1st ISHRAD Symposium
London, UK, 11 Nov 2011

How does France save its radiological historical memory in the early XXIst Century?

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Information on X-rays discovery 28 December 1895

- Wilhelm C. Roentgen's first paper on the discovery of X-rays, published in a confidential journal in Würzburgh, was dated on **28 December 1895**.

- W.C. Röntgen: *Ueber eine neue Art von Strahlen*. Aus den Sitzungsheriten der Würzburger Physik.-medic. Gessellschaft, 1895.

Information on the X-rays discovery 1 January 1896

Wilhelm C. Roentgen informed several great European scientists with personal letters dated on **1 January 1896**.

Parisian but native from Lorraine, the French mathematician, **Henri Poincaré**, was one of these.

1. IN SPITE OF…

Preliminary personal statement expressed on 11 November 2011

In spite of the early French participation **since January 1896** in the saga of the Roentgen's X-rays medical applications with many **glorious pioneers**…

In spite of continuous creative waves all along the XXth Century with plentiful **French innovative international-labelled scientists** and/or **practitioners**…

In spite of…

A wealthy heritage of an early and earnestly innovative **national industry involved in all branches of medical imaging technologies…**

In spite of…

some worthwhile (even neither exhaustive nor recent) **national literature dedicated to the history of radiology and medical imaging in France and in the French-speaking countries** (former French colonial Empire)…

In spite of…

a few number of **historical centres** aiming to deserve the memory of the French radiology and medical imaging,

* such as the **Centre Antoine Béclère** and the **Musée Curie** in Paris,

* the **Claude Renaud's collection** in Lyon…

In spite of such positive factors…

… The French radiologists never exhibited nor even fell

a deep motivation to save their actually rich national history of Radiology and Medical Imaging

as a whole.

In spite of those positive factors…

Until now, in spite of a few impulsive actions along the XXth Century,

the French radiologists didn't work on any ambitious project aiming to recollect seriously such a huge material and immaterial heritage

in a comprehensively dedicated architectural location yet.

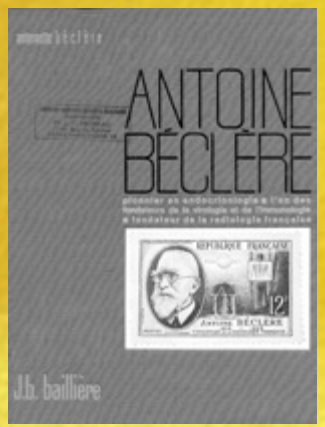
In spite of those factors…

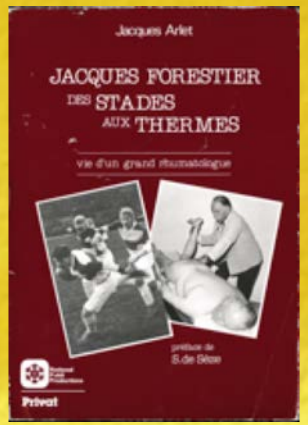
… **The French radiologists** don't have a true Museum of Radiology like in Germany and in Belgium.

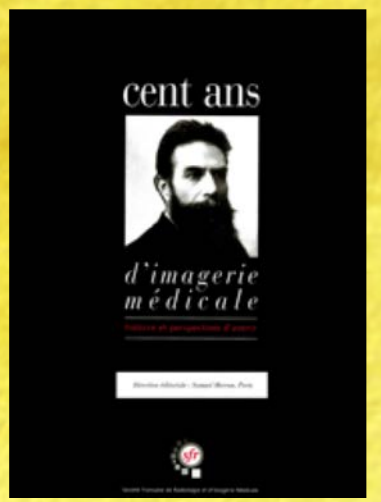
They even don't own a *Domus Radiologica* like in the UK (British Institute of Radiology and Royal College of Radiology)

or in the USA (American College of Radiology).

History of French Radiology
Useful French books





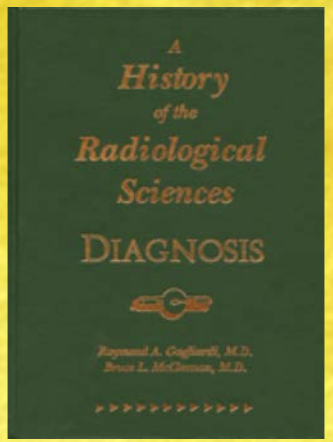


The international literature

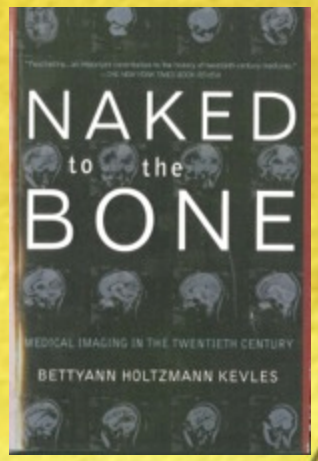
Grigg's (1965) and **Kevles'** (1998) **books** are more informative on the French history of radiology than that of **Gagliardi & McClennan** (1995).

E.R.N. GRIGG. [1965]
The trail of the invisible light.
Charles C Thomas
Springfield, Il, USA.

R.A. GAGLIARDI & B.L. McCLENNAN. [1996]
A History of the Radiological Sciences. Diagnosis.
Radiology Centennial, Inc., Reston, USA.



B.H. KEVLES. [1998]
Naked to the Bone. Medical Imaging in the Twentieth Century.
Perseus Publishing, Cambridge, USA.



2. 1896, the crucial year!

2. 1896, the crucial year!

PIONEERING RADIOLOGY.

Physicians,

Photographers,

Scientists,

in France…

Information on X-rays in Paris 7 January 1896 ?

- **DR TOUSSAINT BARTHÉLÉMY**, Poincaré's nephew, was born in Lorraine too.
- He was a **fluent German-speaking physician.**
- **He was a *Frankfürter Zeitung's* regular subscriber and a daily reader**.
- He could read the news in the famous issue dated on **7 January 1896**… (before his uncle received Röntgen's letter?)

Information on X-rays in Paris 10 January 1896 ?

Dr Toussaint Barthélémy immediately contacted and informed

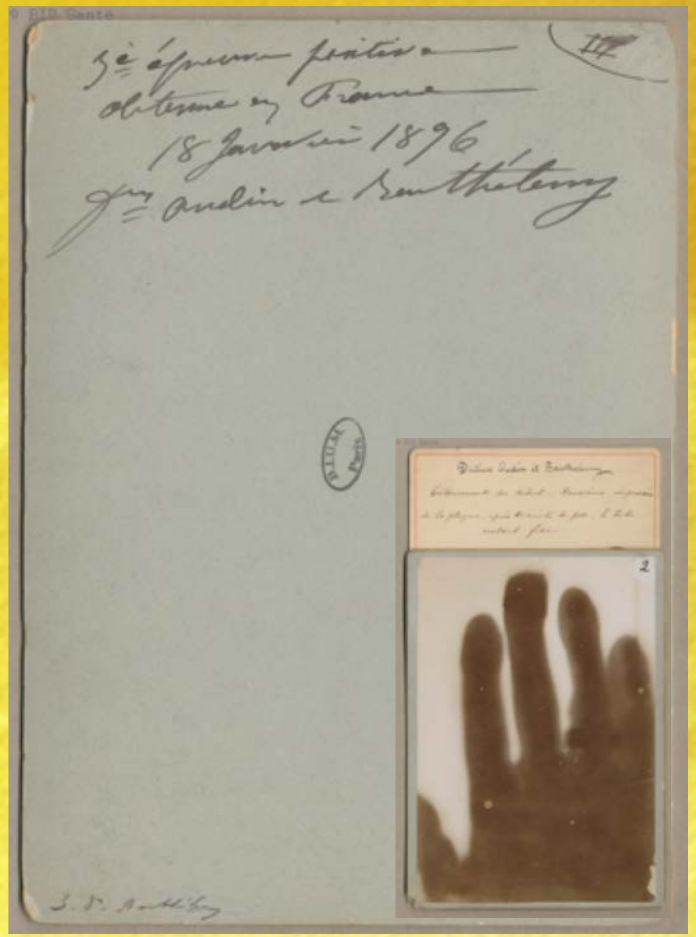
Dr Paul Oudin who obtained a few Crookes' tubes from an academic pharmacist.

Information on X-rays in Paris 18 January 1896

Toussaint BARTHÉLÉMY (1850-1906), dermatologist,

Paul OUDIN (1851-1923), physician and physicist,

performed on 18 January 1896 the first French radiography of a hand according to Roentgen method.



18 January 1896
Toussaint Barthélémy - Paul Oudin

http://www.bium.univ-paris5.fr/

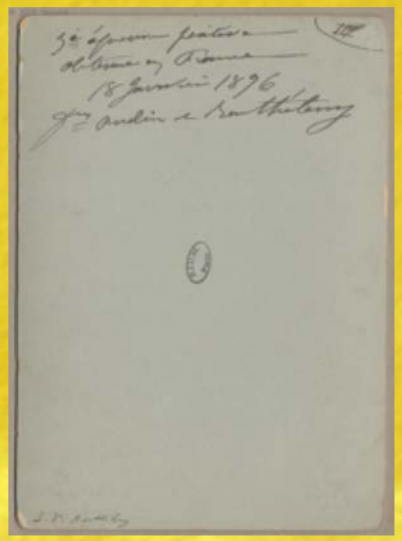
Toussaint BARTHÉLÉMY

and Paul OUDIN,

both of them former residents (AIHP) and medical doctors at the hospitals of Paris,

were less good photographers than Wilhelm Roentgen himself!

1896
Toussaint Barthélémy - Paul Oudin



- Both of them soon opened a radiological office close to the Hospital Saint-Louis of Paris.
- All along the year 1896 they published a dozen of series of earnestly improved radiographies of the hand and of the foot at both Académie des sciences and Académie Nationale de Médecine.

17 February 1896 Montpellier, France

First radiography of a child's hand with osteomyelitis:

C FAURÉ: La radiopédiatrie : passé, présent, avenir

A. IMBERT, H. MARTIN-SANS *(Montpellier) :*

Photographie avec les rayons X de Röntgen,

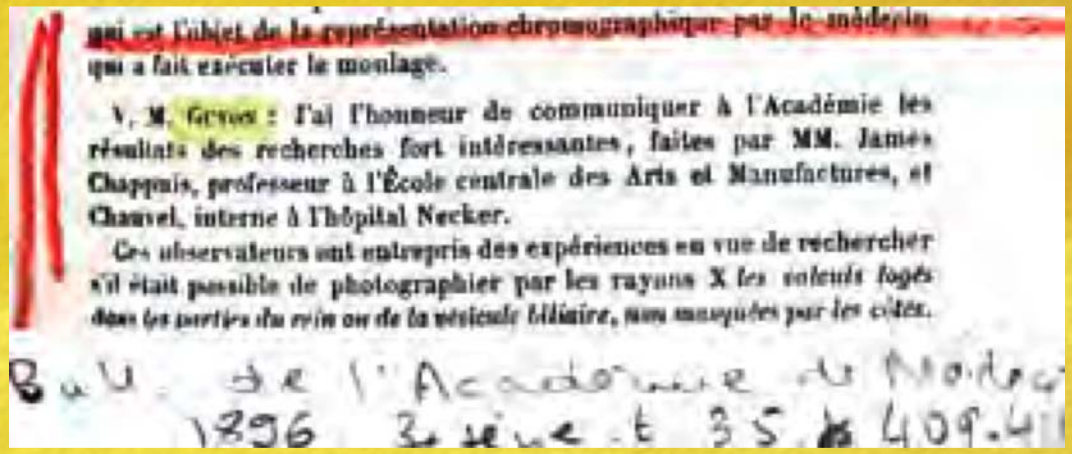
Presented by Arsène d'Arsonval.

Académie des sciences.

17 February 1896.

26 April 1896
James Chappuis - Fernand Chauvel
Félix Guyon (Hospital Necker - Paris)

http://www.ishrad.org/227



qui est l'objet de la représentation chronographique par le médecin qui a fait exécuter le moulage.

V. M. Guyon : J'ai l'honneur de communiquer à l'Académie les résultats des recherches fort intéressantes, faites par MM. James Chappuis, professeur à l'École centrale des Arts et Manufactures, et Chauvel, interne à l'hôpital Necker.

Ces observateurs ont entrepris des expériences en vue de rechercher s'il était possible de photographier par les rayons X les calculs logés dans les parties du rein ou de la vésicule biliaire, non masquées par les côtes.

B.U. de l'Académie de Médec 1896 3e série t 35 p 409-411

26 Apr 1896 : J. Chappuis (engineer, left), F. Chauvel (resident) & F. Guyon (urologist) published the **1st series of radiographies of several human renal and biliairy calculi** (Bull. Nat. Acad. Méd, 26 avril 1896, 35:410-411).

3. The early French radiological Elite.

1896 - 1939

The early French Elite

- Radiologists :

  Charles Bouchard (1837-1915)
  Antoine Béclère (1856-1939)
  Jean-Alban Bergonié (1857-1925), *et al.*

- Radiographers :

  Albert Londe (1858-1917)
  Gaston Contremoulins (1878-1950), *et al.*

- Physicists

  Marie Curie (1867-1934)
  Arsène d'Arsonval (1851-1940):electrophysiology
  Paul Langevin (1870-1946): ultrasound - sonar
  et al.

The early French Elite

M.D. Radiologists

Charles Bouchard (1837-1915)

Antoine Béclère (1856-1939)

Jean-Alban Bergonié (1857-1925)

… *et al.*

Etienne-Jules Marey and Radiology

JF Moreau. Etienne-Jules Marey and Gaston Contremoulins, from chronophotography to Radiology.

