.

- *the first (and until recently the only) treatment of a notable innovator in Nephrology.*

Rosen C. Carl Ludwig and his American students. *Bull Hist Med* 1936; 4: 609-650.

- *amongst whom was John Jacob Abel, who first performed in vivo dialysis in 1913*

Beilin A. Richard Bright 1789-1858: distinguished pioneer physician and investigator. *Hygeia* 1937; 15: 151-152.



Knorr M. Johann Lukas Schönlein. Familie, Leben, Persönlichkeit (Johann Lukas Schoenlein. His family background, life and personality). Ber Phys Med Ges Wurzburg 1938; 62: 108-129.

Kurz H. *Friedrich Theodor Frerichs. Sein leben und sein Werke 1819-1885 (Friedrich Theodor Frerichs, his life and work 1819-1885)*. Diss. Med., Düsseldorf, 1938.

White WH, Hopkins FG, Osman AA. George Owen Rees, pioneer in biochemistry. *Guy's Hosp Rep* 1939; 89: 1-8.

Wilke H. *Die Verdienste Pierre François Olivier Rayer um die Erkenntnisse und Behandlung der Nierenkrankheiten (The outstanding Pierre Olivier François Rayer and the knowledge and management of renal diseases)*. Diss. Med. Düsseldorf 1937.

Chance B. Richard Bright, traveller and artist. With illustrations. *Bull Hist Med* 1940; 8: 909-933.

- *an extensive treatment of Bright's travels to Iceland and Hungary, and his sketches.*

Lamson PD. John Jacob Abel. A portrait. *Bull Johns Hopkins Hosp* 1941; 68: 228-257.

MacNider W de B. John Jacob Abel 1857-1938. *Nat Acad Sci USA Biogr Mem* 1947; 24: 228-257.

Wilbur RL. Appreciation of Thomas Addis. *Stanford Med Bull* 1948; 6: 3-4.

Nonnenbruch W. Franz Volhard zum 70. Geburtstage. *Munch Med Wschr* 1942; 89: 403-405.

- *the author of this laudatory note was the physician who replaced Volhard when he was driven out of his post by the Nazis in 1938!*

Bock HE. Franz Volhard. *Neue Med Welt* 1950; 1: 835-838.

- *Bock worked with Volhard for some years and was still alive in 1999*

Batty Shaw A. Frederick Akhbar Mahomed and his contribution to the study of Bright's disease. *Guy's Hosp Rep* 1952; 101: 153-173.

- *until recently the main source of information on Mahomed's work and life.*

Von Müller F. *Lebensgerrinerungen (The course of my life)*. Lehmann, Munich 1953.

Keith NM, Keys TE. Contributions of Richard Bright and his associates to renal disease. *Arch Intern Med* 1953; 94: 5-21.

- *an important and extensive review which (amongst many other points) first drew attention to Bright's histological work with Joseph Toyne and published under the latter's name only (see*

also Cameron & Becker (1964) below)

Anonymous. Conversations with Friedrich von Müller. N Engl J Med 1955; 252: 65-67.

Smith SG. *The contributions to science of John Bostock MD FRCS 1773-1846*. MSc Dissertation, London University, 1955.

- *A major source of information on Bright's chemist colleague Bostock, who performed most of the early chemical work on his patients' blood and urine, and together with Bright described the nephrotic syndrome in all but name in 1827.*

Armitage WHC. William Charles Wells. A precursor of Darwin. Br Med J 1957; 2: 1302.

- *describes mainly Wells' theories of inheritance and selection, in which he preceded Darwin and reached similar conclusions.*

Voetglin C. John Jacob Abel. Decade 1903-1913. Bull Johns Hopkins Hosp 1957; 101: 303-305.

Rowntree LG. John Jacob Abel, decade 1903-1913. Bull Johns Hopkins Hosp 1957; 101: 306-310.

Marshall EK Jr. John Jacob Abel, decade 1913-1923. Bull Johns Hopkins Hosp 1957; 101: 311-316.

Geiling EMK. John Jacob Abel. Decade 1923-1932. Bull Johns Hopkins Hosp 1957; 101: 317-326.

Firor WM. John Jacob Abel. Retirement 1932-1938. Bull Johns Hopkins Hosp 1957; 101: 327-328.

