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## **Knowledge book on milk microfiltration: an INRA project to identify key actions in research on proteins fractionation**

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# KNOWLEDGE BOOK ON MILK MICROFILTRATION

An INRA project to identify key actions in research on proteins fractionation

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## Context

The expertise of both industry and research institutes has created an **important collection of knowledge on food processes**, which is the result of **scientific and technological research** and **experimental know-how**. However, despite a great number of results published in the form of “peer” reviewed papers and patents, it has been failed to **formalize, organize and complete the acquired knowledge**.

The need for a sustained capitalization is crucial in view of:

- preventing the loss of knowledge due to the departure of employees;
- avoiding the dispersal of existing experimental data;
- allowing optimal exploitation of data and knowledge.

**Objective** : To capitalize the data related to one specific food process (milk microfiltration) by developing an **electronic knowledge book** (kBook) [Raboutet et al., 2008].

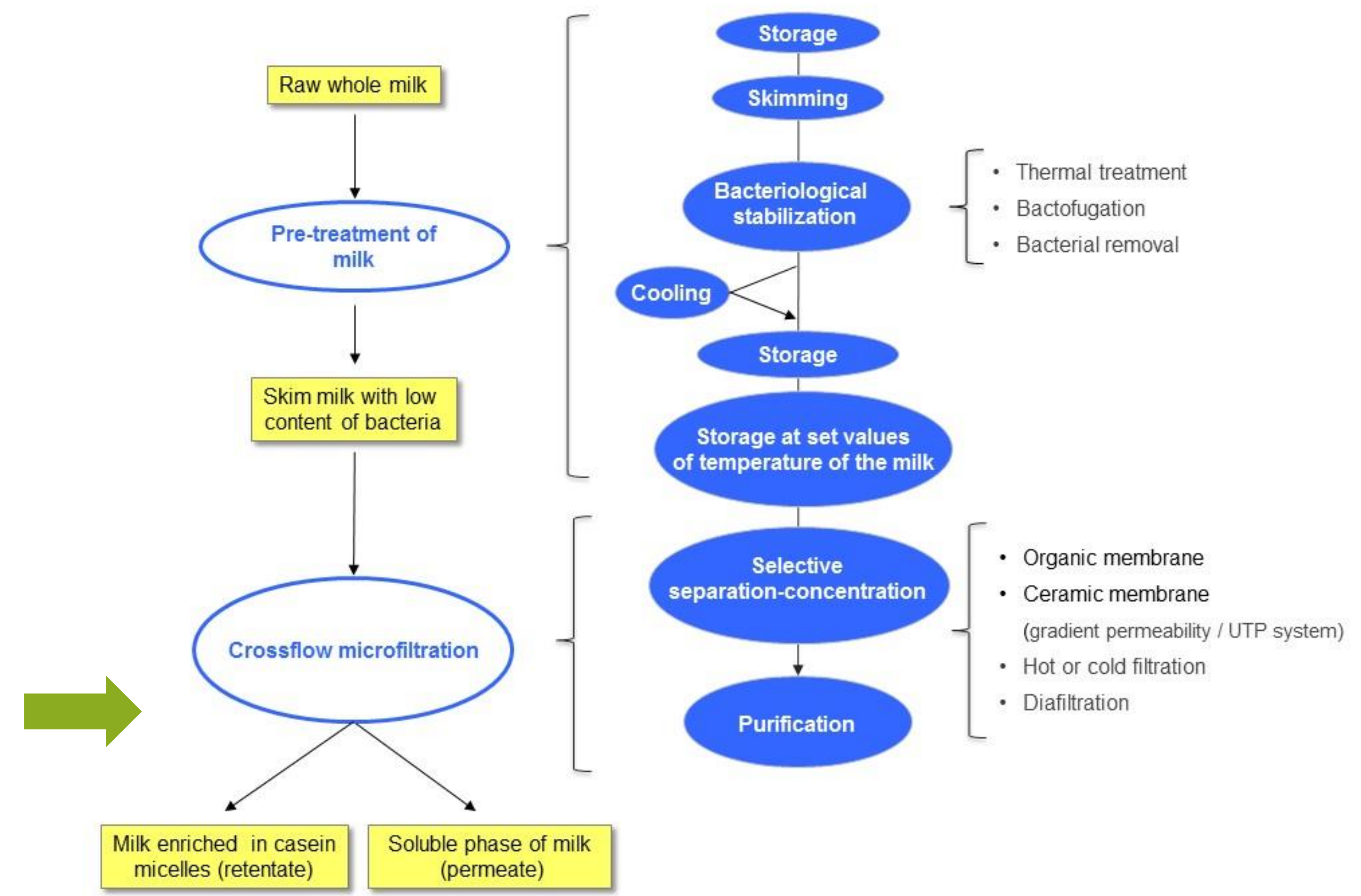
**Microfiltration of skimmed milk** is widely used in the dairy industry to separate casein micelles from whey protein aiming at producing a retentate used in cheese making and a permeate containing whey proteins with valuable nutritional and functional properties.

