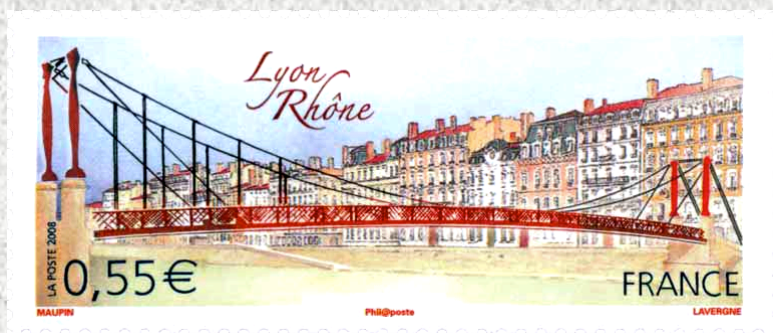




Lyon 1



VILLE DE LYON



# A thick layer of History for Thin-Layer Chromatography

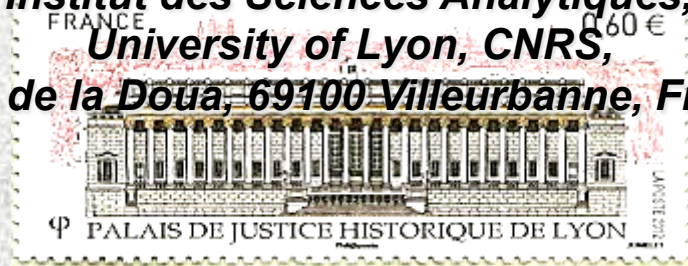
A welcome lecture introducing HPTLC 2014 in LYON

by

Alain Berthod



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# Outline

- Geographical and demographic situation
- History (a thick layer)
  - The foundation of Lyon by the Romans
  - Lyon, capital of Gauls
  - Medieval era
  - XVI and XVII<sup>th</sup> centuries
  - XVIII and XIX<sup>th</sup> centuries
  - Modern era
- Chromatography (a thin layer)