- *this series of biographical notes cover Abel's career including his work with "vivo diffusion" (in vivo dialysis) in the articles by Eli K Marshall and Leonard Rowntree, both of whom contributed notably to the history of nephrology themselves*

Oliver J. Materials for a portrait of Richard Bright as a young man. J Mt Sinai Hosp 1957; 24: 1057-1065.

Thannhauser SJ. Friedrich von Müller 1858-1941. Diabetes 1958; 22 :66-68.

- *Müller made contributions in many areas of medicine including diabetes, as well as his dubious introduction of "nephrosis" to nephrology*

Foster WD. Lionel Smith Beale (1828-1906) and the beginnings of clinical pathology. Med Hist 1958; 2: 269-273.

- *Lionel Beale, although little known today, made many contributions to the study of renal disease, especially the urinary sediment.*

Rowntree LG. *Amid masters of the twentieth century medicine*. Charles C Thomas, Springfield IL, 1958

- *a bouncy personal history of particularly American medicine during the first half of the 20<sup>th</sup> century by a participant in many advances in renal disease from 1910 to 1930, including the first in vivo dialysis in 1913.*

Hill W. Richard Bright: a bibliography. *Guy's Hosp Rep* 1958; 107: 531-542. Reprinted from *Guy's Hospital Gazette* 1950; 64: 546 et seq.

- *the centenary of Bright's death gave rise to a series of articles listed beneath; this bibliography of Hill gives details of the articles about Bright, his life and his work, published up to 1950, which constituted a large proportion of the published work on the history of nephrology up to that time.*

Cameron HC. Richard Bright at Guy's. *Guy's Hosp Rep* 1958; 107: 263-293.

Hale-White W. Richard Bright and the discovery of the disease bearing his name. *Guy's Hosp Rep* 1958; 107: 294-307.

Hale-White W. Bright's observations other than on renal disease. *Guy's Hosp Rep* 1958; 107: 308-322.

Kark RM. A prospect of Richard Bright on the centenary of his death. *Am J Med* 1958; 25: 819-824.

Veith I. Richard Bright 1789-1858. An appreciation of the centenary of his death. *Mod Med (Minneapolis)* 1958; 26: 202-216

Winston GAR. Richard Bright and his published writings: a review. *Guy's Hosp Gaz* 1958; 72: 483-488.

Shapiro E. William Charles Wells (1757-1817). *N Engl J Med* 1959; 261: 708-709.

Murray G. *Medicine in the making*. Ryerson Press, Toronto 1960.

- *The first of Murray's two autobiographical works in which his work on dialysis and transplantation is described. See also :*

Murray G. *Quest in Medicine*. Ryerson Press, Toronto 1963.

Simpson JF. Joseph Toynbee. His contributions to otology. *Proc Roy Soc Med* 1963; 56: 97-98.

- *Toynbee was the first observer to describe and illustrate glomerular changes in nephritis, in work done under Bright's supervision and published in 1846 (see Keith & Keys (1954) and Cameron & Becker (1964)). This was his only work on the kidney, but he helped found the speciality of Otorhinolaryngology*

- Ackerknecht EH. Johann Lucas Schönlein (1793-1864). *J Hist Med* 1964; 19: 131-138.
- Anonymous. Friedrich Theodor von Frerichs (1819-1885). *N Engl J Med* 1963; 186: 511-512.
- Mark DE. Franz Volhard als Kliniker (Franz Volhard as a clinician). *Med Welt* 1963; 14: 13-16.
- Black DAK. Robert Platt, the Nephrophile. *Manchester Med Gaz* 1965; 45: 6-9.
- Brock WH. The life and work of William Prout. *Med Hist* 1965; 9: 101-126.
- *an important article about one of the leading animal chemists of the day, who contributed also to atomic theory as well as working extensively on urine chemistry*
- Chasis H, Goldring WF (eds) *Homer William Smith DSc. His scientific and literary contributions*. New York University Press, New York. 1965
- *This set of re-published essays, edited by two of his clinical co-workers, includes the famous essay "De urina" on pp 127-147 as well as "Plato and Clementine" and other delights.*
- Kinder CH. Richard Bright (1789-1858). *Invest Urol* 1966; 4: 288-290.
- Wilson TG. Joseph Toynbee. *Arch Otolaryng* 1966; 498-500.
- *see the note to Simpson (1963) above*
- Thomas KB. The manuscripts of Sir William Bowman. *Med Hist* 1966; 10: 245-256.
- *Bowman spent almost all his career as an ophthalmologist, but is immortalised by his eponymous glomerular capsule described in his only paper on the kidney (see Eknoyan 1996) III below)*
- Schröer H. Carl Ludwig, Begründer der messenden Experimentalphysiologie (Carl Ludwig, founder of quantitative experimental physiology). In *Grosse Naturforscher*. Ed Degen H. Stuttgart Wis. Verlagsges. 1967, Band 33.
- Vallery-Radot P. Lucien de Gennes (1892-1968). *Presse Méd* 1968; 76: 2363-2364.
- Delarue J. P. Gauthier-Villars (1894-1968). *Presse Méd* 1968; 76: 2305.
- Küss R. Bernard Fey (1890-1968). *Presse Méd* 1968; 76: 2402.
- *three papers dealing with pioneers of French nephrology*
- Anonymous. Edwin Klebs (1834-1913) peripatetic bacteriologist. *JAMA* 1968; 204: 729-730.