## Method

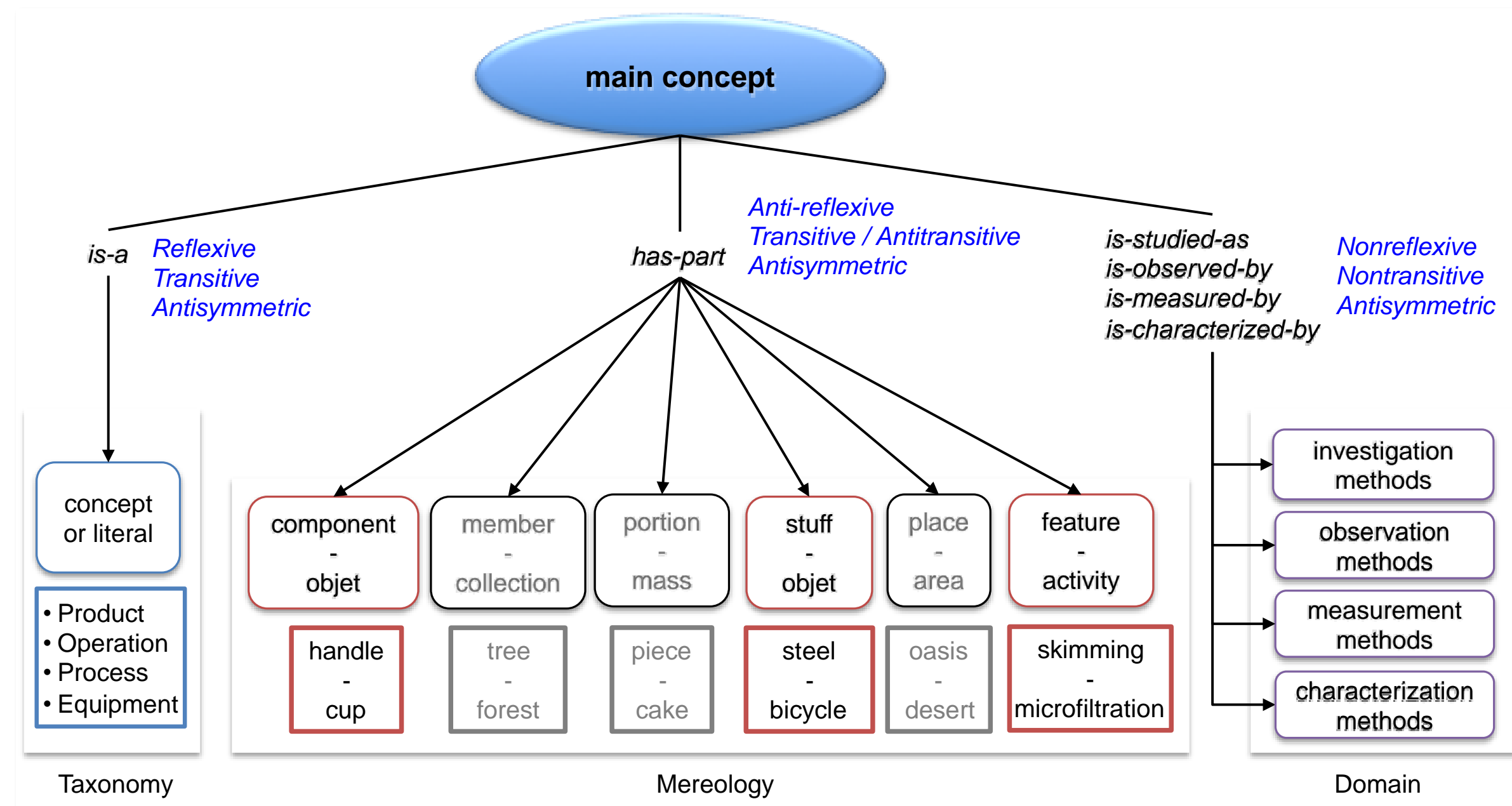
The knowledge was first elicited through semi-structured interviews with a group of experts on dairy filtration.