1895: the illustrious French physiologist **Etienne-Jules Marey** was Presidents of **Institut de France** and of **Académie des sciences**.

Since the first months of **1896** and until his death in **1904**, **he supported radiology but he didn't practice it by himself.** He mentored radiology by his photographer **Gaston Contremoulins** (see slides 51 to 78).

Etienne-Jules Marey and Radiology

JF Moreau. Etienne-Jules Marey and Gaston Contremoulins, from chronophotography to Radiology.

1900: Marey was President of Académie Nationale de Médecine.

"I urge the radiographists to work altogether on a unique and consensual method providing reliable images earnestly comparable one to another."

["Cela ne suffit pas. Il faut qu'une entente parfaite s'établisse entre les radiographistes pour qu'une méthode unique donne, dans tous les cas, des images fidèles et comparables entre elles."].

Bull. Acad. Nat. Méd, 1901; 45:6-17.

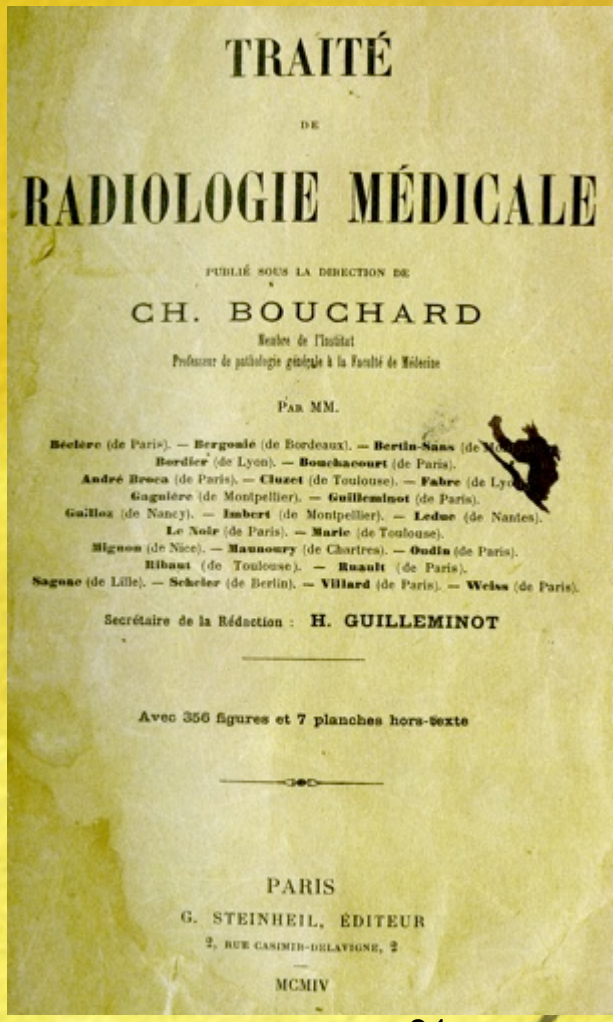
CHARLES BOUCHARD
1836 - 1915

Pathologist, Bacteriologist and Internist

Powerful member of Académie des Sciences (President in 1908) and of Académie de Médecine, he was professor of medicine and chairman at the hospital de la Charité of Paris.
He was **the earliest supporter of medical RADIOFLUOROSCOPY**.
He bought his radiological equipment with his own money (like plenty of his colleagues in the hospitals of Paris, e.g. Félix Guyon), without municipal support.
Dr. Guilleminot was his personal radiographer.

CHARLES BOUCHARD
1836 - 1915

Charles Bouchard was the editor of the 1st French comprehensive multi-authored 3-volume-book of medical Radiology published in 1904 by Steinhel of Paris.



TRAITÉ

DE

RADIOLOGIE MÉDICALE

PUBLIÉ SOUS LA DIRECTION DE

CH. BOUCHARD

Membre de l'Institut

Professeur de pathologie générale à la Faculté de Médecine

PAR MM.

Béclère (de Paris). — **Bergonié** (de Bordeaux). — **Bertin-Sans** (de M
Bordier (de Lyon). — **Bouchacourt** (de Paris).
André Broca (de Paris). — **Cluzet** (de Toulouse). — **Fabre** (de Ly
Gagnière (de Montpellier). — **Guilleminot** (de Paris).
Guilloz (de Nancy). — **Imbert** (de Montpellier). — **Ledoe** (de Nantes).
Le Noir (de Paris). — **Marie** (de Toulouse).
Mignon (de Nice). — **Maunoury** (de Chartres). — **Oudin** (de Paris).
Ribaut (de Toulouse). — **Ruault** (de Paris).
Sagnac (de Lille). — **Scheler** (de Berlin). — **Villard** (de Paris). — **Weiss** (de Paris).

Secrétaire de la Rédaction : **H. GUILLEMINOT**

Avec 356 figures et 7 planches hors-texte

PARIS

G. STEINHEIL, ÉDITEUR

2, RUE CASIMIR-DELAVIGNE, 2

MCMIV

Béclère was in charge of the second volume dealing with the medical applications of X-rays. **Contremoulins** wrote the pages on the detection of foreign bodies.

ANTOINE BECLERE
1856 - 1939

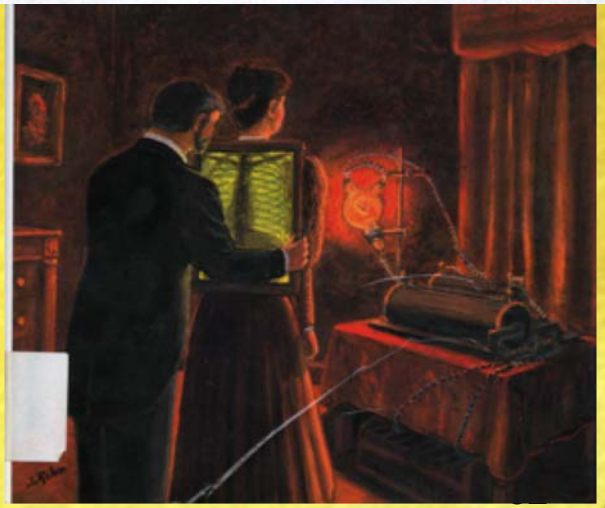
Bacteriologist, Immunologist, Internist, 1st medical Radiologist

Antoine Béclère first was a bacteriologist who pioneered immunology.

He discovered radiofluoroscopy in the fall 1896.

Drs Barthélémy and Oudin invited Charles Bouchard, Antoine Béclère and several scientists to attend the first demonstration of the process at their office opened close to the Hospital Saint-Louis.

Béclère immediately fell enthusiastic and decided to become an active radiologist.



ANTOINE BECLERE
1856 - 1939

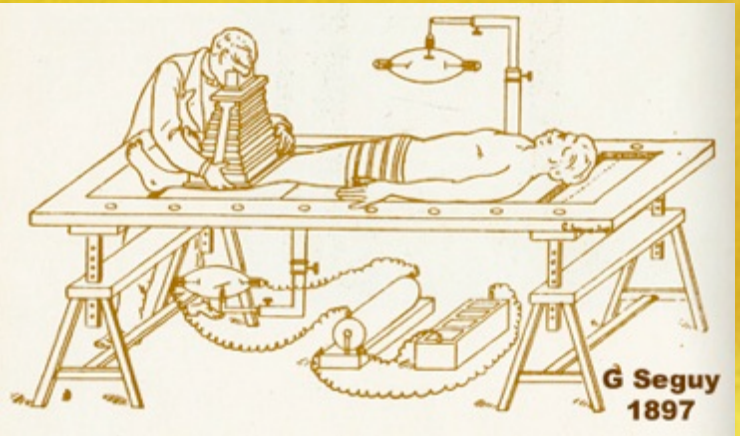
1st French Medical Radiologist

Antoine Béclère bought his first X-ray machine with his own money.

He performed diagnostic and therapeutic acts by himself…

… firstly at the **Hospital Tenon** that wasn't equipped with electricity.

He started teaching in 1897.



By courtesy of Centre Antoine Béclère

ANTOINE BECLERE
1856 - 1939

1st French medical Radiologist

1898: Antoine Béclère moved onto the Hospital Saint-Antoine because it was equipped with electric power.

Here he founded **the first French school of radiology** that dominated radiology before WW2 in Paris and in France.

ANTOINE BECLERE

1st medical Radiologist

Antoine Béclère stated that all medical radiological activities had to be practiced by medical doctors only.

A technical act performed by a technologist had to be supervised by a medical radiologist only allowed to write the report.

Such an academic regulation hadn't been truly operational before the late 1950ies.

ANTOINE BECLERE
1856 - 1939

1st medical Radiologist

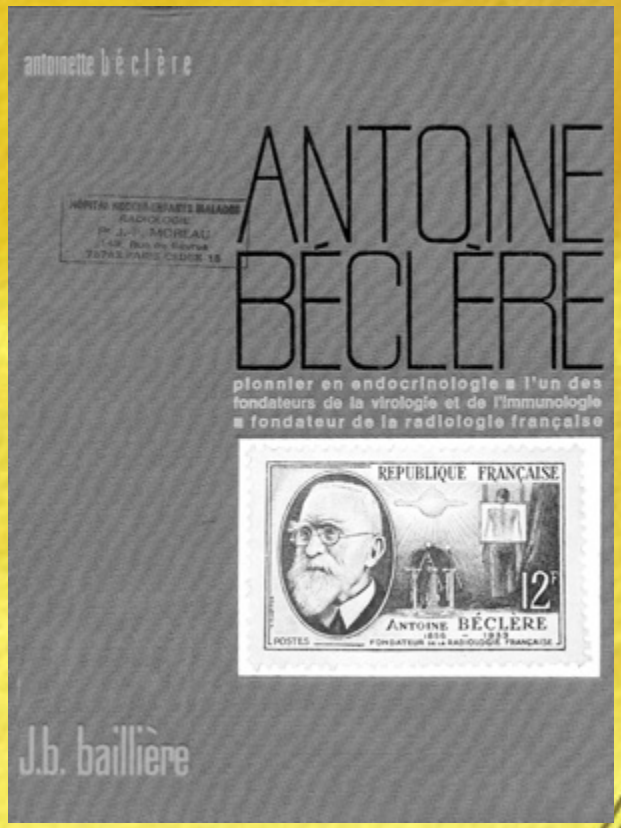
Because of fluoroscopic abuse, Antoine Béclère soon developed a radionecrosis of his left hand that he hid into a purple leaden glove. His daughter never saw his naked hand!

ANTOINE BECLERE
1836 - 1915

Bacteriologist, Immunologist, Internist, 1st medical Radiologist

His daughter **Antoinette Béclère** edited **his biography** written in both French and English languages.

There are the **Hôpital Antoine Béclère** in 92-Clamart,
the **place Antoine Béclère** face to the **Hôpital Saint-Antoine** entrance
and the **Centre Antoine Béclère** in Paris.



ANTOINE BECLERE
1836 - 1915

1st French medical doctor and radiologist
An international star!

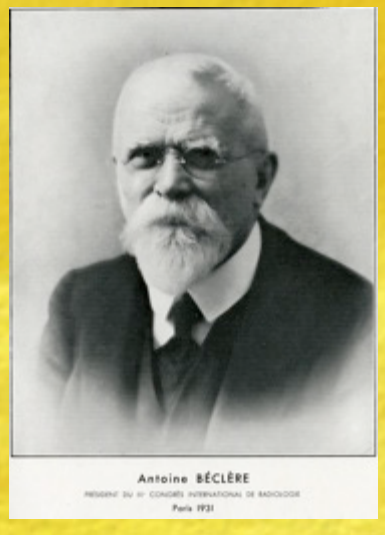
- 1900: **Antoine Béclère** was the Secretary General of the **1er Congrès International de Radiologie**
- (unofficial 1st International Congress of Radiology)
- held during the famous *Exposition Universelle 1900* in Paris.
- The words **RADIOLOGY** and **RADIOGRAPHER** were adopted internationally.

les rayons X ne se trompent jamais c'est nous qui nous trompons en interprétant mal leur langage ou en leur demandant plus qu'ils ne peuvent nous donner.

Antoine Béclère à 40 ans

The four European giants
Thurstan Holland (GB) - Gösta Forsell (S)
Antoine Béclère (F) - Hans Schinz (CH)

Gösta Forsell



Hans Schinz
Courtesy of R.vanTiggelen

They were respectively **Presidents** of both the **International Society of Radiology (ISR)** created in 1913 but acting after World War 1, and the **1st, 2nd, 3rd, 4th official International Congresses of Radiology** (**ICR** 1925, 1928, 1931, 1934) in Europe before WW2. The next one was held in 1937 in Chicago, USA.

The four European giants at ICR'1934 - Zurich Psdt: Hans R Schinz

By courtesy of Centre Antoine Béclère.

Monument for the victims of the X-ray radiation, Hamburg, Germany

Monument for the victims of the X-ray radiation on the grounds of the Asklepios hospital St. Georg in Hamburg.

http://www.geolocation.ws/v/W/File:Gedenkstein%20Opfer%20R%C3%B6ntgenstrahlung.JPG/-/en

Inaugurated in 1936 by Prof. Dr. **Hans Meyer** of Bremen, President of Deutsche Röntgengesellschaft,
and Dr. **Antoine Béclère**, Past-President of the International Society of Radiology.