- although best known as a bacteriologist (he invented solid culture media and has *Klebsiella* named after him), Kelbs also introduced paraffin embedding into pathology, and coined the word "glomerulonephritis" in 1876. The "peripatetic" refers to his numerous sequential appointments in Germany, together with time in Chicago in the USA.

Seldin DW. Special issue devoted to Dr Robert F Pitts. *Nephron* 1969; 6: 161-163.

Schmidt CF. Alfred Newton Richards 1876-1966. *Ann Intern Med* 1969; 71 (suppl 8): 15-27.

Gottschalk CW. Dr AN Richards and kidney micropuncture. *Ann Intern Med* 1969; 71 (suppl 8): 28-37.

Wearn JT, Findley T, Cochrane DW, Graham J. Recollections (of Dr AN Richards- ed.) *Ann Intern Med* 1969; 71 (suppl 8): 45-50.

Starr I. The lobster memorial parties. *Ann Intern Med* 1969; 71 (suppl 8): 51-53.

- these were parties given by AN Richards for his staff

Buchborn E. Franz Volhard, 1872-1950. Uber die funktionelle Unterscheidung der Schrumpfnieren. (Franz Vollhard, 1872-1950. Functional differentiation of renal shrinkage). *Internist* 1969; 10: 102-105.

Van Bogaert L. Eloge académique du Professeur Norbert Goormaghtigh (1890-1960). (Academic eulogy of Professor Norbert Goormaghtigh (1890-1960)). *Mém Acad Roy Méd Belg* 1969; 7: 89-114.

Anonymous. William Charles Wells (1757-1817) South Carolinian tory. *JAMA* 1969; 209: 106-107.

Jonti J. Richard Bright vesepathologiai es helye kora orvostudományában (The works of Richard Bright on kidney disease and his role in the medicine of his age). *Orvosi Hetilap* 1969; 110: 2406-2408.

Boksay G. Dr Richard Bright and lake Balaton. *Med Hist* 1970; 14: 106-107.

- Bright visited the lake during his travels to Hungary in 1816

Kauntze R. Samuel Wilks. *Guy's Hosp Rep* 1970; 119: 353-355.

Frame E. Thomas Graham: a centenary account. *Philos J (Glasgow)* 1970; 7: 116-127.

Shul'tsev GP. Burtsev VI. Richard Bright- osnovopolozhnik ucheiia o bolezniakh pocjek. (Richard Bright--founder of teaching on kidney diseases). *Urol Nefrol (Mosk)* 1970; 35: 60-63.

Wellmann KF. In memoriam. Paul Kimmelstiel, M.D., 1900-1970. *Am J Clin Pathol* 1971; 56: 117-119.

Niebyl PH. Sennert, van Helmont and medical ontology. Bull Hist Med 1071; 45: 115-137.

*-Daniel Sennert probably noted haematuria after scarlatina for the first time, and van Helmont made many observations on renal function*

Munro AC. Thomas Graham (1805-1869). Phil J (Glasgow) 1971; 8: 30

Schmidt C. Alfred Newton Richards. Biograph Mem Nat Acad Sci 1971; 42; 271-318.

Debré R. Louis Pasteur Vallery-Radot (1886-1970). Bull Acad Nat Méd 1971; 155: 436-448.

*- Pasteur-Vallery-Radot was one of the founders of French Nephrology and a mentor of Jean Hamburger. Together they helped found the Société de Pathologie Rénale in 1949- the first Nephrological society in the world (see Richet (2000) part V below)*

Lilien OM. Marcello Malpighi (1628-1694) and Lorenzo Bellini (1643-1704). Invest Urol 1971; 8: 698-699.