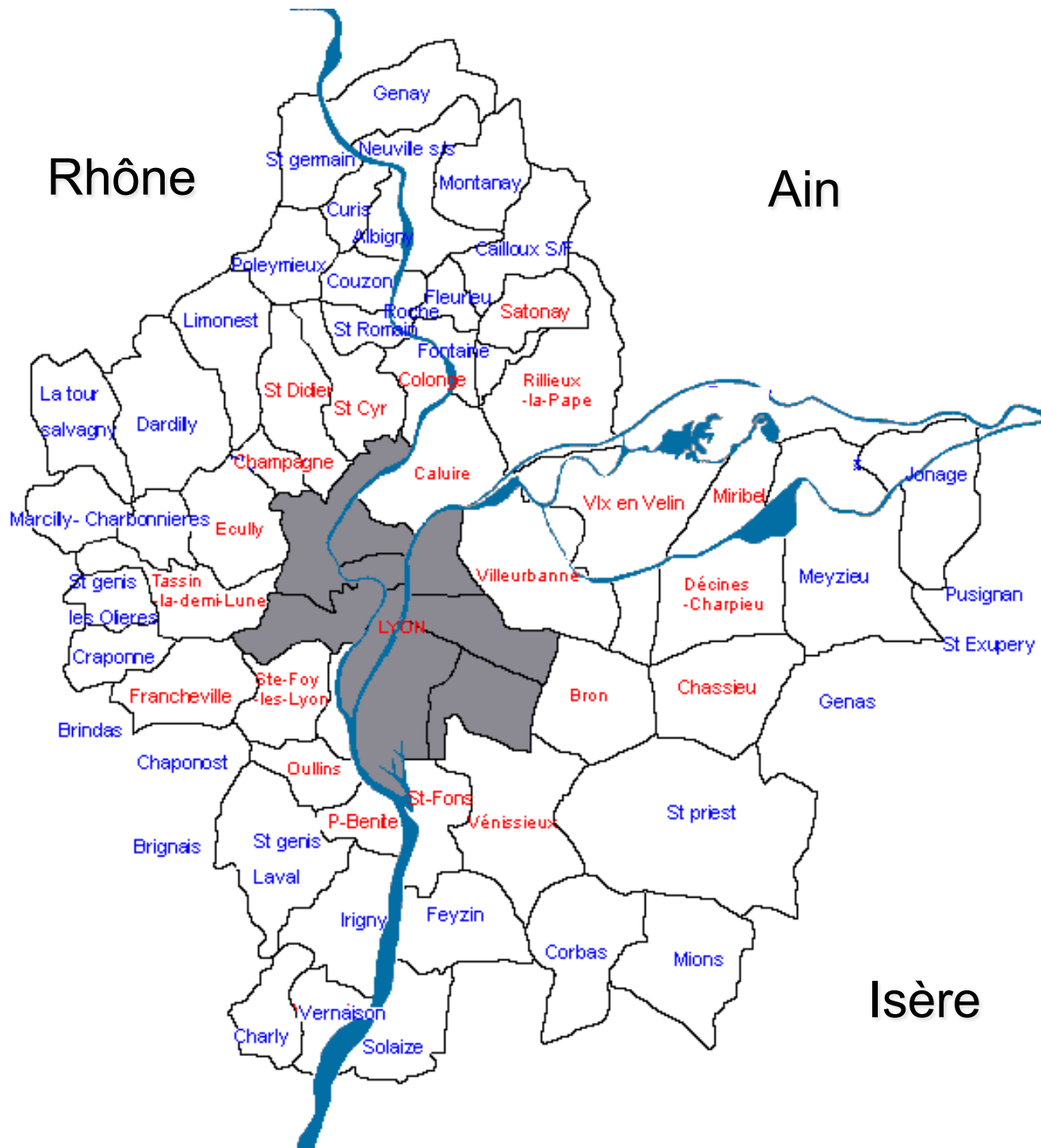


Lyon 1

# LYON in FRANCE

Rhône-Alpes area  
6.3 million people  
**Lyon 500,000 p.**  
COURLY  
1.6 million people  
World Headquarter  
of Interpol





**GRAND LYON** or **COURLY**, the Communauté Urbaine de Lyon gathers 59 towns with 1.6 million people on 534 km<sup>2</sup>.

Including:

- Villeurbanne, 150,000 p.
- Vénissieux, 60,000 p.
- Vaulx en Velin 42,000 p.
- Caluire, 42,000 p.
- St Priest, 42,000 p.
- Bron, 39,000 p.
- Meyzieux, 31,000 p.
- Rillieux, 30,000 p.
- Décines, 26,000 p.
- Oullins, 25,000 p.



# A thick layer of History

- On a site where Gaul local chiefs gathered and worshiped the god Lug, Lucius Plancus (87-15 BC) established on **October 9, 43 BC** a Roman colony named Lugdunon or, in latin, Lugdunum.
- In 27 BC, Agrippa, son-in-law of emperor Augustus, divided Gaul in three provinces, with Lugdunum as the capital of the three Gauls.



1957 French stamp for the 2000 years of Lyon.

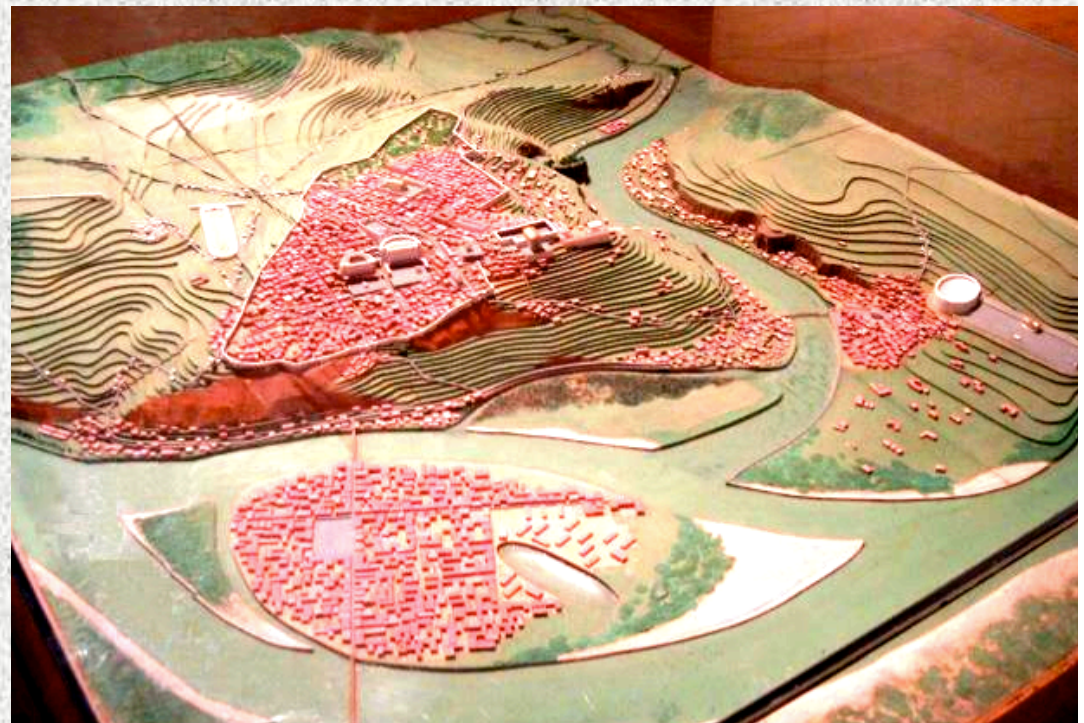
# Roman Lugdunum



Roman denier with Claudius Augustus head and four horses on tails, 50 AD.