Concomitantly, data and knowledge from patents and literature were collated.

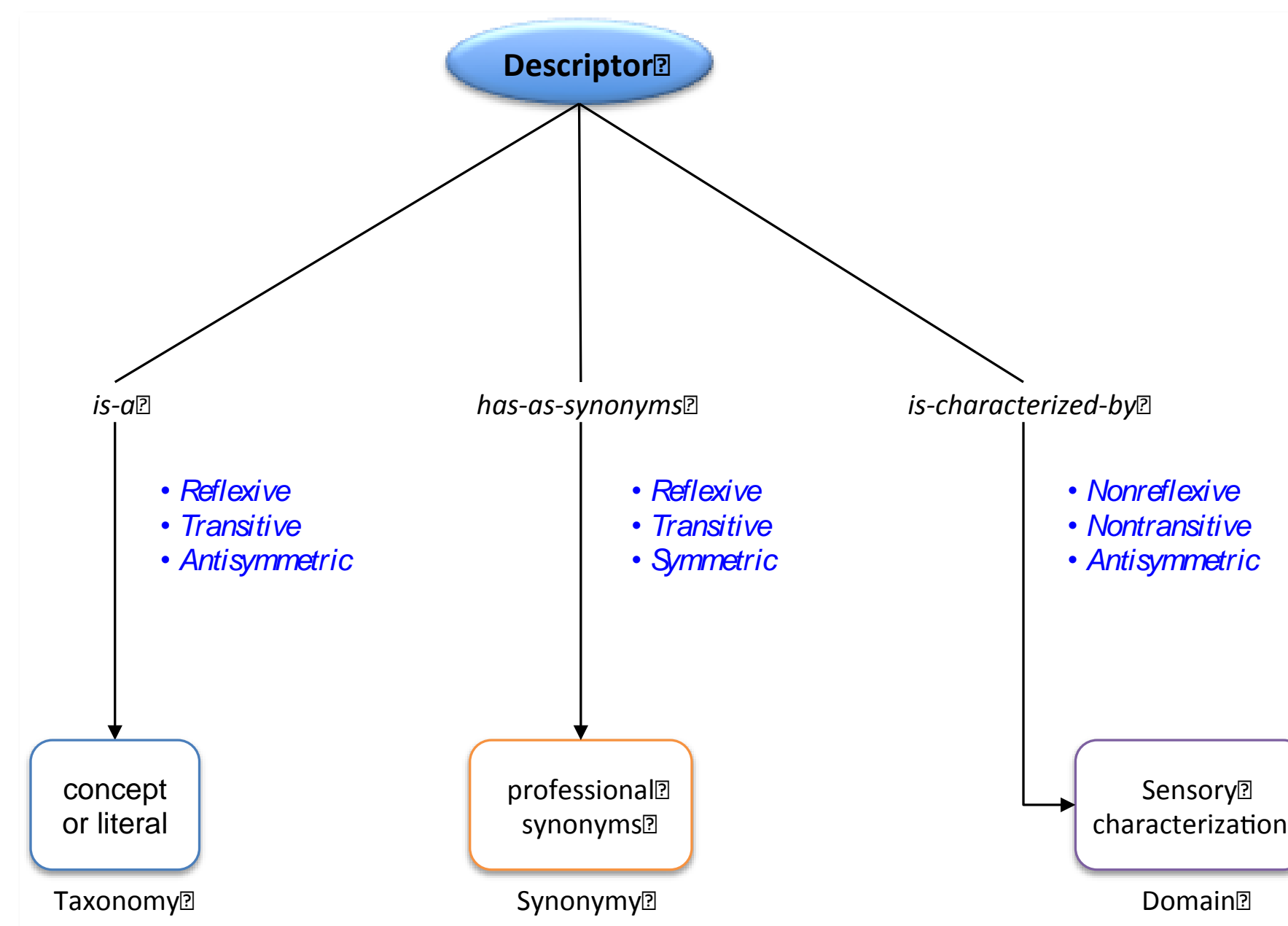
Then, a kBook was established, whose pages were formatted in canonical concept maps (cmap) [Jmal et al., 2011] and technical sheets [Raboutet et al., 2008] that are connected by hypertext links. A cmap is a semantic graph where nodes represent concepts that are connected by arcs expressing the relationships between them.