Bruetsch WL. Richard Bright (1789-1858) and apoplexy. Trans Am Neurol Soc 1971; 96: 213-215.

Kaiser W, Stolze M. In memoriam Friedrich Volker (1872-1955). Ztschr Urol Nephrol 1972; 65: 721-726.

*- Voelker was one of the pioneers of intravenous urography*

Schiele H. Friedrich Voelker. Zentrbl Chirurg 1973; 98: 475-477.

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Lampen H. Franz Volhard und sein letztes grosses Thema - aus der sicht eines Mitarbeiters Franz Volhard and his last great theme - from the point of view of one of his collaborators). Med Welt 1973; 24: 41-42.

Pickering G. The first Volhard lecture. Clin Sci Mol Med 1973; 1s-10s.

*- this 100<sup>th</sup> anniversary of Volhard's birth led to a small cataract of publications on his life and work, including the very useful publication of his own autobiographical writings, later re-published as a book (see Bock (1982) Part II below)*

Rathert P, Melchior H, Lutzeyer W. Johannes Volkmann M.D. Pioneer in intravenous urography. Urology 1974; 4: 613-616.

*- Volkmann was Voelker's pupils and continued his work on intravenous pyelography*

Strauss MB. Louis Gordon Welt 1913-1974. Trans Ass Am Physcns 1974; 87: 40.

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*- two great American clinical physiologists died close together in time.*

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### ***Nephrology in the ancient and mediaeval world (see also Uroscopy and Urinalysis)***

Thompson H. Assyrian prescriptions for diseases of the urine. *Babyloniaca* 1934; 14: 108-109.

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Dimitriadis K. *Byzantinische Uroskopie*. Dissertation, University of Bonn 1971.

### ***Renal structure and function***

Schumlansky A. *De structura renum tractatus physiologicus-anatomica (Physiological-anatomical treatise on the structure of the kidney)*. JG Treuttel, Strasbourg, 1788.

- Schumlansky, unusually for the period, gives extensive detailed references to previous work on the morphology and function of the kidney. This, therefore, can be considered the earliest work in the history of nephrology.

Foster W. *Lectures in the history of physiology during the six preceding centuries*. Cambridge University Press., Cambridge, 1901.

- contains some work on the physiology of the kidney and urine formation

Cushny A. *The secretion of the urine*. Longmans, Green, London 1917.

- Cushny, a pharmacologist, summarised and synthesised the previous century's work on urine formation in this influential book, which thus acts as a valuable source of references to ideas on urine formation in the nineteenth century. He himself provided no new data.

Hayman JM Jr. Malpighi's "Concerning the structure of the kidneys". A translation. *Ann Med Hist* 1925; 7: 242-263.



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Smith HW. Highlights in the history of renal physiology. *Georgetown Med Bull* 1959; 13: 4 - 59.

- *the first- and for a long time the only- survey of the history of ideas in renal physiology*

Stroppiana L. La funzione renale in una lezione inedita di G.B.Morgagni (renal function in an unpublished text of GB Morgagni). *Atti Accad Stor Arte Sanit* 1957; 23: 10-21.

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Grondona F. Structure et fonction du rein selon William Bowman (Structure and function of the kidney according to William Bowman). *Clio Medica* 1971; 6: 195-204.

Andreucci V. On the glomerulus. *Kidney Int* 1972; 2: 349-351.

Wesson LG. Glomerulotubular balance; history of a name. *Kidney Int* 1973; 4: 236-238.

Herman JR. Candiru: urinophilic catfish: its gift to Urology. *Urology* 1973; 1: 265-267.

### ***Uroscopy and urinalysis***

Leube W. *Ueber die Bedeutung der Chemie in der Medizin (On the significance of chemistry for medicine)*. Berlin 1884

- in this book Leube suggested, for the first time, that Frederick Dekkers had described coagulable urine after heating and adding vinegar, more than a century before Cotugno, and was thus the discoverer of proteinuria. This claim remains doubtful, however, because Dekkers thought the precipitate was a rennet (by analogy to the behaviour of milk), and (unlike Cotugno) made no connection with dropsy, but considered this phenomenon a character of "wasting diseases".

(Wellcome H.) *The evolution of urine analysis. An historical sketch of the clinical examination of the urine*. British Medical Association, Birmingham, 1911.