ANTOINE BECLERE'S ASSISTANTS
at the Hospital Saint-Antoine

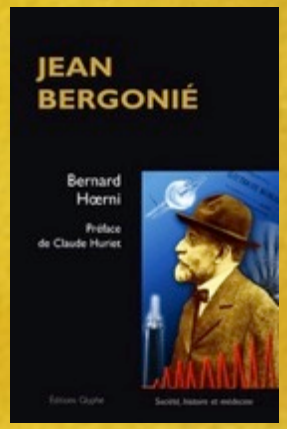
- **Dr Leray** was his assistant-radiographer then his radiologist at the Hôpital St-Antoine.
- He was the first tenured doctor heading a French municipal radiological lab in 1898.
- X-ray victim he died in 1921, four years before Béclère's retirement in 1925.

ANTOINE BECLERE'S ASSISTANTS
at the Hospital Saint-Antoine

Béclère's main assistant then vice-chief, **Dr. René Ledoux-Lebard** (1879-1948) was nominated chairman in 1925.

JEAN-ALBAN BERGONIÉ (1857-1925)

Physicist, Biologist
Radiation oncologist
Victim of X-rays



Professor of medical physics in **Bordeaux**, Jean-Alban Bergonié pioneered radiobiology and radiotherapy. Those studies « in the mean time brought glory but death to him » (« *la gloire mais aussi la mort.* ») since his body was severely damaged by an excessive use of X-rays without protection.
His name is listed on the Albert-Schönberg Monument in Hamburg, Germany, dedicated to the victims of the ionizing radiations.
He was at the origin of the French **multidisciplinary anti-cancer centers**.
He died on 1925, January 2nd, just after he could inaugurate the first stone of the center of Bordeaux on December 14th, 1924.
The center was termed **Institut Bergonié** in 2006.

The early French Elite

Radiographers

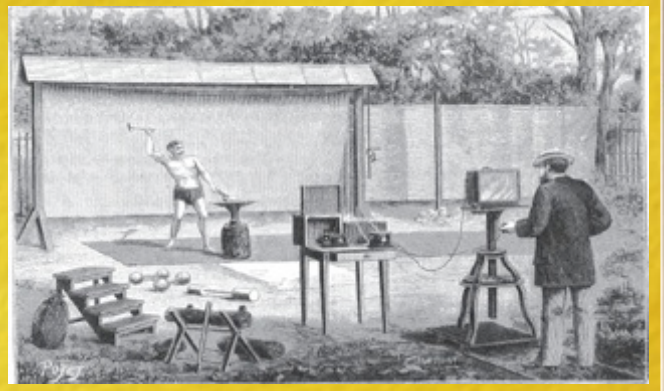
Albert Londe (1858-1917)

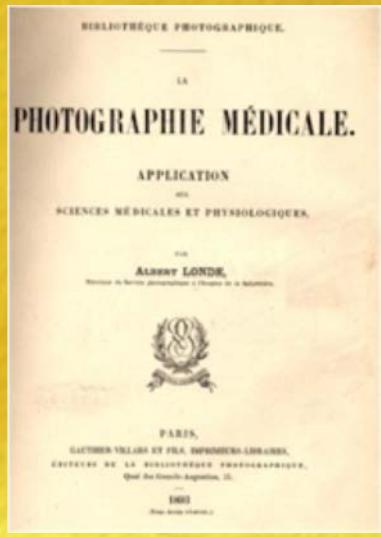
Gaston Contremoulins (1878-1950)…

et al.

ALBERT LONDE (1858-1917) photographer - radiographer

- **Albert Londe** was the famous **photographer** of the great neurologist **Jean-Martin Charcot**, at the **Hospice de la Salpêtrière** of Paris.
- With **Etienne-Jules Marey** (1830–1904), Londe performed many **chronophotographic experiments** concerning movement; the layout of his laboratory at the Salpêtrière was similar to Marey's renowned *Station Physiologique*.
- In 1893 Londe published **the first book on medical photography**, titled *La photographie médicale: Application aux sciences médicales et physiologiques*.
- In 1896 **Albert Londe** had become the **first hospital chief-radiographer** in Paris…




BIBLIOTHÈQUE PHOTOGRAPHIQUE.

LA

PHOTOGRAPHIE MÉDICALE.

APPLICATION

AUX

SCIENCES MÉDICALES ET PHYSIOLOGIQUES.

PAR

ALBERT LONDE,

PARIS,

GAUTHIER-VILLARS ET FILS, IMPRIMEURS-LIBRAIRES,

ÉDITEURS DE LA BIBLIOTHÈQUE PHOTOGRAPHIQUE,

Quai des Grands-Augustins, 55.

1893

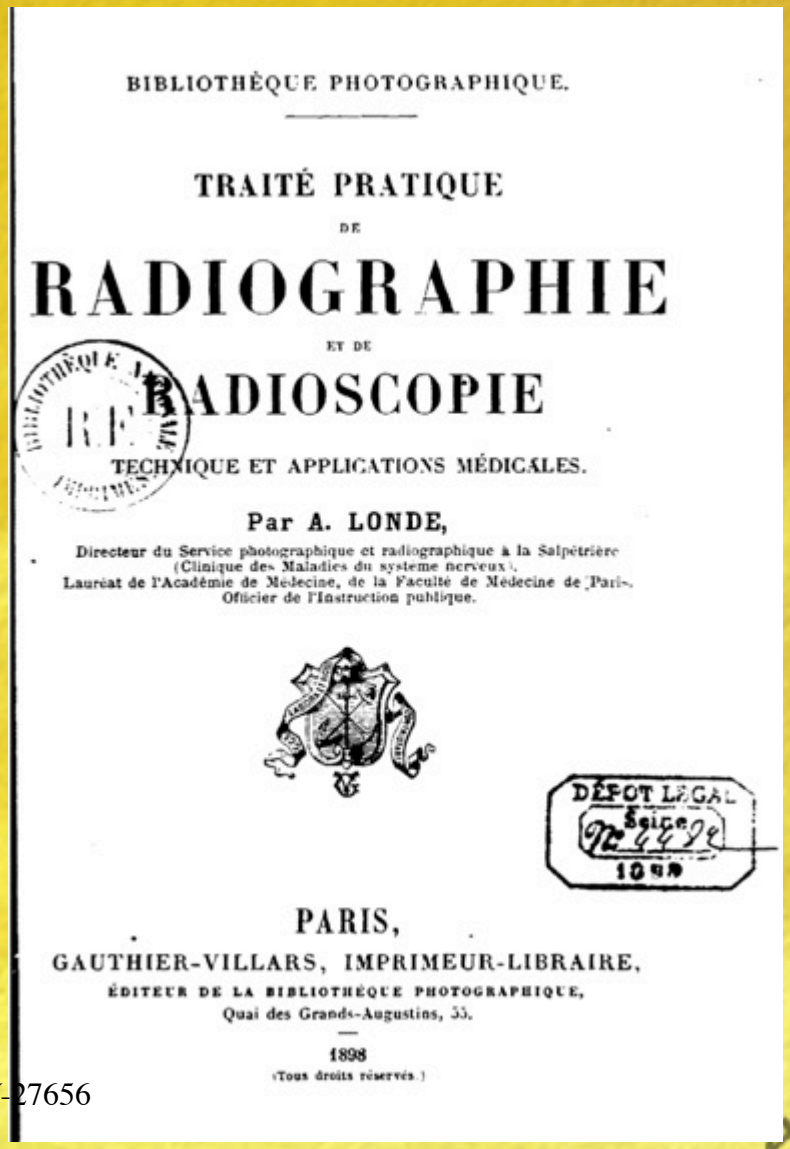
ALBERT LONDE (1858-1917) photographer - radiographer

Albert Londe was the famous photographer of the neurologist Jean-Martin Charcot, at the Hospice de la Salpêtrière of Paris.

On the famous Brouillet's painting (1887) "*Une leçon clinique à la Salpêtrière*", Albert Londe can be observed seated to the far left.

ALBERT LONDE (1858-1917)
photographer - radiographer

- **Albert Londe** had become the **first French hospital radiographer** in Paris since his laboratory was soon equipped with a performing X-ray supply payed by Charcot.
- His lab belonged to the four first municipal labs installed in 1898 by Minister Barthou (under Bouchard's recommendation).



BIBLIOTHÈQUE PHOTOGRAPHIQUE.

TRAITÉ PRATIQUE

DE

RADIOGRAPHIE

ET DE

RADIOSCOPIE

TECHNIQUE ET APPLICATIONS MÉDICALES.

Par A. LONDE,

Directeur du Service photographique et radiographique à la Salpêtrière (Clinique des Maladies du système nerveux).
Lauréat de l'Académie de Médecine, de la Faculté de Médecine de Paris.
Officier de l'Instruction publique.

PARIS,

GAUTHIER-VILLARS, IMPRIMEUR-LIBRAIRE,

ÉDITEUR DE LA BIBLIOTHÈQUE PHOTOGRAPHIQUE,

Quai des Grands-Augustins, 55.

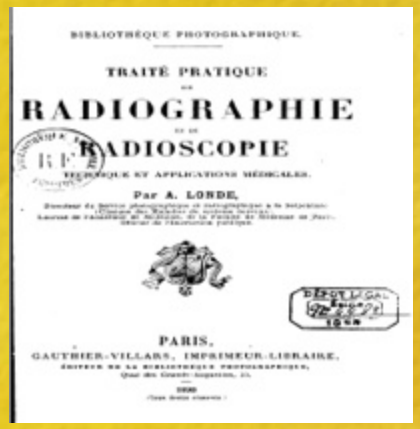
1898

(Tous droits réservés.)

Bibliothèque nationale de France, département Sciences et techniques, 8-V-27656

ALBERT LONDE (1858-1917)
photographer - radiographer

In **1898**, Londe published ***TRAITÉ PRATIQUE DE RADIOGRAPHIE ET DE RADIOSCOPIE: TECHNIQUE ET APPLICATIONS MÉDICALES***,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TRAITÉ PRATIQUE

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RADIOGRAPHIE

ET DE

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TECHNIQUE ET APPLICATIONS MÉDICALES.

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GAUTHIER-VILLARS, IMPRIMEUR-LIBRAIRE,

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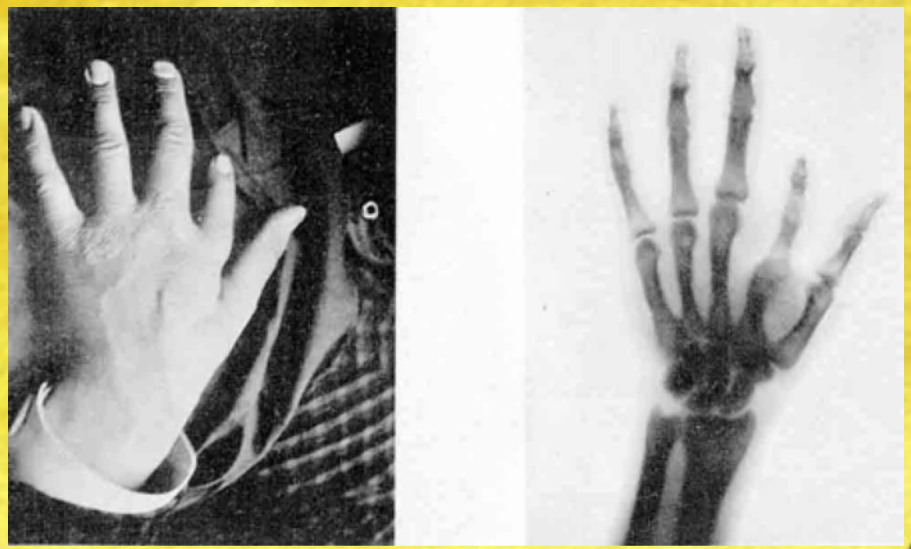


first book of radiological literature…

at least in France…

… *in the world as well?*.