- Claude was born in 10 BC in Lugdunum, becoming Emperor for 13 years from 41 AD till his death in 54 AD.

- Lugdunum developed in a city of 80,000 on the Fourviere hill and surrounding area.



# Roman Lugdunum

- Three amphitheaters are still visible today in Lyon.
- Impressive remnants of the 40 km long aqueduct bringing fresh water to the top of the hill can be visited.



# First Christians in Gaul

- As Peter, the first Christian pope, went to Rome, capital of the Antique world,
- In the early II century, the first Christians settled in Lugdunum, capital of the Gauls, to be executed as Martyrs.



St Pothin, first bishop in Gaul, executed as a martyr in 177.

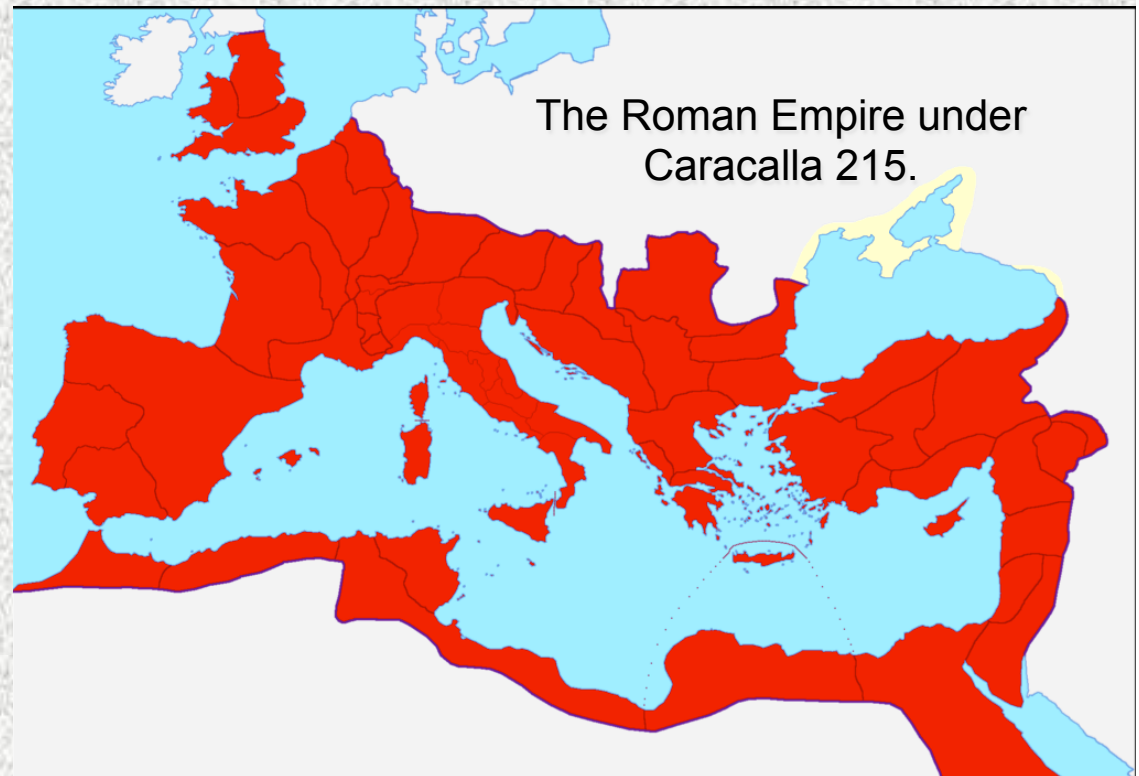




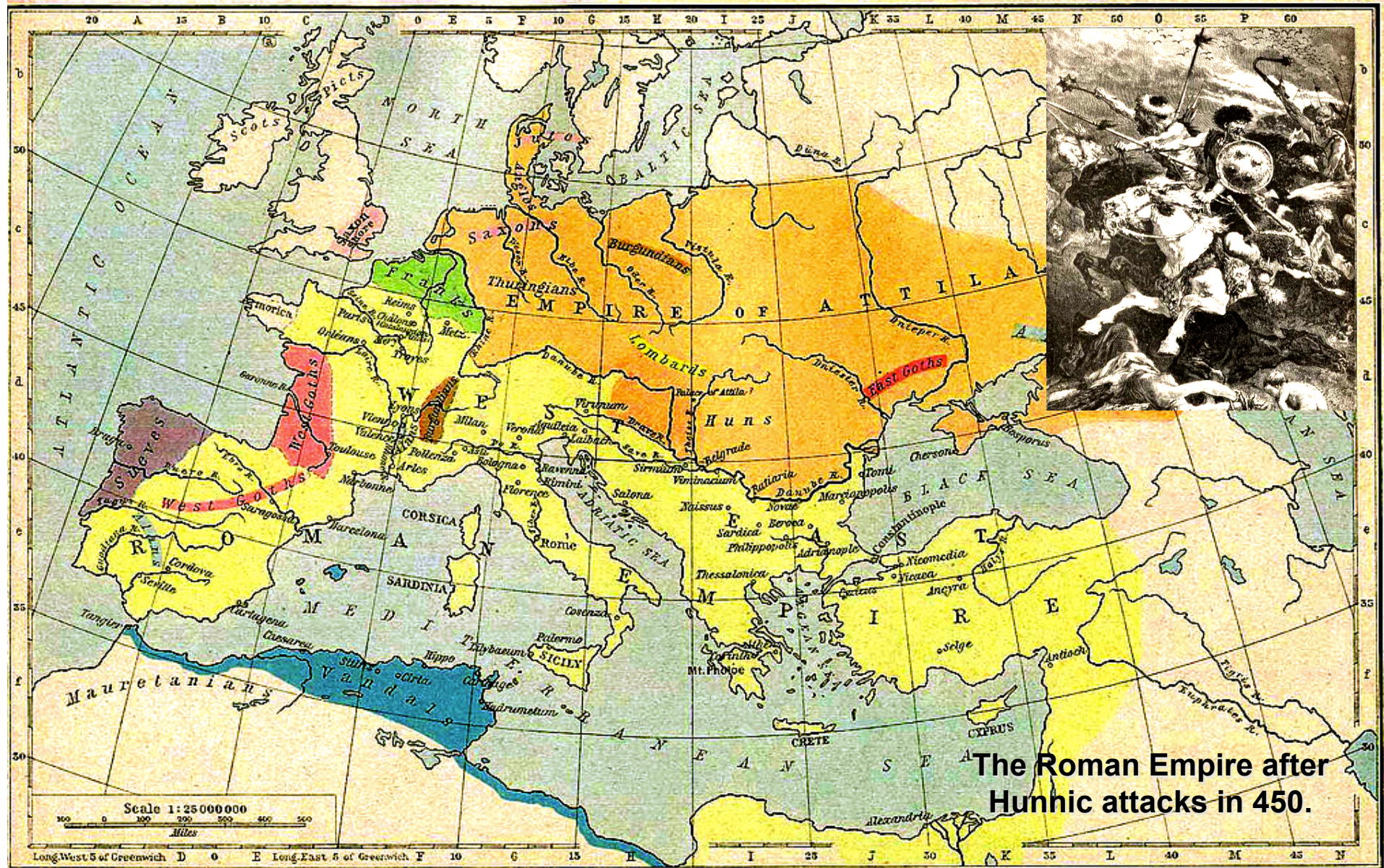
# Late Roman Empire



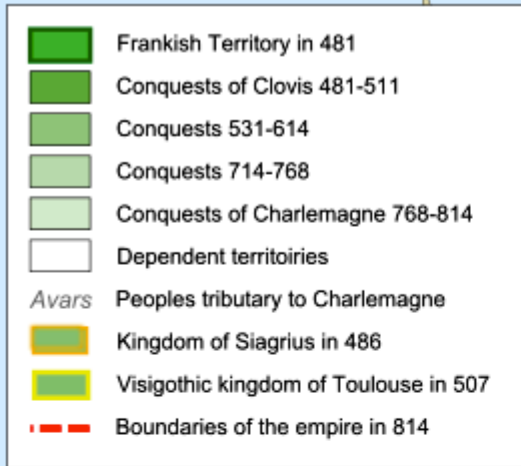
- Caracalla, born in Lyon 188, was Emperor from 198 to 217. He was 10 when his sick father, Septimius Severus, associated him as head of the Empire.
- He murdered his brother Geta in 211, being himself assassinated in 217 at age 29.