Skimmed milk microfiltration process



Canonical concept maps used to represent product, operation, process and equipment

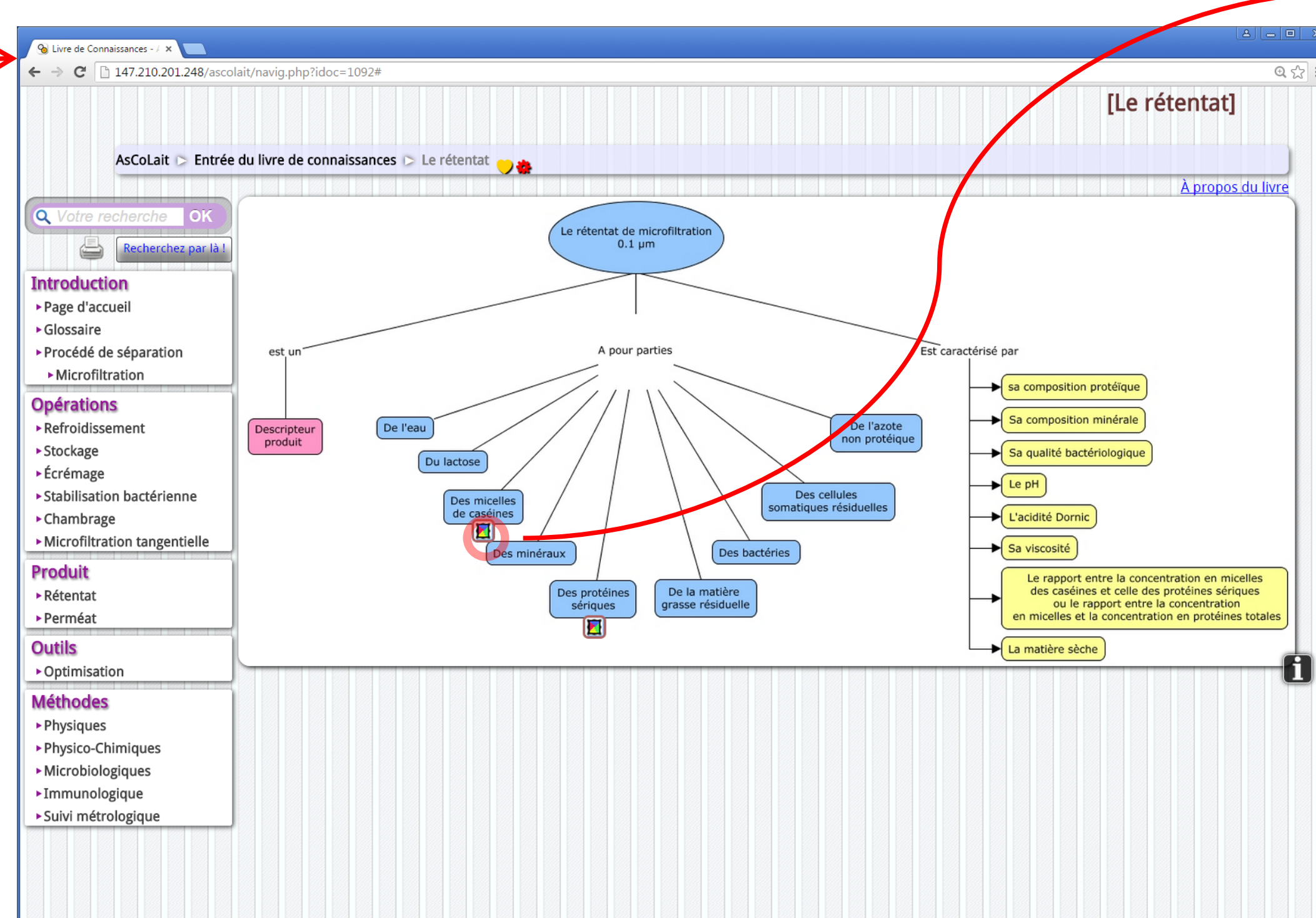
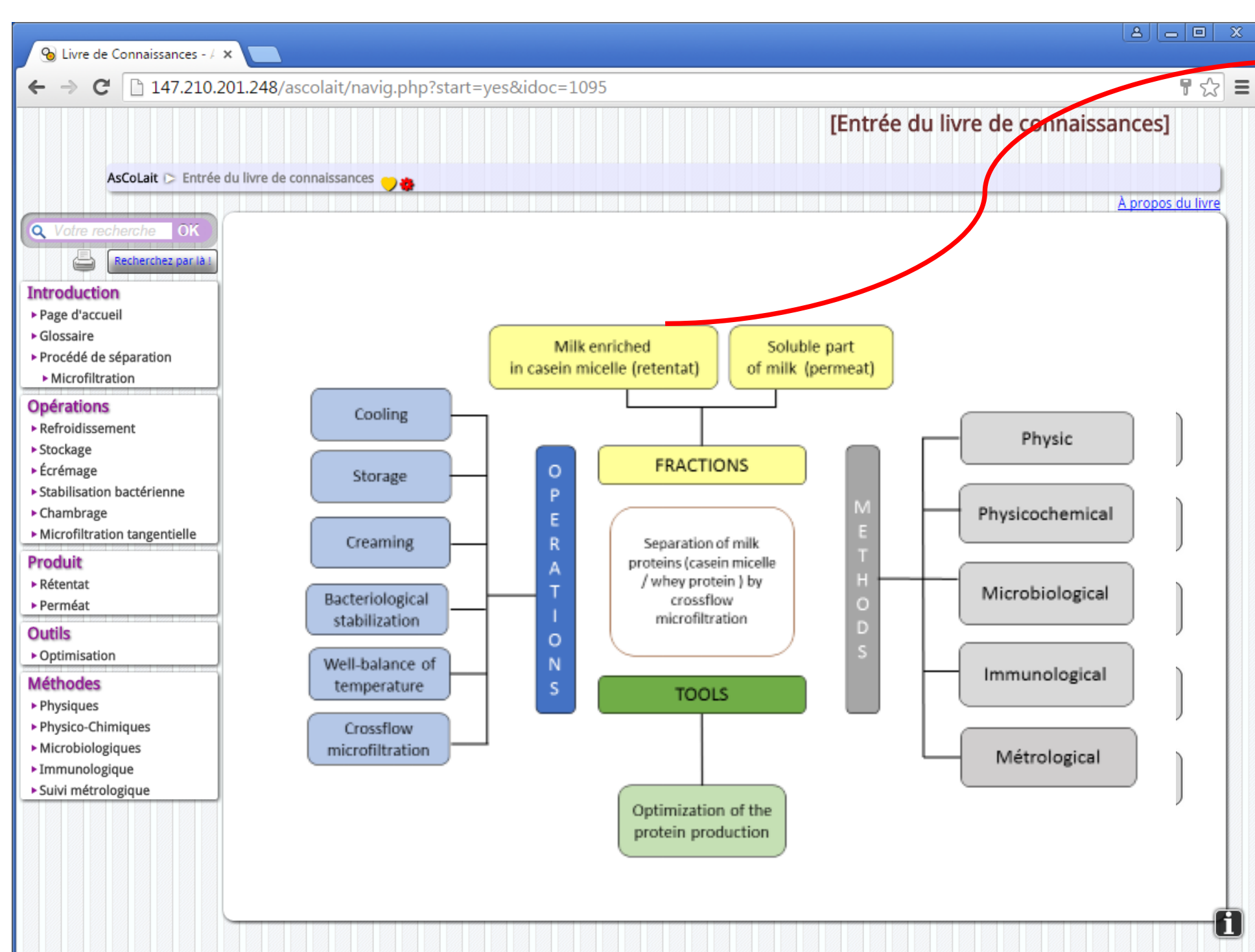


Technical sheet's format

Cmap answers an ontological question about a specific main concept. The hyperlinks between cmaps, technical sheets and between cmaps and technical sheets form a network of knowledge which can be browsed to find answer to a question.

## Results

Several knowledge areas have been identified so far including milk pretreatment, microbiological stabilization, microfiltration and analytical methods for the characterization of fractions. A global representation of the overall process from raw milk to fractions of proteins, based on the individual cmaps has been built.



Navigating the electronic knowledge book of milk microfiltration via hyperlinks' cmaps

## Conclusion

The development of a kBook, through its knowledge elicitation process, allows the detection of knowledge lacking and by the way is a good guide for new research actions. The kBook is an original and effective tool for transfer of knowledge that is used, here, for initiation to the crossflow microfiltration of skim milk dedicated to a large public.

## Perspectives

. Simulation tools will be integrated to the kBook for the optimization of crossflow microfiltration taking into account various operating conditions and conception alternatives . Disorientation and cognitive load of the kBook's users will be evaluated on a significant population.

To be continued through the **Optimal** Project