ALBERT LONDE (1858-1917) photographer - radiographer

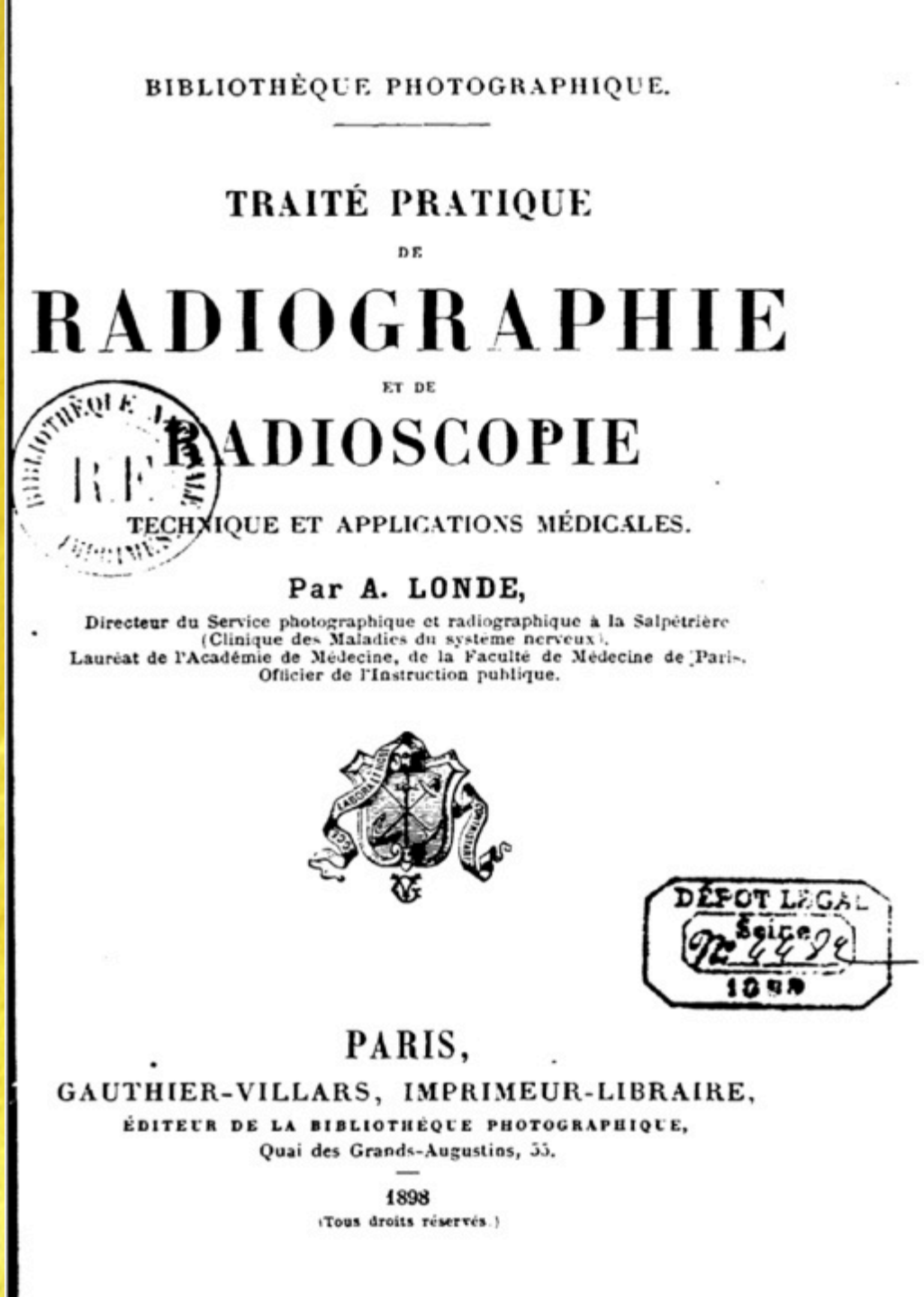
Iconography

In: Denis Bernard ,

« L'image des rayons X et la photographie »,

Études photographiques ,

17 | Novembre 2005



BIBLIOTHÈQUE PHOTOGRAPHIQUE.

TRAITÉ PRATIQUE

DE

RADIOGRAPHIE

ET DE

RADIOSCOPIE

TECHNIQUE ET APPLICATIONS MÉDICALES.

Par A. LONDE,

Directeur du Service photographique et radiographique à la Salpêtrière (Clinique des Maladies du système nerveux),
Lauréat de l'Académie de Médecine, de la Faculté de Médecine de Paris,
Officier de l'Instruction publique.

DÉPOT LÉGAL
Seine
N° 4494
1898

PARIS,

GAUTHIER-VILLARS, IMPRIMEUR-LIBRAIRE,

ÉDITEUR DE LA BIBLIOTHÈQUE PHOTOGRAPHIQUE,

Quai des Grands-Augustins, 55.

1898

(Tous droits réservés.)

ALBERT LONDE (1858-1917)
photographer - radiographer

Albert Londe early retired in 1900 for unclear reasons.

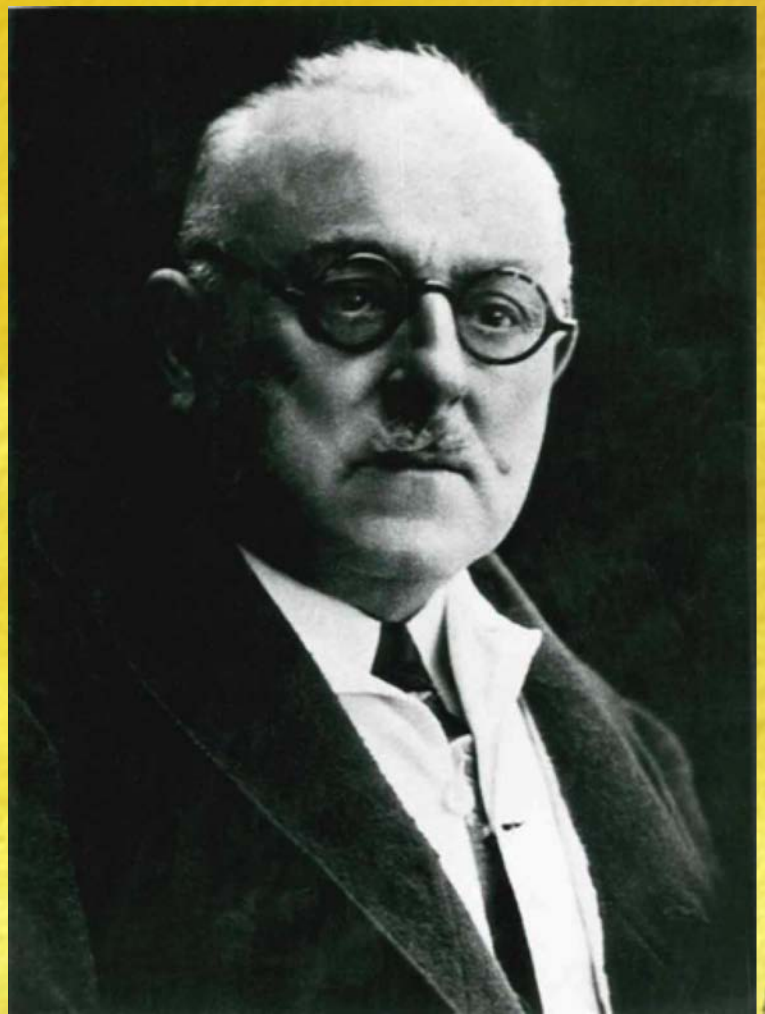
His successor was **Charles Infroid** who quickly died because of severe handicapping radiation-abusive lesions.

GASTON CONTREMOULINS (1869-1950) photographer, French radiographers' godfather

Gaston Contremoulins born in Rouen, Normandy, studied **fine arts** at the Ecole des Beaux-Arts before he discovered **photography** in 1891.

He was recruited in 1892 at Mathias Duval's histology chair at the University of Paris where he worked with the surgeon **Dr Charles Rémy**.

He had become Etienne-Jules Marey's chronophotographer in the mean time when Demenÿ resigned his position at the *Station physiologique* in 1894.

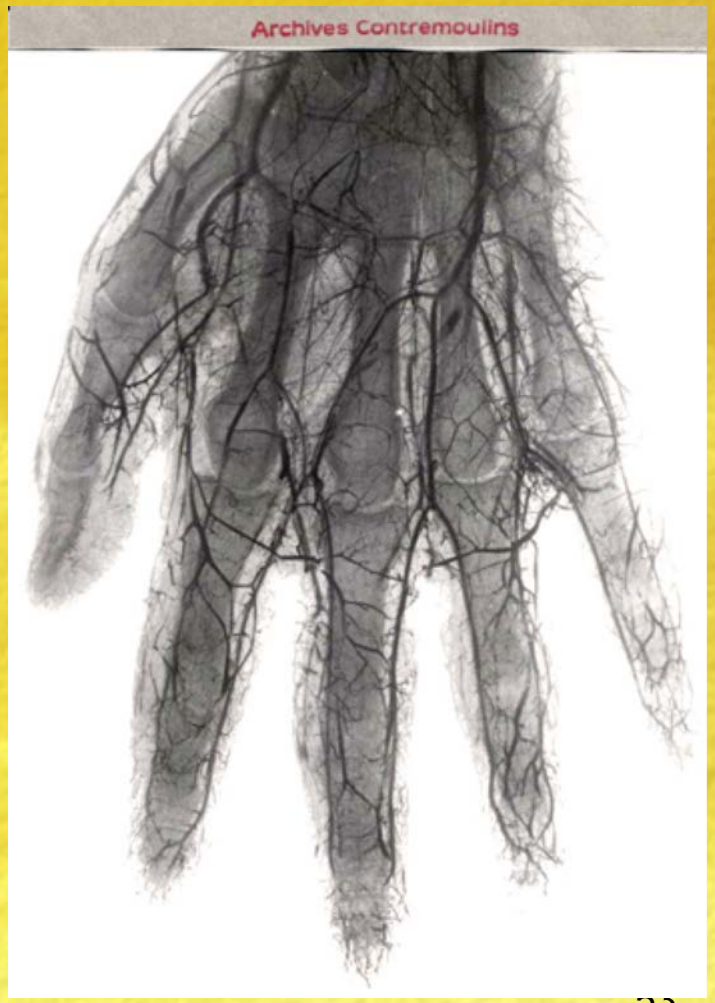


GASTON CONTREMOULINS (1869-1950) French radiographers' godfather

Mathias Duval early in 1896 created an academic laboratory dedicated to **histological radiology** headed by the surgeon **Charles Rémy** assisted with **Gaston Contremoulins**.

Their first communications at the Académie des Sciences are dated on July and November 1896.

- C. Rémy et G. Contremoulins : *Endographie crânienne* au moyen des rayons de M. Röntgen. Note présentée par M. Marey. C.R. de l'Académie des sciences. 27 juillet 1896.
- C. Rémy et G. Contremoulins : *Injections cadavériques rendant* les vaisseaux visibles sur les radiographies.Note présentée par Mr. Marey. Et *Emploi des rayons X pour les recherches* anatomiques, développement de l'ossification et évolution des dents. C.R. de l'Académie des sciences. 2 novembre 1896..



GASTON CONTREMOULINS

metroradio

Monthyon Prize’1897 of the Académie des sciences.

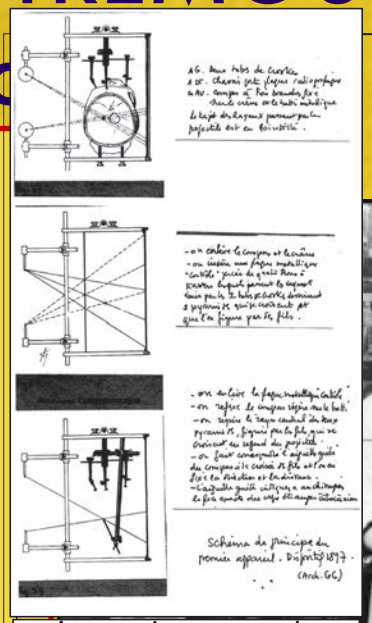


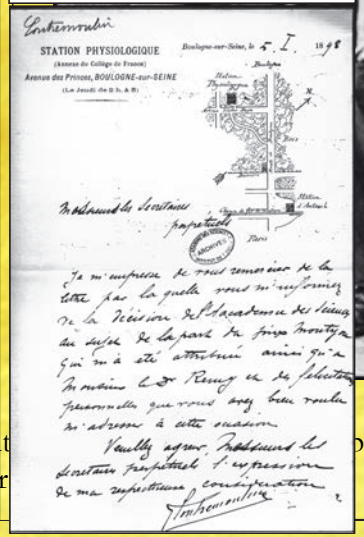
Schéma de principe du premier appareil. Dupontey 1897 (Arch. GC)

Le premier compas de Contremoulins en 1897

Du concept au Prix Monthyon.

Premier appareil de localisation et de recherche des corps étrangers du crâne. Modèle 1897. malade de Charles Rémy.

Le compas d'opération Contremoulins modèle 1897
Il comporte une colonne centrale sur laquelle se monte, à son extrémité inférieure, trois branches plates, orientables séparément. Un serrage axial immobilise simultanément les trois organes.



STATION PHYSIOLOGIQUE
(Annexe du Collège de France)
Avenue des Princes, BOULOGNE-sur-SEINE
(Les Jeudi, de 2 h. à 5)

Boulogne-sur-Seine, le 5 I 1898

Monsieur le Secrétaire perpétuel
Paris

Je m'empresse de vous remercier de la lettre par laquelle vous m'informez de la décision de l'Académie des Sciences au sujet de la part du prix Monthyon qui m'a été attribuée ainsi qu'à Monsieur le Dr Rémy et de la sélection pécuniaire que vous avez bien voulu m'adresser à cette occasion.

Veuillez agréer, Monsieur le Secrétaire perpétuel l'expression de ma respectueuse considération

Contremoulins

L'Illustration
22 novembre 1897

G. Cont… 1897
By cour…

GASTON CONTREMOULINS
radiographer at the Hôpital Necker of Paris
1898-1935

Minister Louis Barthou decided in 1897 to create four municipal laboratories of radiology at the Assistance publique à Paris.

They were headed by:

Londe at the Salpêtrière (1),

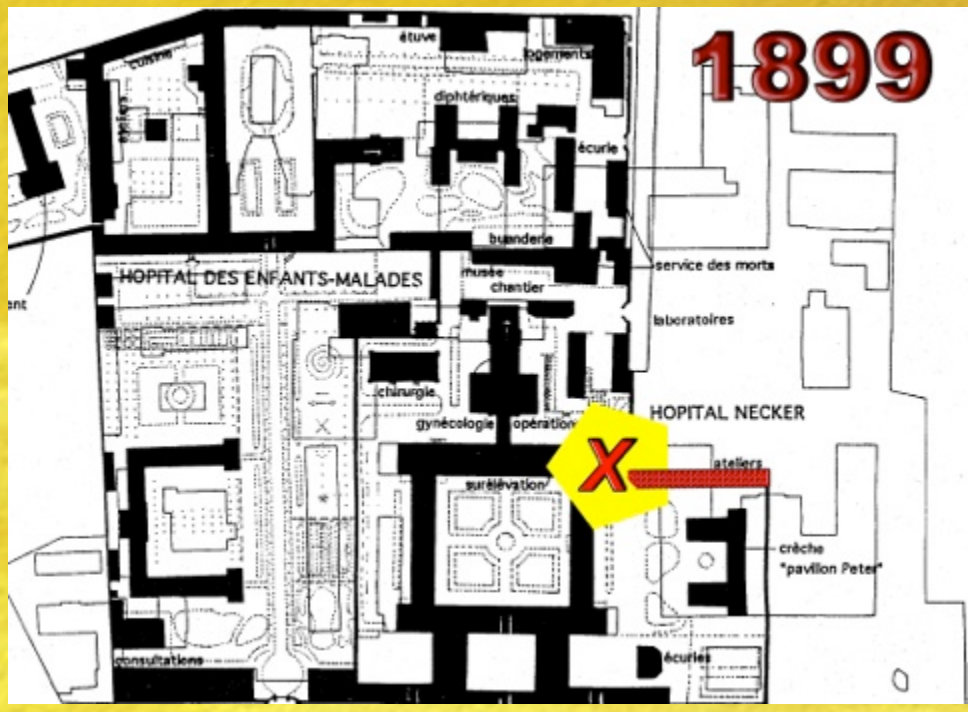
Dr. Leray at the Hospital Saint-Antoine (2),

Vaillant at the Hospital Cochin (3),

Contremoulins at the Hospital Necker (4).