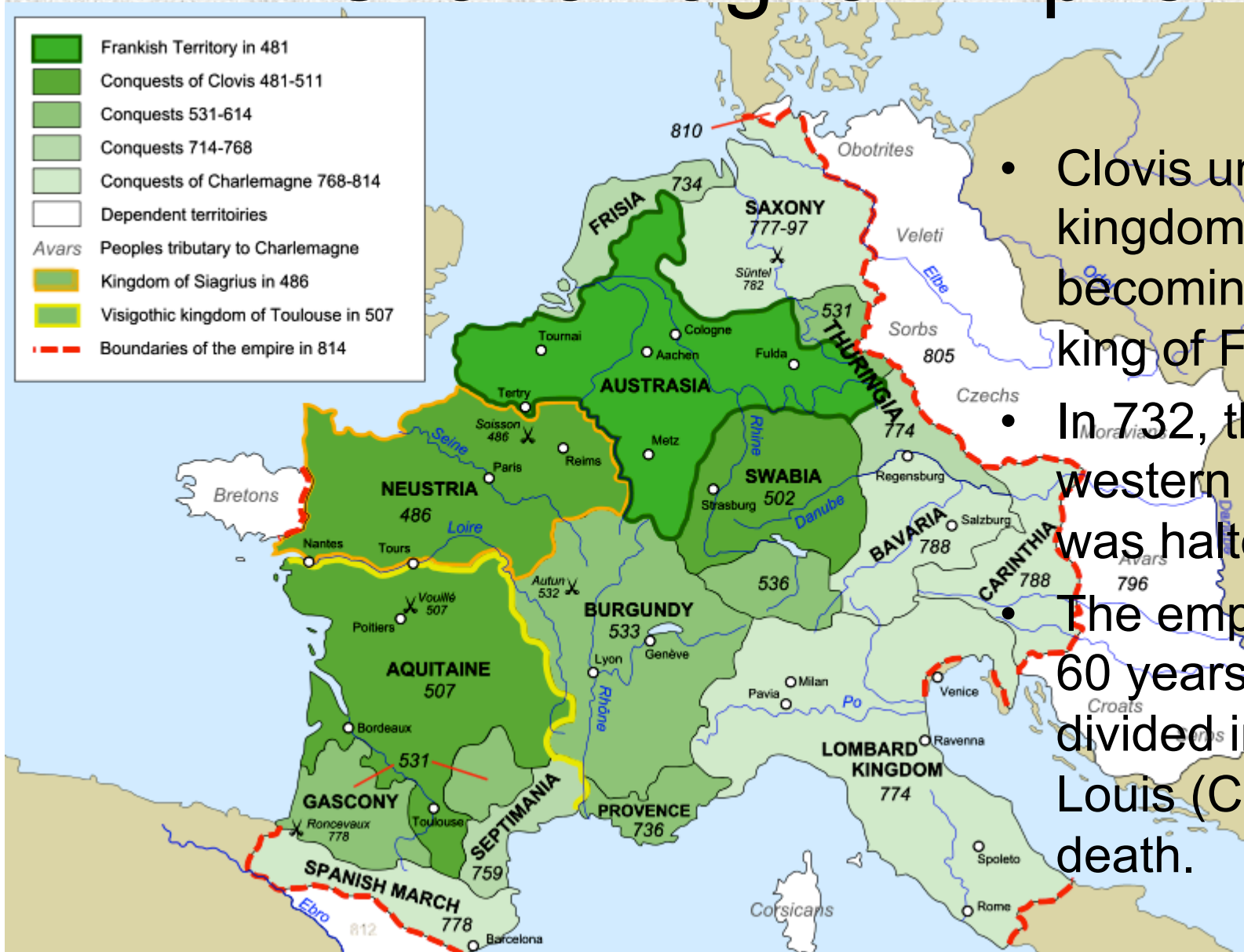
# Barbarian attacks



# Charlemagne Empire



- Clovis unified Frank kingdoms in 511 becoming the first king of France.
- In 732, the Islamic western invasion was halted in Tours.
- The empire lasted 60 years till 843 divided in three at Louis (Charles' son) death.