- although written by Henry Wellcome himself, this important early monograph, as published, is not credited to any author.

Dock W. Some early observers of albuminuria. *Ann Med Hist* 1922; 4: 287-290.

- a classical account of the discovery of albuminuria, from Dekkers to Bright

Pezzi G. *L'esame dell'urine nel'antico a medio evo. (Urine examination from ancient times to the middle ages)* Ministero della Difesa-Marina: pagine di storia della scienza e della tecnica. 1938, vol 10, ser. 1.

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Ross JH. Proteinuria: a review. *Lond Hosp Gaz* 1956; 59: 161-164.

Gough WB. Old volumes from the library no 14: "The different causes and judgements of urine" by J Fletcher 1623. *Birmingham Med Rev* 1957; 20: 300-302.

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Ideler IL (ed). Ioannis Actuarii: *De Urinis and Magnus of Nisibus: De Urinis*. In: *Physici e Medici Graeci Minores*. Amsterdam, Adolf M Hakkert, 1963.

Kaplan E. Robert Recorde and the authorities of uroscopy. *Bull Hist Med* 1963; 37: 65-71.

Rajam RV. The mystery that is urine. *Ind J Dermatol Venereol* 1963; 29: 164-170.

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Kiefer JH. Uroscopy: the artists' portrayal of the physician. *Bull NY Acad Med* 1964; 51: 55-560

Berger-Blecker J. Von der Uroskopie zur Urochemie (From uroscopy to urine chemistry). *Hippokrates, Stuttgart* 1966; 37: 653-657.

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- the publication is by Johannes Ketham, a mediaeval book including work on uroscopy

Bush RB. "The urine is an harlot, or a lyer". *JAMA* 1969; 208: 131-134.

- the quotation is from Thomas Bryan's work on the urine which attacked uroscopy

Cameron JS. The history of proteinuria. In *proteins of normal and pathological urine*. eds Manuel J, Betuel J. Karger, Basel 1970.

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Cheyamol J. le diagnostic de grossesse au temps de mireurs d'urines. (The diagnosis of pregnancy in the time of the uroscopists). Hist Méd Sci 1973; 7: 7-28.

Wilcox HG. "Urina est meretrix" ("Urine is an lyer.."). Rocky Mtn Med J 1973; 70: 38-41

*-Thomas Bryan again....*

Dock W. Proteinuria: the story of 280 years of trials, errors and rectifications. Bull NY Acad Med 1974; 50: 659-666.

Davison JM, Cheyne GA. History of the measurement of glucose in the urine: a cautionary tale. Med Hist 1974; 18: 194-197.

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### *Parenchymatous renal disease*

Virchow R. Historische Notizen über Lupus (Historical note on lupus). Arch Pathol Anat 1865; 32: 139-143.

- in this paper Virchow points to descriptions of "lupus" by Rogerius and Paracelsus but misses the earlier description of Hebernus of Tours in the 10<sup>th</sup> century

Geddings JFM. A historico-pathological sketch of Bright's disease. Trans S Carolina Med Assoc 1875; 25: 1-135.

Christian HA. Kidney disease as described by Richard Bright in the light of knowledge of a century later. Ann Med Hist 1927; 9: 337-346.

Comrie JD. Remarks on historical aspects of ideas regarding dropsy. Br Med J 1928; ii : 229-232.

Osman AA. Studies in Bright's disease no VII. Histological sections from kidneys of 3 cases of "Bright's disease" originally described by Dr Bright. Guy's Hosp Rep 1933; 83: 185-193.

- This was the first of several assaults on the three kidneys remaining in the museum at Guy's (see Cavanagh (1958) and Nester and Weller (1972) below). One kidney shows secondary amyloid (positive for anti-amyloid A (B Hartley personal communication) and the other two mesangiocapillary glomerulonephritis.

Osman AA. *Original papers of Richard Bright on renal disease*. Oxford University Press, London 1937.

- this book contains reprints of Bright's section on kidney diseases in the Reports of medical cases, the Gulstonian (sic) lectures of 1833 from the Lancet, and the two classic papers of 1836 from Guy's Hospital Reports. It contains also a shortened version of Osman's paper of 1933 cited above. This publication was important, since it made available Bright's writings to a wide audience, and is often cited.

Brun C. *Acute anuria*. Munksgaard, Copenhagen, Chapter 1. 1954

- this important thesis contains a useful history and summary of papers on acute renal failure from the second half of the nineteenth century onwards.