GASTON CONTREMOULINS
radiographer at the Hôpital Necker of Paris
1898-1935

Supported by the urologist **Félix Guyon** and the surgeon **Auguste Le Dentu**, **Contremoulins** was recruited to head the lab to be built at the **Hôpital Necker** (X+red bar).



GASTON CONTREMOULINS

radiographer at the Hôpital Necker of Paris 1898-1935

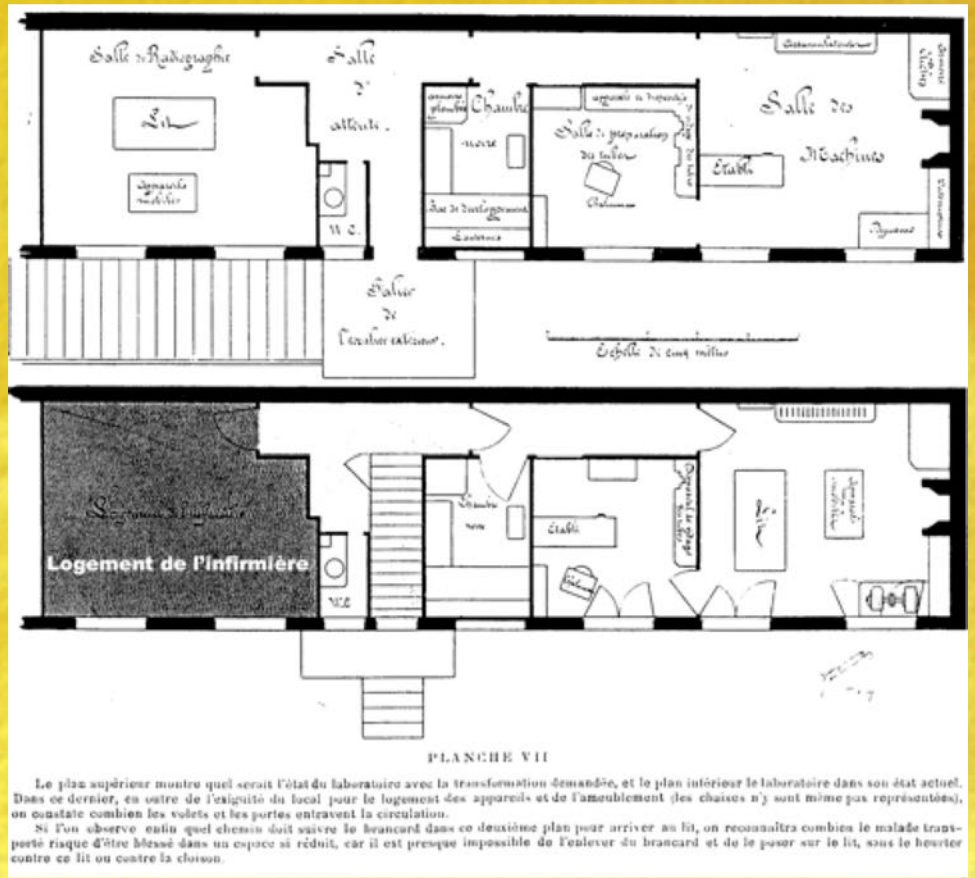
Contremoulins himself designed the ward opened in 1899 inside the Clinique Urologique.

There were two floors, one for medical radiology, the other for radiological technology. He was in charge of up to 18 hospitals and he invented a lot of devices and of techniques.

His laboratory soon had become the national reference and it was often visited by foreigners.

Rapport d'activité annuel, de 1898. Hôpital Necker : Organisation des services de radiologie Archives G. Contremoulins.

The lab was destroyed in 1965.



By courtesy of Dr P. Mornet

GASTON CONTREMOULINS

radiographer at the Hôpital Necker of Paris

1898-1935

By courtesy of Dr P. Mornet

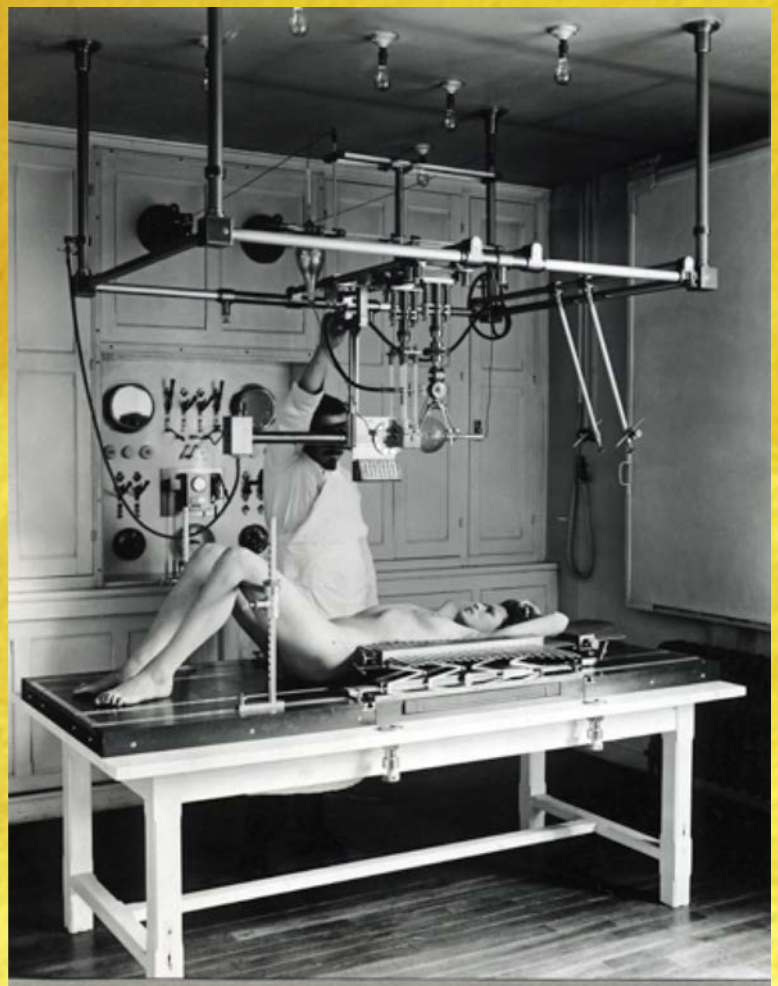


Fig. 37

Archives Contremoulins

Fig. 31

De droite à gauche : Au premier plan, fraiseuse disposée pour une taille d'engrenage. Au second plan tour parallèle équipé pour un filetage. Au troisième plan, établi de montage. Au fond, forge et enclume. En avant de la forge, petit tour d'horloger.

A gauche : Au premier plan, sur la table, pièces détachées d'une traverse métroradiographique et d'un tachy-décompteur disjoncteur en construction.

De droite à gauche: Au premier plan, fraiseuse disposée pour une taille d'engrenage.
Au second plan, tour parallèle équipé pour un filetage. Au troisième plan, établi de montage.
Au fond, forge et enclume. En avant de la forge, petit tour d'horloger.
A gauche: Au premier plan, sur la table, pièces détachées d'une traverse métroradiographique et d'un tachy-décompteur disjoncteur en construction.

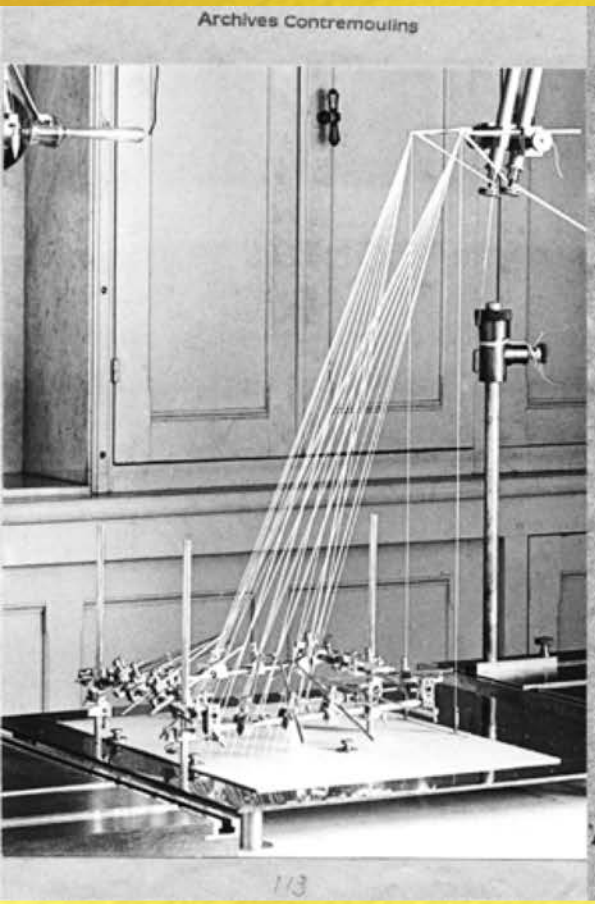
Archives Contremoulins

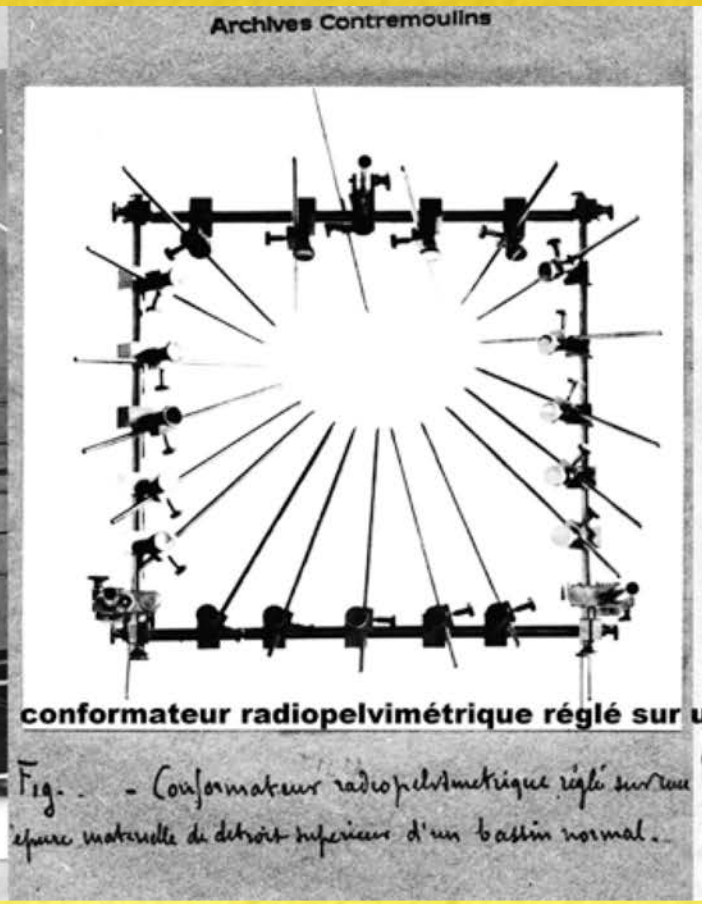
GASTON CONTREMOULINS

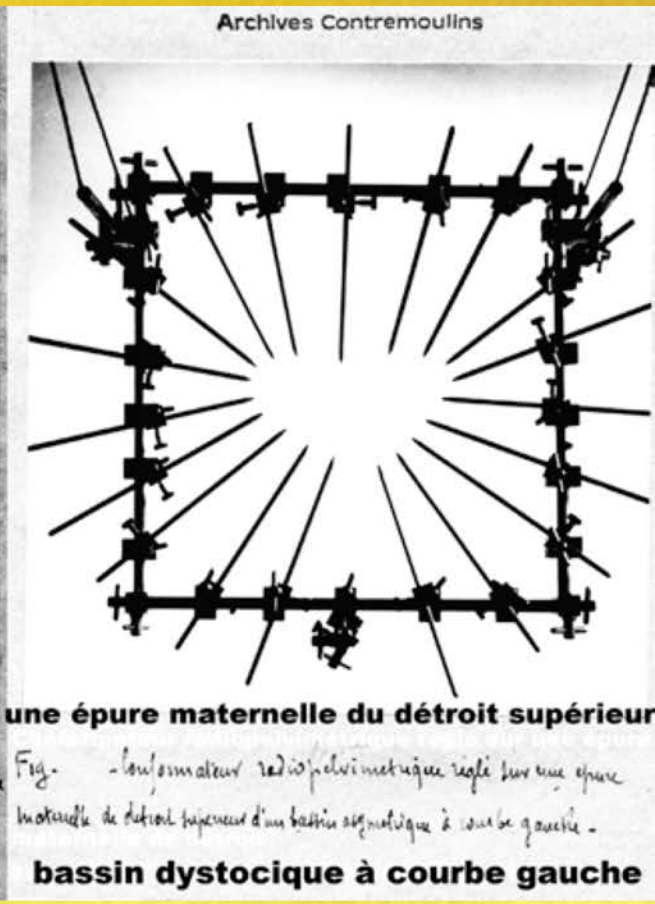
radiographer at the Hôpital Necker of Paris

1898-1935

By courtesy of Dr P. Mornet







Device for radiopelvimetry designed by Contremoulins

G. Contremoulins : *Radiographie : sur le contrôle prépondérant de la géométrie dans les examens topographiques*.
Note présentée par M. Édouard Perrier. Académie des sciences. 26 octobre 1908.