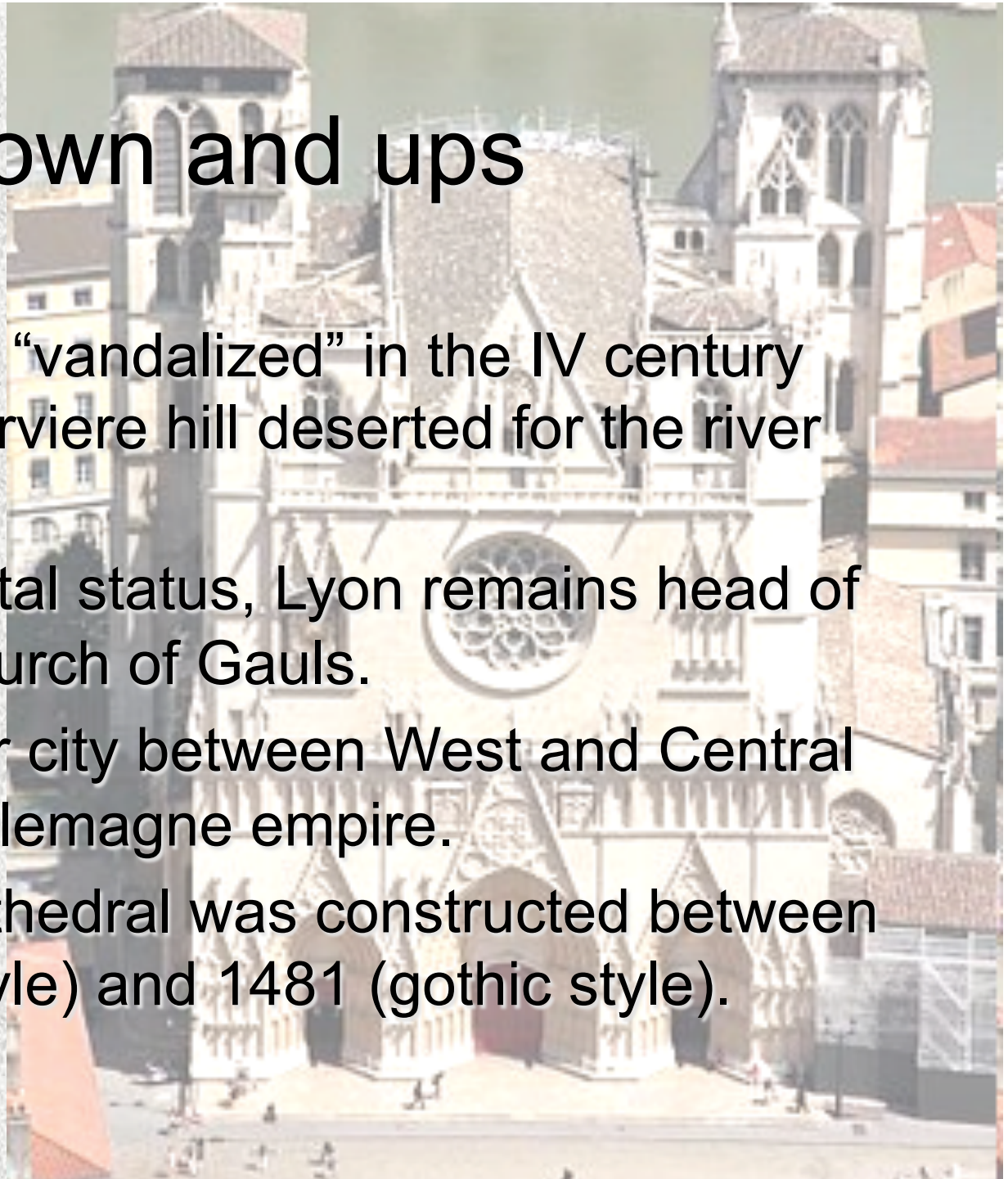
# 6 centuries under Burgundy rules



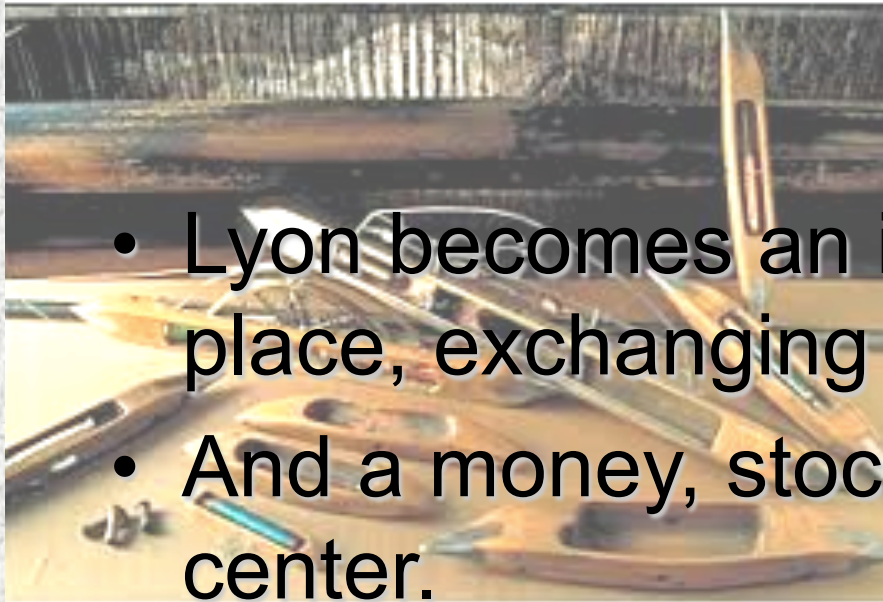
- Louis XI (1423-1483) ended the Hundred Years' War against the English.
- Taking advantage of the death of Charles the Bold, Duke of Burgundy, Louis XI annexed Burgundy to the crown of France, making Lyon a French city.