Stürtzbecker M. Zur Therapie der Wassersucht bei Freidrich Wilhelm II von Preussen. Ein Beitrag zur Geschichte der Korpufschertums um 18. Jahrhundert (On the treatment of Friedrich Wilhelm II of Prussia's oedema. An essay on the history of quackery in the 18<sup>th</sup> century). Sudhoff's Archiv 1957; 41: 10-18.

Michele J. Il rene nella visione Morgagnana (Dal "De sedibus..." e dalle lesioni teoriche di medicina) (The kidney in the view of Morgagni (from the "De Sedibus..." and theories of medicine. Pagine Stor Med 1957; 1: 22-29.

Bloomfield AL. A bibliography of internal medicine: Bright's disease. From Bright to Addis. Stanford Med Bull 1958; 16: 133-148.

- an important early work in which a number of key papers in the history of nephritis are

*abstracted and commented upon. Much quoted since.*

Mann WN. Bright's disease. The changing concept of a century. *Guy's Hosp Rep* 1958; 107: 323-347.

- *the first of a number of accounts analysing the various forms of Bright's disease and the emergence of hypertension during the 19th and early 20<sup>th</sup> century*

Cavanagh JB. A note on the histological appearances of three kidneys originally described by Dr Richard Bright. *Guy's Hosp Rep* 1958; 107: 390-398.

- *see Osman (1937) above*

Klemperer P, Federn W. The dilemma of Johann Jacob Wepfer: the history of contracted kidney. *Bull Hist Med* 1959; 33: 50-66.

- *a description of a notable patient and an extensive discussion of the history of contracted kidney*

Peters JH, Freedman P. Immunologic aspects of renal disease. *N Engl J Med* 1960; 261: 1166-1173, 1225-1235, 1275-1281.

- *this massive three-part review summarises work in the nineteenth, and twentieth century up to the 1950s, in both clinical and experimental aspects of immunological renal disease. A valuable source of references. Peters and Freedman were amongst the first to apply immunofluorescent antibody techniques to renal biopsy specimens, together with Kark.*

Talbott JH, Terplan KI. The kidney in gout (historical introduction). *Medicine(Baltimore)* 1960; 39: 406-410.

- *a classical paper from the end of the period when topaceous gouty nephropathy was a frequent and serious complication of gout*

Elaut L. P. Rayer en de pathologische anatomie van de urine afvoerwegen (Rayer and the relation of urinary findings to renal pathology). *Ned T Geneesk* 1961; 105: 33-35.

Leonardi P, Ruol A. *La biopsia renale transcutanea (Percutaneous renal biopsy)*. Casa Editrice Ambrosiana, Milano, 1961.

- *this little-known book (even in Italy) which was one of the first on renal biopsy contains a virtually complete bibliography of papers on renal biopsy from its beginnings to 1960*

Ostanodohn V, Potter EL. Pathogenesis of polycystic kidneys: historical survey. *Arch Pathol* 1964; 77: 459-465.

Jarcho S. William Charles Wells on non-scarlatinal dropsy (1812). *Am J Cardiol* 1964; 14: 1880-1887.

Cameron JS, Becker EL. Richard Bright and observations on renal histology. *Guy's*

Hosp Rep 1964; 113: 159-171.

- *details the microdissection studies done under Bright's direction by Josph Tonybee in 1839-42 (see Simpson (1958) above)*

Thomsen Å Ch. *The kidney in diabetes mellitus*. Munksgaard, Copenhagen, 1965.

- *it seems incredible today that for a decade or more this was the only separate work on this topic. It begins with a historical review of diabetic renal disease which is still useful.*

Yoshitoshi Y, Maeda T. [Development of clinico-pathological concepts of chronic glomerulonephritis]. *Nippon Rinsho (Japan J Clin Med)* 1966; 24: 626-634. (Japanese).

Wojcik T, Rostropowicz-Denisiewicz , Wagner T. Rozwoj pogladow na etiopatogeneze guzkowego zapalenia tetnic (w 100 rocznic pierwszwego doniesienia (Development of views on the aetiology and pathogenesis of polyarteritis nodosa (100th anniversary of the first report). *Wiadomosci Lekarskie* 1967; 20: 1363-1365.

Anonymous. Two case reports by Richard Bright. *JAMA* 1967; 199: 395, 1967.