GASTON CONTREMOULINS

radiographer at the Hôpital Necker of Paris
1898-1935

Until MAREY's death in 1904, CONTREMOULINS had cordial relationship with ANTOINE BÉCLÈRE.

But, since 1905, **discrepancies between both French leaders** emerged when radiology was expanding and the toxicity of the ionizing radiations had become obvious. Too many scandals happened because of fakes performed by impostors and charlatans too.

GASTON CONTREMOULINS

radiographer at the Hôpital Necker of Paris
1898-1935

1908: Minister Georges Clemenceau created eight new municipal laboratories in Paris.

BÉCLÈRE, supported by the Académie de Médecine and Charles Bouchard, started a noisy lobbying campaing against **CONTREMOULINS** and **PUTHOMME** aiming **to suppress - even retrospectively - the radiographer's right to head a radiological lab in the hospitals**.

GASTON CONTREMOULINS

radiographer at the Hôpital Necker of Paris
1898-1935

Contremoulins was talented and proud of himself, and he had an excellent national reputation.

He refused to be headed by a medical supervisor in the lab he had created almost a decade ago and until then he was managing beautifully.

He reacted noisily featuring his own lobbying campaign.

GASTON CONTREMOULINS
radiographer at the Hôpital Necker of Paris
1898-1935

Contremoulins and Puthomme could save their positions because of the strong support brought by the Académie des Sciences

and the **workers' unions** lawful since 1904.

GASTON CONTREMOULINS

radiographer at the Hôpital Necker of Paris
1898-1935

The physicists Gabriel Lippmann
(method of reproducing colours in photography
Nobel Prize 1908)

and Paul Villard
(Gamma Rays' discoverer)

+ 30 non medical members of the Académie des Sciences

were the strongest supporters of Contremoulins and Puthomme.

GASTON CONTREMOULINS

radiographer at the Hôpital Necker of Paris
1898-1935

Since 1898 Contremoulins'deep involvement in the radioprotection of the wards and of their environment often conflicted with some institutional and private radiologists' pecuniary interests.

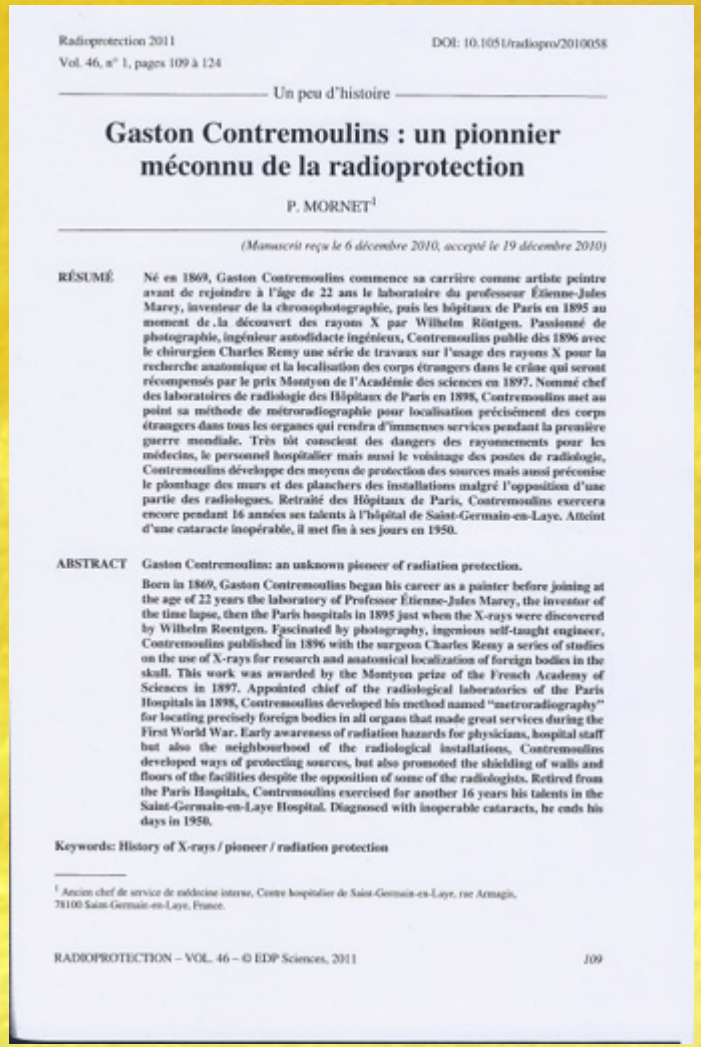
A new but last, and long, and tough medical fight targeting Contremoulins himself developed in all along the 1920ies.

CONTREMOULINS RADIOPROTECTIONNIST

After WW1, radiology boomed. The radiological performances were much improved by the powerful **Coolidge's tube** and the **Potter-Bucky's grid**.

CONTREMOULINS RADIOPROTECTIONNIST

Contremoulins demonstrated **the lack of safety in the X-ray's rooms and even far outside when the walls** were not built carefully without taking into account of the physical properties of the ionizing radiations.



Radioprotection 2011
Vol. 46, n° 1, pages 109 à 124
DOI: 10.1051/radiopro/2010058

Un peu d'histoire

Gaston Contremoulins : un pionnier méconnu de la radioprotection

P. MORNET[1]

(Manuscrit reçu le 6 décembre 2010, accepté le 19 décembre 2010)

RÉSUMÉ **Né en 1869, Gaston Contremoulins commence sa carrière comme artiste peintre avant de rejoindre à l'âge de 22 ans le laboratoire du professeur Étienne-Jules Marey, inventeur de la chronophotographie, puis les hôpitaux de Paris en 1895 au moment de la découvert des rayons X par Wilhelm Röntgen. Passionné de photographie, ingénieur autodidacte ingénieux, Contremoulins publie dès 1896 avec le chirurgien Charles Remy une série de travaux sur l'usage des rayons X pour la recherche anatomique et la localisation des corps étrangers dans le crâne qui seront récompensés par le prix Montyon de l'Académie des sciences en 1897. Nommé chef des laboratoires de radiologie des Hôpitaux de Paris en 1898, Contremoulins met au point sa méthode de métroradiographie pour localisation précisément des corps étrangers dans tous les organes qui rendra d'immenses services pendant la première guerre mondiale. Très tôt conscient des dangers des rayonnements pour les médecins, le personnel hospitalier mais aussi le voisinage des postes de radiologie, Contremoulins développe des moyens de protection des sources mais aussi préconise le plombage des murs et des planchers des installations malgré l'opposition d'une partie des radiologues. Retraité des Hôpitaux de Paris, Contremoulins exercera encore pendant 16 années ses talents à l'hôpital de Saint-Germain-en-Laye. Atteint d'une cataracte inopérable, il met fin à ses jours en 1950.**

ABSTRACT **Gaston Contremoulins: an unknown pioneer of radiation protection.**

Born in 1869, Gaston Contremoulins began his career as a painter before joining at the age of 22 years the laboratory of Professor Étienne-Jules Marey, the inventor of the time lapse, then the Paris hospitals in 1895 just when the X-rays were discovered by Wilhelm Roentgen. Fascinated by photography, ingenious self-taught engineer, Contremoulins published in 1896 with the surgeon Charles Remy a series of studies on the use of X-rays for research and anatomical localization of foreign bodies in the skull. This work was awarded by the Montyon prize of the French Academy of Sciences in 1897. Appointed chief of the radiological laboratories of the Paris Hospitals in 1898, Contremoulins developed his method named "metroradiography" for locating precisely foreign bodies in all organs that made great services during the First World War. Early awareness of radiation hazards for physicians, hospital staff but also the neighbourhood of the radiological installations, Contremoulins developed ways of protecting sources, but also promoted the shielding of walls and floors of the facilities despite the opposition of some of the radiologists. Retired from the Paris Hospitals, Contremoulins exercised for another 16 years his talents in the Saint-Germain-en-Laye Hospital. Diagnosed with inoperable cataracts, he ends his days in 1950.

Keywords: History of X-rays / pioneer / radiation protection

[1] Ancien chef de service de médecine interne, Centre hospitalier de Saint-Germain-en-Laye, rue Armagis, 78100 Saint-Germain-en-Laye, France.

GASTON CONTREMOULINS
radiographer at the Hôpital Necker of Paris
1898-1935

Likely because **Contremoulins** was more interested in radiography than in fluoroscopy and because he didn't practice radiotherapy and radiumtherapy,
he didn't develop any severe radiation damage (just a minimal superficial radionecrosis of one thumb).
According to his records and Dariaux's report (1946), his team - including **Puthomme** - worked safely in his lab.

GASTON CONTREMOULINS

radiographer at the Hôpital Necker of Paris
1898-1935

At the contrary, at the Salpêtrière, Londe's successor **Charles Infroid** and several radiographers developed severe even lethal corporeal **radiation** damages.

Dr Leray, at the Saint-Antoine, died in 1921 because of the so-called **"mal des rayons"** (malignant haemopathies).

GASTON CONTREMOULINS
radiographer at the Hôpital Necker of Paris
Radioprotection.

1920ies: new but last rude medical fight targeting Contremoulins himself started because of his early and deep and consistent involvement in environmental radioprotection of the persons inside and outside the X-ray's sources.

P. Mornet : *Gaston Contremoulins : pionnier méconnu de la radioprotection*. Club Histoire de la société française de radioprotection. Bulletin d' information n° 22, avril 2009.

GASTON CONTREMOULINS
radiographer at the Hôpital Necker of Paris
Radioprotection.

In the early fall 1929 for the first time publicly, a noisy press campaign opposed Contremoulins to the Béclère's radiological school.

Like in 1907 Contremoulins was urged to resign his lab headship.

G. Contremoulins : Mesures de protection contre les rayons X dans les pays étrangers, depuis 1922. Archives G. Contremoulins, 1928).

G. Contremoulins : A propos de la protection des tiers contre les rayons X. Rapport annuel du laboratoire principal de radiologie de Necker. 1929.

Le Matin : Contre le danger des rayons X, le public n'est pas défendu. 14 et 18 septembre 1929.

Le Matin : La défense du public contre les dangers des rayons X. Intervention de M. Alexandre. 19 septembre1929.

Le Matin : Une opinion rassurante sur les rayons X : seule la radioscopie est dangereuse pour les opérateurs, par le Dr Foveau de Courmelles. 26 septembre 1929.

Le Siècle médical : Les rayons X ne sont pas un danger pour le voisinage, par M. Maingot, électroradiologiste de l'hôpital Laennec. 1e octobre 1929

L'Intransigeant : Les rayons X sont-ils dangereux pour les voisins ? Non, répond la Science. Dr Duhem. 4 octobre 1929.

Le Siècle médical : Le danger des rayons X pour les voisins n'est pas un mythe. G. Contremoulins. 1e novembre 1929.

GASTON CONTREMOULINS
radiographer at the Hôpital Necker of Paris
Radioprotection.

The Académie des Sciences had become less supportive than in 1907 but **Maurice de Broglie** published a moderate editorial in the regular press.

Le Matin : Le danger des rayons X : l' avis de M. Maurice de Broglie, de l' Académie des sciences. 23 septembre1929.

The Necher's surgeon **Dr. Maurice Robineau** was his best defender .

Maurice Robineau et Anselme Schwartz : Les dangers d' un monopole. L' utilisation des rayons X chez l' homme. Radiologie médicale. Radiologie scientifique. 3 mai 1929 (Archives Contremoulins).l

October 28th, 1929, "Black Monday" happened and the campaign stopped (coincidentally?) in November 1929!

A city commission was appointed by Préfet de Paris, Mr. Chiappe.

Le Matin : L' emploi des rayons X dans les locaux d' habitation. M. Chiappe, préfet de police, a nommé une commission.20 novembre 1929

No opened report had been available.

GASTON CONTREMOULINS
noble end at St-Germain-en-laye

In fine, because of his outstanding national and international reputation and competence, **Contremoulins** remained on place at the Hôpital Necker until his legal retirement in 1935.

Thereafter he was invited to work at the **Hôpital de Saint-Germain-en-Laye** where he practiced radiographies and orthopaedics.

He created **a school of technologists** that nowadays is still prosperous.

GASTON CONTREMOULINS
noble end at St-Germain-en-laye

Contremoulins wrote and printed his Memoirs in 1943 but he couldn't find a publisher. x1

He committed suicide in 1950 because he had become fully blind and he fell to be useless. x2

There is a *Rue Gaston Contremoulins* in the city of Sotteville-lès-Rouen. **x3**

His legacy was transmitted to Mrs **Andrée Madou** (†) **x4** then to **Dr. Patrick Mornet x5** (ISHRAD member).

By courtesy of Dr. P. Mornet

GASTON CONTREMOULINS
FINAL CONSEQUENCES AFTER 1935

1. **Radiology has been practiced in France by MDs only**. The first university chair was created in 1947. A university certificate of electro-radiology was created after WW2.