# Down and ups

- Aqueducts were “vandalized” in the IV century making the Fourviere hill deserted for the river banks.
- Loosing its capital status, Lyon remains head of the Catholic Church of Gauls.
- Lyon is a border city between West and Central part of the Charlemagne empire.
- The St John cathedral was constructed between 1165 (roman style) and 1481 (gothic style).



# XVI<sup>th</sup>-XVII<sup>th</sup> centuries



- Lyon becomes an important trade and fair place, exchanging with Italy.
- And a money, stock exchange and banking center.
- The silk trade and printing industry develop.
- The religious wars were devastating.

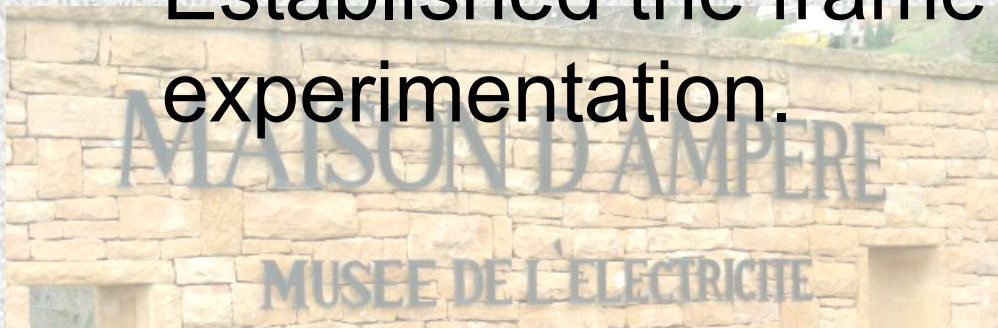


# XVIII<sup>th</sup>-XIX<sup>th</sup> centuries

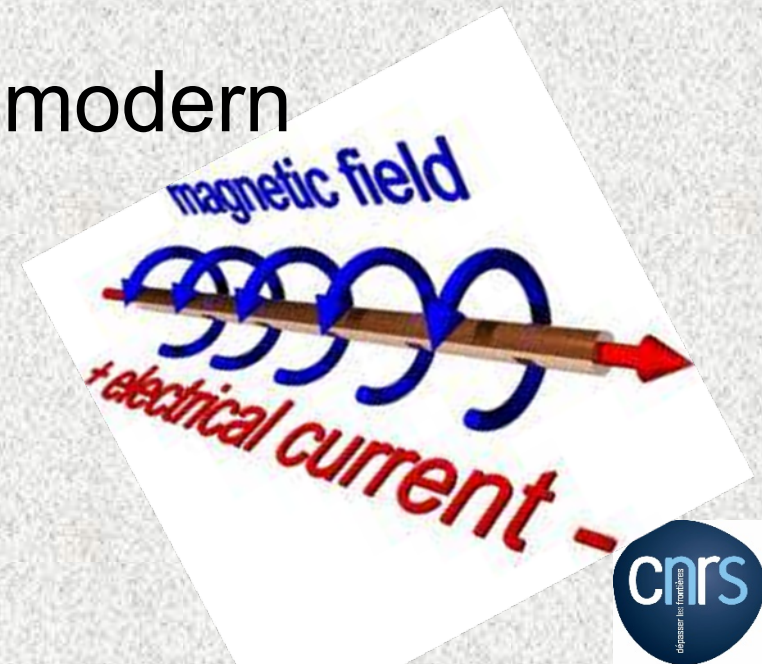
- Raising against the Parisian 1793 Terror of the Convention, Lyon was besieged for two months, August and September, by 65,000 troops.
- Lyon was sacked with 2,000+ beheaded.
- The Convention ordered the destruction of Lyon including its name.
- Bonaparte ended the ban favoring the silk industry and attributing money for Lyon reconstruction.

# André-Marie Ampère

- Developed the principles of electromagnetism
- Suspected that electricity was carried by particles (electron).
- Established the frame of modern experimentation.



International INTENSITY unit:  
1 Ampere (A) = 1 coulomb per second (s) =  
 $6.24 \times 10^{18}$  electrons flowing per second





# Technical advancements



- Jacquard invented the programmable loom that allowed to produce large length of elaborated silk fabric.
- Thimonnier patented in 1830 a modern sewing machine.