Kusunoki N, Maeda T. [Historical changes of lipoid nephrosis]. *Nippon Rinsho (Japan J Clin Med)* 1968; 26: 1072-1078 (Japanese).

Bode HH, Crawford JD. Nephrogenic diabetes insipidus in North America. The Hopewell hypothesis. *New Engl J Med* 1969; 280: 750-754.

- *this paper describes the transit across the Atlantic in the ship Hopewell kindred with diabetes insipidus. The idea proposed here that cases in the United States derive from this family has since been discredited*

\* Regaly-Merei G. A vesegyulladas fogalmanak kialakulasa (History of the concept of nephritis). *Orv Hetil* 1969; 110: 25: 27-29. (correction)

Kark RM. Some remarks on fatty livers and fatty kidneys in the nephrotic syndrome. *Scand J Gastroenterol* 1970; Suppl.7:111-116.

- *this rather obscure title conceals the story of accidental biopsy of the kidney when attempting liver biopsy, and its role in the introduction of the technique*

Becker EL. Conference on glomerulonephritis. *Bull NY Acad Med* 1970; 46: 747-748.

Weller R, Nester B. Histological reassessment of three kidneys originally described by Richard Bright in 1827-36. *Br Med J* 1972; 2: 761-763.

- *the 3<sup>rd</sup> assault on the historic kidneys of Mary Sallaway and her fellow patients; see Osman (1937) above*

Regöly -Merei O.[History of the concept of nephritis]. *Orv Hetil* 1969; 110: 2827-2829.(in Hungarian)

Anon. The effects of albumniuria upon vision. Bull NY Acad Med 1862; 2: 14-20. Bull NY Acad Med 1970; 36: 197-198.

*-reprint of a historical article*

Sarre H. Was bleibt von Franz Volhards Begriff der diffuse Glomerulonephritis? ( What remains of Franz Volhard's concept of diffuse glomerulonephritis ). Med Welt 1973; 24: 11-17

Wedeen RP. *Poison in the pot: the legacy of lead*. University of Illinois Press, Carbondale ILL, 1973.

*- a fascinating history of lead and lead poisoning, particularly with reference to saturnine gout and renal disease*

Kibukamusoke J. Historical background. In *The nephrotic syndrome of quartan malaria*. Williams & Wilkins, Baltimore, 1973.

## ***Hypertension***

Mann WN. Arterio-capillary fibrosis: an historic specimen. Guy's Hosp Rep 1946; 95: 73-78.

*- the description and histology of a specimen from the Gordon museum at Guy's Hospital of a scarred kidney and a hypertrophied heart of Rhoda Harrison, discussed by Gull in 1872 and said by him to have been prepared by Bright himself in 1847. The specimen is still in the museum at Guy's.*

Ryle JA. Chronic Bright's disease without albuminuria. An historical note on the contributions of Bright and his successors of the Guy's school to the study of high blood pressure and its consequences. Guy's Hosp Rep 1927; 77: 307-313.

Major RH. The history of taking the blood pressure. Ann Med Hist 1930; 2: 47-55.

Ruskin AR (Ed) *Classics in hypertension*. Charles C Thomas, Springfield MA. 1956.

*- contains reprints and translations of a number of crucial papers, from Huang Ti onwards, in the history of hypertension.*

Allanby KD. The evolution of treatment of essential hypertension. Guy's Hosp Rep 1958; 107: 515-530

Jantsch M. Zür Geschichte der Kenntniss des renalen Hochdrucks (On the history of knowledge of renal hypertension]. S-B Archiv Gesch Klin Med Sekt Urologie DDR 1964; 55-61.



MacMahon HE. Malignant nephrosclerosis - 50 years later. *J Hist Med* 1966; 21: 125-146.

- *from its first description by Volhard and Fahr in 1914. See also his paper in German on the same subject in 1968, below*

MacMahon HE. Die maligne Nephroskelrose- ihre fünfzigjährige Geschichte (the fifty years' history of malignant nephrosclerosis). *Med Welt (Stuttgart)* 1968; 2: 156-159, 3: 212-217.

Sinclair RG. High blood pressure- ancient, modern and natural. *J R Coll Gen Pract* 1969; 18: 207-213.

Koelbing HM. *Blutgefäße und Blutdruck einst und jetzt (Blood vessels and blood pressure then and now)*. Documenta Geigy, Basel, 1969.