2. **There have been no more independant "radiographers" in France contrary to the Anglo-Saxon countries.** Contremoulins and Puthomme were the last ones.

3. **The radiologists have been assisted by technologists** (manipulateur/trice de radiologie) who still have minimal decisional power on the medico-radiological applications. Until the 1960ies, they had to be nurse-qualified before they had to spend a third year at school to be subspecialized in electroradiology and to obtain the official diploma.

GASTON CONTREMOULINS

FINAL CONSEQUENCES UNTIL TO-DAY

4. The memory of Contremoulins vanished totally for a long while, specially at the Hôpital Necker, because of a silent conspiracy decided by Béclère's school and his medical successors.

However, Contremoulins'memory took benefit of some resuscitation by motivated medical radiologists at the end of XXth century: **Dr Charles Pizon**, in 1970, **Dr. Guy & Marie-Josée Pallardy** in 1989, and **Dr. Claude Marsault** in 1995.

GASTON CONTREMOULINS

FINAL CONSEQUENCES UNTIL TO-DAY

4. The memory of Contremoulins vanished totally for a long while, even at the Hôpital Necker.

"*I,Jean-François Moreau, honorary chairman of the department of radiology of the Hospital Necker, who spent my academic life mostly there (1971-2006), never heard of him until 1998.*

I discovered his bright past when I was committed to write the history of medical imaging in the hospitals of the Université Paris 5 René Descartes [nowadays Université Paris Descartes]…

"I couldn't benefit from those centenary lessons when I reshaped the department in 1989. Otherwise I would have mind of an associate lab inspired by Contremoulins' technological spirit." Personal statement, 15 April 2012.

GASTON CONTREMOULINS

FINAL CONSEQUENCES UNTIL TO-DAY

5. Historical works on Contremoulins' genius and innovating character started in 1983 at the school of Saint-Germain-en-Laye by both "radiographers" Marie-Josée Watremez and Jean-Claude Stolaric.

Dr. Patrick Mornet, an ISHRAD member, is looking for a publisher interested in his **Contremoulins' biography** compensating the vanishing own **Contremoulins' memoirs** (2 volumes printed in 1943 but not published because of WW2 constraints).

6. Gaston Contremoulins should be sacred "moral godfather" of all radiographers worldwide like Mrs K. C. Clark had been sacred after the first edition of her blockbuster book in 1939.

The early French Elite

Physicists

Marie Curie (1867-1934) and the stages of the discovery of radioactivity.

Arsène d'Arsonval (1851-1940): electrophysiology.

Paul Langevin (1870-1946): ultrasound - sonar…

et al.

The French scientific background was ready to welcome X-rays as early as **1895**.

- 1895: in his doctorate thesis on **magnetism**, **Pierre Curie** demonstrated the **piezo-electric effect**. (*Lois expérimentales du magnétisme. Propriétés magnétiques des corps à diverses températures*. Ann Chim Phys. 1895;5:289-405)

- 30 Dec 1895 : **Jean Perrin** demonstrated that the **cathodic rays** are **electronic**. (*Nouvelles propriétés des rayons cathodiques*. CR Acad Sci. 1895;121:1130-1134)

J. Perrin, P. Curie and W.C. Röntgen influenced Henri Becquerel on the way to the discovery of radioactivity: the uranic rays.

1896: **Henri Becquerel**.
Sur les radiations émises par phosphorescence.
CR Acad. Sci 1896, 122:420-421.

1898: **Pierre & Marie Curie**.
Sur une substance nouvelle radio-active contenue dans la pechblende. C R Acad Sci 1898, 127:175–178.

Three French Nobel Prizes at the origin of **nuclear medicine**.

- 1904: **Henri Becquerel, Pierre & Marie Curie** (natural radioactivity).
- 1911: **Marie Curie** (polonium and radium chemistry).
- 1935: **Frédéric & Irène Joliot-Curie** (artificial radioactivity).

MARIE CURIE (1867-1934)

Physicist, Chemist, Biologist, Radiation oncologist, Radiographer
She participated in the 1st Solvay Conference, Brussels, 1911.

Seated (L-R): Walther Nernst, Marcel Brillouin, Ernest Solvay, Hendrik Lorentz, Emil Warburg, **Jean Baptiste Perrin**, Wilhelm Wien, **Marie Curie**, and **Henri Poincaré**.

Standing (L-R): Robert Goldschmidt, Max Planck, Heinrich Rubens, Arnold Sommerfeld, Frederick Lindemann, **Maurice de Broglie**, Martin Knudsen, Friedrich Hasenöhrl, Georges Hostelet, Edouard Herzen, James Hopwood Jeans, Ernest Rutherford, Heike Kamerlingh Onnes, Albert Einstein, and **Paul Langevin**.

Photograph of participants at the first Solvay Conference, in 1911, Brussels, Belgium.
Photography by Benjamin Couprie

MARIE CURIE (1867-1934)

Radiographer during World War 1: radiologic ambulance “Petite Curie”

Musée Curie - archives

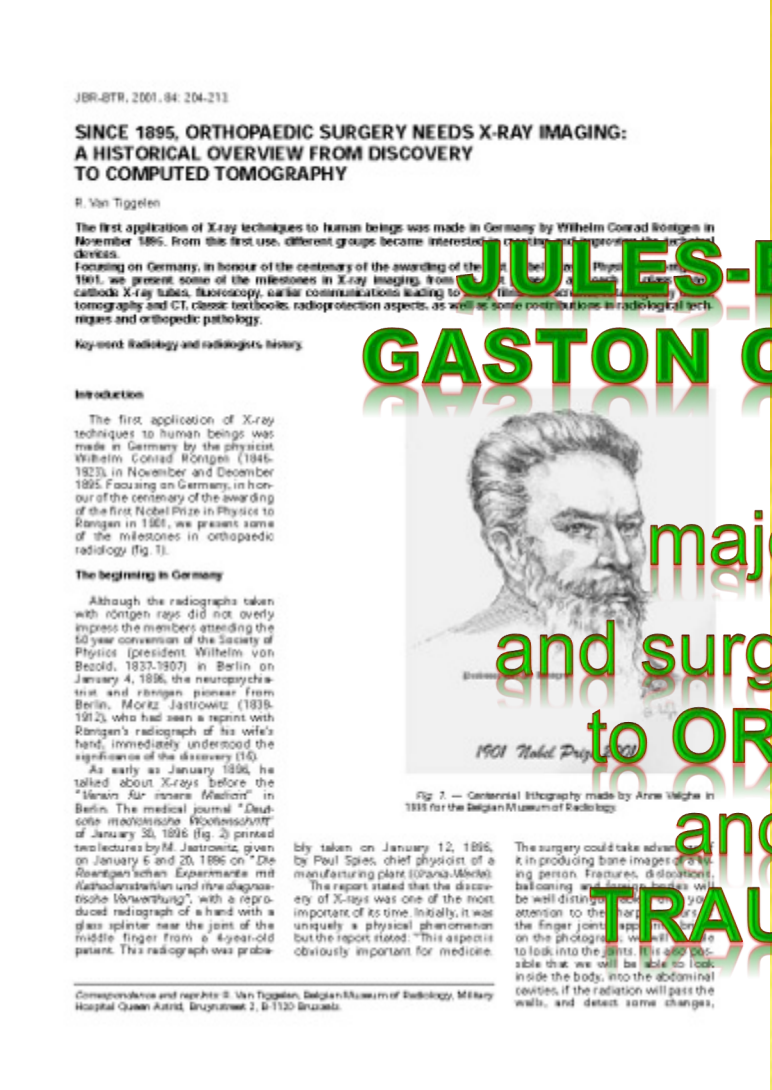
3.3
RADIOLOGY AND SURGERY

Orthopaedics and traumatology

Warrior's disease

Urology

RADIOLOGY AND SURGERY



JBR-BTR, 2001, 84: 204-213

SINCE 1895, ORTHOPAEDIC SURGERY NEEDS X-RAY IMAGING: A HISTORICAL OVERVIEW FROM DISCOVERY TO COMPUTED TOMOGRAPHY

R. Van Tiggelen

The first application of X-ray techniques to human beings was made in Germany by Wilhelm Conrad Röntgen in November 1895. From this first use, different groups became interested in [illegible] improved the medical devices.
Focusing on Germany, in honour of the centenary of the awarding of the [illegible] Physics [illegible] 1901, we present some of the milestones in X-ray imaging, from [illegible] cathode X-ray tubes, fluoroscopy, earlier communications leading to [illegible] tomography and CT, classic textbooks, radioprotection aspects, as well as some contributions in radiological techniques and orthopedic pathology.

Key-word: Radiology and radiologists history.

Introduction

The first application of X-ray techniques to human beings was made in Germany by the physicist Wilhelm Conrad Röntgen (1845-1923), in November and December 1895. Focusing on Germany, in honour of the centenary of the awarding of the first Nobel Prize in Physics to Röntgen in 1901, we present some of the milestones in orthopaedic radiology (fig. 1).

The beginning in Germany

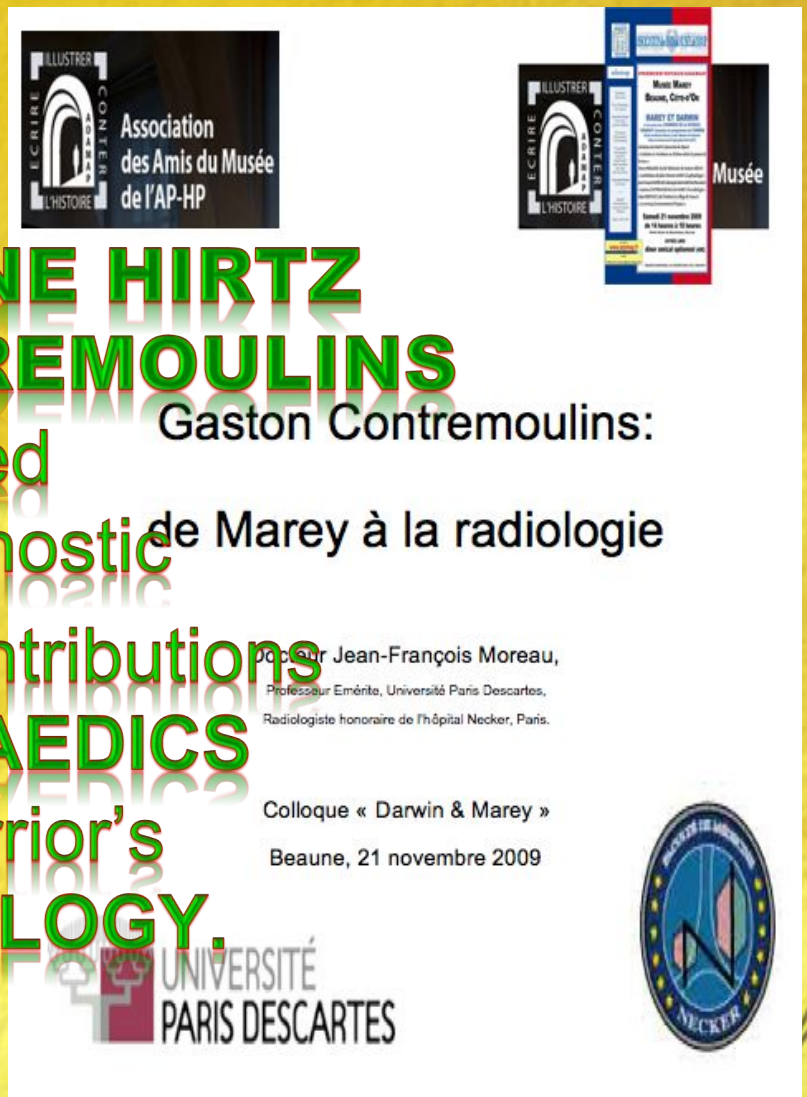
Although the radiographs taken with röntgen rays did not overly impress the members attending the 66 year convention of the Society of Physics (president: Wilhelm von Beezold, 1837-1907) in Berlin on January 4, 1896, the neuropsychiatrist and röntgen pioneer from Berlin, Moritz Jastrowitz (1839-1912), who had seen a reprint with Röntgen's radiograph of his wife's hand, immediately understood the significance of the discovery (14).

As early as January 1896, he talked about X-rays before the "*Verein für innere Medicin*" in Berlin. The medical journal "*Deutsche medicinische Wochenschrift*" of January 30, 1896 (fig. 2) printed two lectures by M. Jastrowitz, given on January 6 and 20, 1896 on "*Die Röntgen'schen Experimente mit Kathodenstrahlen und ihre diagnostische Verwerthung*", with a reproduced radiograph of a hand with a glass splinter near the joint of the middle finger from a 4-year-old patient. This radiograph was probably taken on January 12, 1896, by Paul Spies, chief physicist of a manufacturing plant (Opana-Werke).

The report stated that the discovery of X-rays was one of the most important of its time. Initially, it was uniquely a physical phenomenon but the report stated: "This aspect is obviously important for medicine. The surgery could take advantage of it in producing bone images of a living person. Fractures, dislocations, ballooning and foreign bodies will be well distinguished. [illegible] attention to the [illegible] the finger joints [illegible] on the photograph, we will [illegible] to look into the joints. It is also possible that we will be able to look inside the body, into the abdominal cavities, if the radiation will pass the walls, and detect some changes,

Correspondence and reprints: R. Van Tiggelen, Belgian Museum of Radiology, Military Hospital Queen Astrid, Bruyninckx 2, B-1120 Brussels.

Fig. 2. — Centennial lithography made by Anne Weighe in 1995 for the Belgian Museum of Radiology.