- The brothers Louis and Auguste Lumière patented in 1895 an improved Edison movie projector, the cinematograph, allowing for reliable projections.

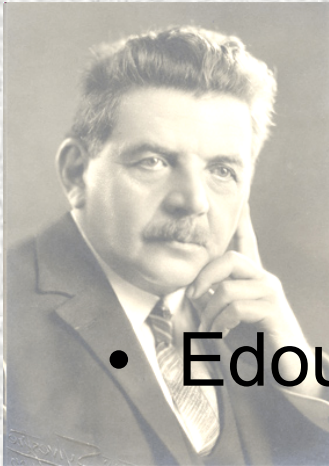


# 1870 war against Prussia

- The French armies were defeated in two weeks and Paris is besieged. The Prussians aim South.
- Lyon is terrified, the people ask their bishop to make a vow to Virgin Mary, patron saint of the city: “If the Prussians stop, we will erect a cathedral on the Fourviere hill”. The Prussians did stop and the cathedral was built.
- First stone on December 1872, till June 1884.



# XX<sup>th</sup> century



- Edouard Herriot was Mayor from 1905 till 1957.

- Antoine de St Exupery was a major novelist killed in action flying over the Mediterranean sea in 1944.



- Jean Moulin organized in Lyon the Resistance against Nazi occupation of France



# Thin Layer Chromatography



Archer John Martin 1910-2002  
Richard Laurence Synge 1914-1994

1954 Nobel Prize of CHEMISTRY for partition liquid chromatography

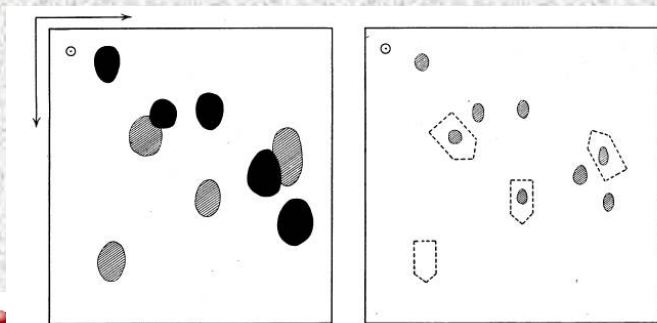


Fig. 5. Diagram showing method of cutting of a two-dimensional chromatogram. (a) and (b) represent duplicate sheets, the solution to be analyzed being applied at the open circles. The arrows indicate the direction of development of the chromatograms in the two solvents. In the guide chromatogram (a), amino-acids are shown as black spots and peptides as shaded spots. After treatment with dilute ninhydrin, the duplicate sheet (b) shows faint spots (some may be barely visible) and is cut as shown by the dotted lines.

## Qualitative Analysis of Proteins: a Partition Chromatographic Method Using Paper

By R. CONSDEN, A. H. GORDON AND A. J. P. MARTIN, *Wool Industries Research Association, Torridon, Headingley, Leeds, 6*

(Received 13 May 1944)

Gordon, Martin & Synge (1943b) attempted to separate amino-acids on a silica gel partition chromatogram, but found it impracticable owing to adsorption by the silica of various amino-acids.

They obtained, however, good separations by using cellulose in the form of strips of filter paper. Following further work along these lines, the present paper describes a qualitative micro-analytical tech-

Biochem. J. 38 (1944) 224-232

590

Biochem. J. 41 (1947) 590-596

1947

## The Identification of Lower Peptides in Complex Mixtures

By R. CONSDEN, A. H. GORDON AND A. J. P. MARTIN  
*The Wool Industries Research Association, Torridon, Headingley, Leeds 6*

(Received 20 February 1947)

The mixture of amino-acids and peptides, which is obtained when proteins are only partially hydrolyzed by acids, is so complex that no single method can be expected to achieve the separation and identification of more than a few of the components present. The successive use of methods effecting separations along different lines is required: a scheme of separation is described here which, it is believed, can lead to the identification of a large proportion of the dipeptide species present in partial acid hydrolysates of proteins (cf. Martin, 1946). The scheme

to the easier one of converting one salt into another, and the alkali metals are no longer troublesome. The field of use of the desalting apparatus thus probably greatly exceeds the use here described. The material obtained from the desalting apparatus is, after evaporation, ready for further fractionation by partition chromatography (Consdan *et al.* 1944) or by other methods.

These paper chromatograms, which may be one- or two-dimensional, are carried out in duplicates or in larger sets; one is treated with ninhydrin and is

Fig. 5 is a 2D TLC paper plate cutting off separated peptides for further analyses.



# XXI<sup>st</sup> century

- The 2003 HPTLC symposium in Lyon
  - **The 2014 HPTLC symposium**

# Welcome