Peart WS. The renin-angiotensin system. A history and review of the renin-angiotensin system. *Proc Roy Soc Lond B* 1969; 173: 317-325.

Gordon DB. Some early investigators of experimental hypertension. *Texas Rep Biol Med* 1970; 28: 179-188.

- *until recently only this paper and that of Lupu (1975) (see section II) dealt with this important topic*

Sarre H. Franz Volhard- roter und blässer Hochdruck aus hettiger Sicht 1 (Franz Volhard -- the red and pale high pressure from the modern viewpoint). *Med Klin* 1973; 68: 1309-1312.

Rotter W. Hypertonie, Volhards Thesen in heutiger Sicht (Hypertension - Volhard's ideas from a current perspective). *Med Welt* 1973; 24: 34-40.

## ***Uraemia***

Ascoli G *Vorlesungen über Urämie (A lecture on uraemia)*. Fischer, Jena, 1903.

- *Ascoli reviews ideas on uraemia from Piorry to the end of the nineteenth century, and is a valuable source of early references and ideas*

Harrison TR, Mason MF. The pathogenesis of the uremic syndrome. *Medicine (Baltimore)* 1937; 16: 1-44.

- *contains an extensive review of ideas on uremia up to the middle 1930s*

Mani N. La découverte de l'urémie expérimentale par Jean-Louis Prevost et Jean-Baptiste Dumas, Genève 1821 (The discovery of experimental uraemia by Jean-Louis Prevost and Jean-Baptiste Dumas). *Med et Hyg* 1963; 21: 408-409.

Schreiner, GE, Maher JF. The search for uremic toxin. In *Uremia*. Schreiner GE, Maher JF. Charles C Thomas, Springfield MA, 1963. Pp. 36-41

- updates the theories of uraemic toxicity to 1960 in the light of artificial kidney treatment

## **Dialysis**

*Obviously articles on dialysis and transplantation began to appear much later than those on renal disease in general*

Haas G. Über die künstliche Niere (On the artificial kidney). *Dtsch Med Wschr* 1952; 7: 1640-1641.

- Haas, who had pioneered dialysis in humans in the 1920s, lived to see the artificial kidney used routinely not only for acute renal failure (discussed here) but for end stage renal disease; he died in 1971)

Kolff WJ. The artificial kidney- past, present and future. *Trans ASAIO* 1955; 1: 1-3.

- the first of several accounts by Kolff of his early work with the artificial kidney

Kolff WJ. The artificial kidney-past and future. *Circulation* 1957; 15: 285-294.

Maclean J. The discovery of heparin. *Circulation* 1959; 19: 75-78.

- a personal account, published posthumously, by the individual who first extracted an anticoagulant from liver as a medical student but never received credit for this discovery during his life.

Salisbury PF. History of the American Society for Artificial Internal Organs. *Trans ASAIO* 1960; 6: ii-vi.

Alwall N. *Therapeutic and diagnostic problems in severe renal failure*. Munksgaard, Copenhagen 1963.

- in this account of his work in the 1940s and 1950s, Alwall gives an almost complete bibliography of all papers on haemodialysis up to 1960.

Scribner BH. Ethical problems of using artificial organs to sustain human life. *Trans Am Soc Artif Intern Organs* 1964; 64: 209-213.

- with Scribner's usual insight, this early paper reviews the difficulties engendered by maintaining life long-term by dialysis; little has been added since

Kolff WJ. First clinical experience with the artificial kidney. *Ann Intern Med* 1965; 62: 608-619.

Joeke AM. The historical development of the artificial kidney. In: *Water requirements for kidney dialysis*. Elga Products, Lane End Bucks. 1970; pp 1-4.

- *This little booklet provides also an interesting insight into the water treatment for dialysis in the late 1960s. Joeke's article must have been transcribed from a recording, since almost every name mentioned from "Able" to "Kollof", is misspelled !*

Alwall N. Franz Volhard und die aktive Nierentherapie während seiner letzten Lebensjahre. (Franz Volhard and active kidney therapy during his last years of life). *Z Gesamte Inn Med* 1972; 27: 964-965.

- *this describes how Volhard in his last years wanted to start dialysis in Germany in 1948-1949 with Alwall's help; Volhard died following a car accident before this could be done*

Man NK. L'evolution technique de l'hémodialyse (The technical evolution of haemodialysis). *Ann Méd Interne* 1973; 124: 81-84.

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### ***Transplantation***

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