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Musée

Gaston Contremoulins:

de Marey à la radiologie

Docteur Jean-François Moreau,

Professeur Emérite, Université Paris Descartes,

Radiologiste honoraire de l'hôpital Necker, Paris.

Colloque « Darwin & Marey »

Beaune, 21 novembre 2009

UNIVERSITÉ PARIS DESCARTES

NECKER

JULES-EUGÈNE HIRTZ
GASTON CONTREMOULINS
provided
major diagnostic
and surgical contributions
to **ORTHOPAEDICS**
and to warrior's
TRAUMATOLOGY.

General Eugène Hirtz (1869-1934) 1st French military radiologist Val-de-Grâce, Paris

- In 1920, Médecin-Général Jules-Eugène Hirtz headed the first academic chair of radiology in France at the **École d'application de la médecine militaire au Val-de-Grâce**.
- R. Kohn. *L'activité scientifique des médecins juifs en France depuis 1789*. In:G. Freudenthal, S. Kotten. *Mélange d'histoire de la médecine hébraïque*. Brill, NL, 1985. p. 282.
- **Hirtz created the first military school for the training of non medical radiographers supervised by Marie Curie at the Val-de-Grâce.**
- J.-J. Ferrandis, A. Ségal. *L'essor de la radiologie osseuse pendant la guerre de 1914-1918.* Rhumatologie Pratique I octobre 2009. Médecine

General Eugène Hirtz
1st French military radiologist

- Looking for foreign body Hirtz invented a compass simpler but less precise than that of Contremoulins.
- Kirmisson E. *De l'emploi du compas Contremoulins réglé d'après une localisation radioscopique utilisant un rayon normal vertical*. Routier, Delorme, Kirmisson, Reynier, *Discussion*. Bull. Acad Nat Méd 1917; 77:522-526.

E.J. Hirtz. *Localisation et extraction des projectiles intracérébraux.* Presse méd. 17 juillet 1916. (courtesy of Laurent Provost)

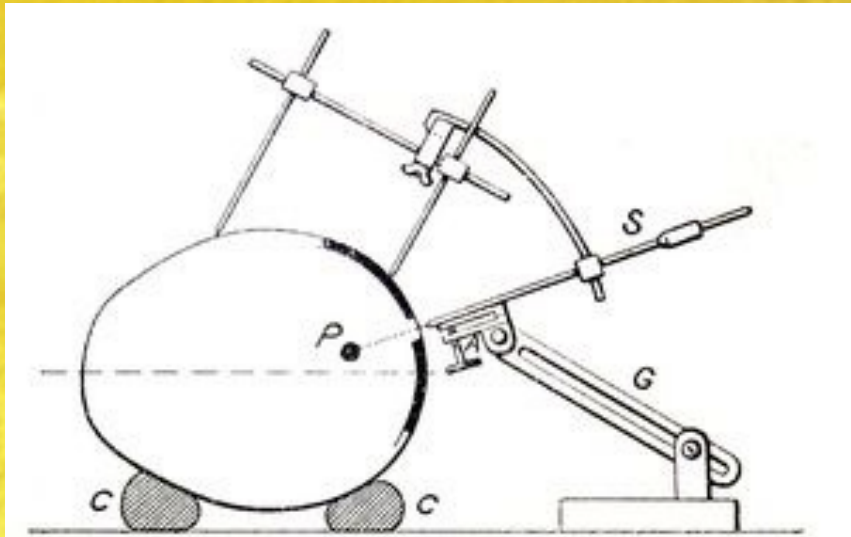


Figure 3.

GASTON CONTREMOULINS
innovations in orthopaedic surgery

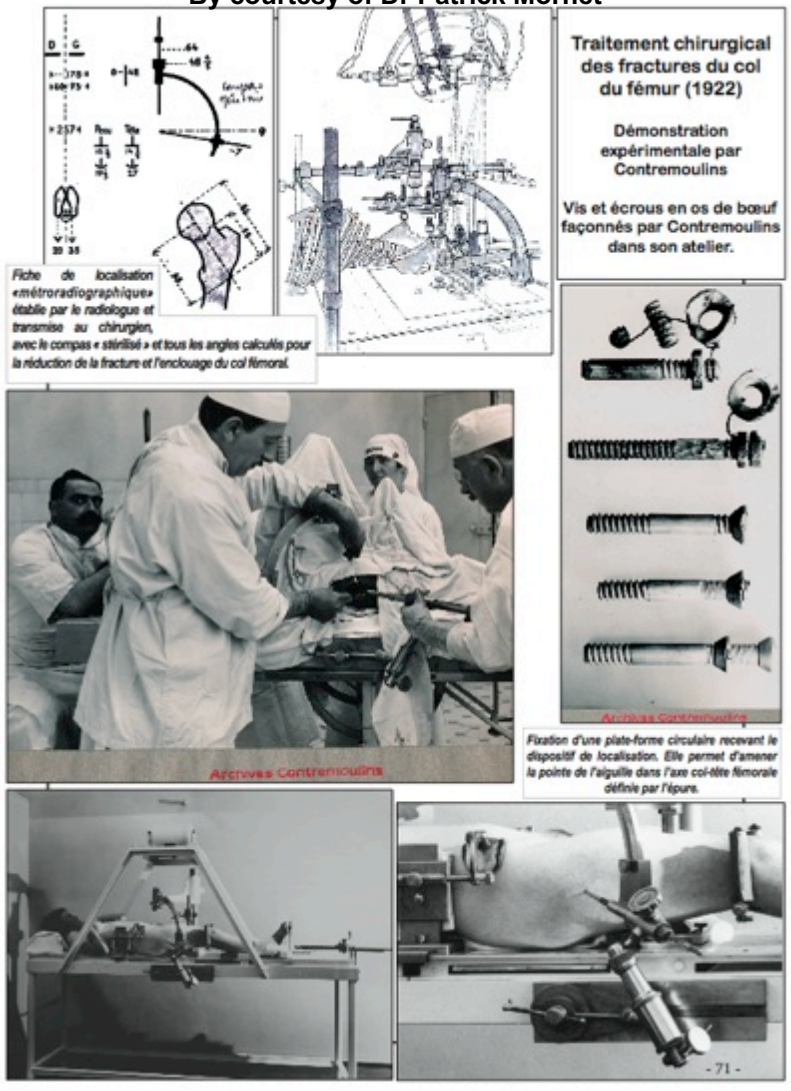
At the Hospital Necker then at St-Germain-en-laye, Contremoulins fitted more with the surgeons than with the other doctors.

The most important contribution Contremoulins offered to the surgeons, Pierre Delbet first, then Maurice Robineau, was his skilled ability to invent tailored tools adapted to the newly developing orthopaedic surgery including bone grafting and prostheses after WW1.

Because of his sophisticated metroradiology he could enable Robineau to perform the first osteosynthesis of the fractures of the femoral neck using the screws designed by Contremoulins.

Dr. Robineau's staff in 1929

By courtesy of Dr Patrick Mornet



3.3
RADIOLOGY AND SURGERY
UROLOGY

DR. JOACHIM ALBARRAN
DR. THÉODORE TUFFIER

GASTON CONTREMOULINS

PROVIDED EARLY
MAJOR DIAGNOSTIC CONTRIBUTIONS
TO UROLOGY.

JF MOREAU, ONE CENTURY OF URORADIOLOGY IN EUROPE, ISHRAD

JOAQUIN ALBARRAN (1860-1912)
1st successor of Félix Guyon
a genious inventor at the Hospital Necker

Genious Cubano-Hispano-French scientist

urologist, pathologist, physiologist,

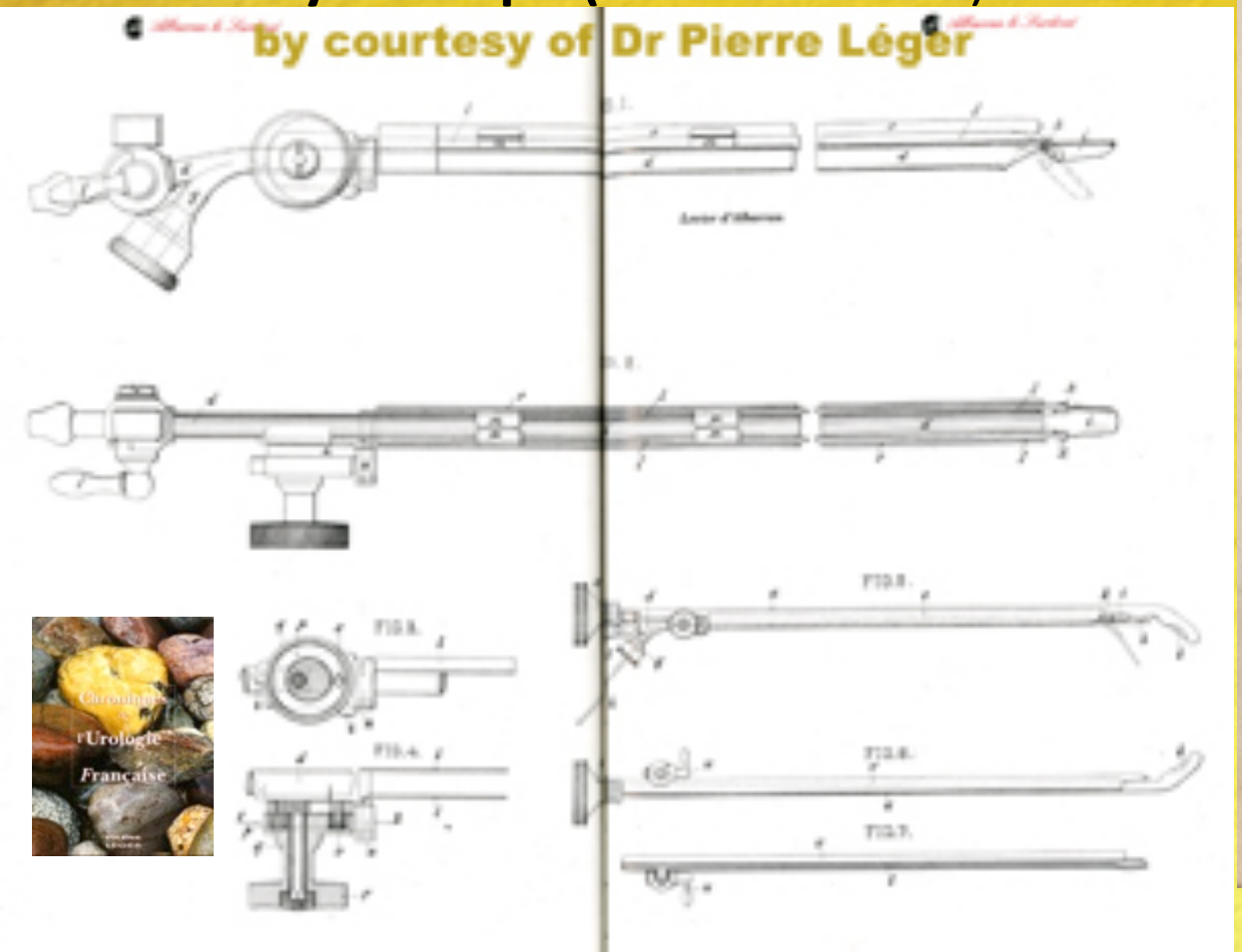
FIRST URORADIOLOGIST

published with

Contremoulins.

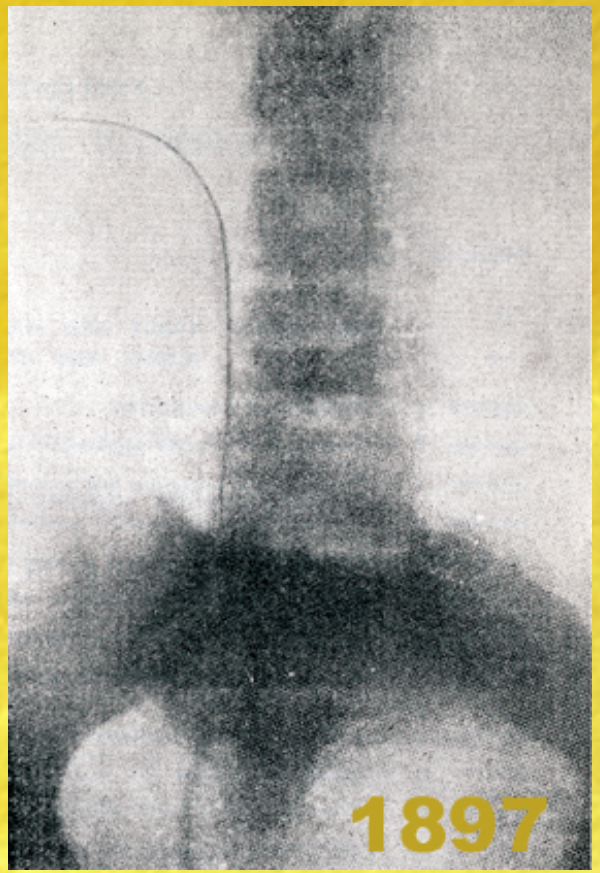
JOAQUIN ALBARRAN (1860-1912)

1897 : with Imbert, he invented
a new cystoscope (Albarrán lever).



THÉODORE TUFFIER (1859-1929)

- In 1897-99, using such an Albarran's **cystoscope**,
- the surgeon **Théodore Tuffier**
- passed **radiopaque catheters** in the **ureter**
- through the ureteral meatus.



Joaquin Albarran (1897-1912)
a genious precursor

He promoted the use of several **fluid contrast media** to perform better surgical operations on the upper urinary tract

under **pyeloscopy**

and **pyelography**.