BIOTECHNOLOGY HAD AN EFFECT ON HOW TO DISCLOSE BIOLOGICAL MATERIALS IN PATENT APPLICATIONS

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Meeting of Member States and International Depositary Authorities under the Budapest Treaty

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QUICK INTRODUCTION

- Inserm is the only public research organization in France entirely dedicated to human health. Its objective is to promote the health of all by advancing knowledge about life and disease, treatment innovation, and public health research.
  - ✓ In the biotechnology sector, Inserm is in second place among European patent applicants
- Inserm Transfert is the private subsidiary of Inserm dedicated to technology transfer
- European Patent Attorney specialized in life sciences
- Having an experience of 20 years at Inserm

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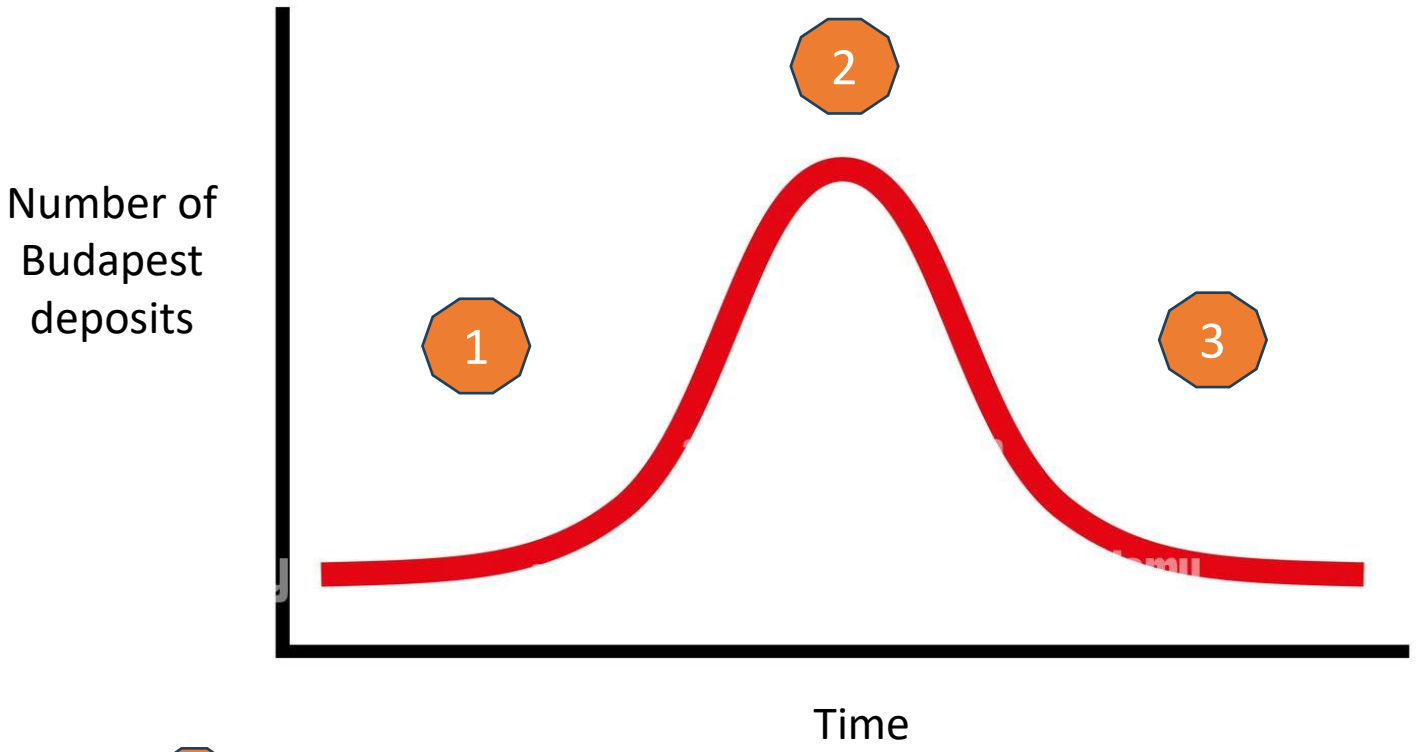
The big picture

The technological developments in the field of biotechnology have significantly impacted the way inventions are disclosed in patent applications.

The deposits of biological materials under Budapest treaty dramatically have dramatically decreased during the 10 past years.

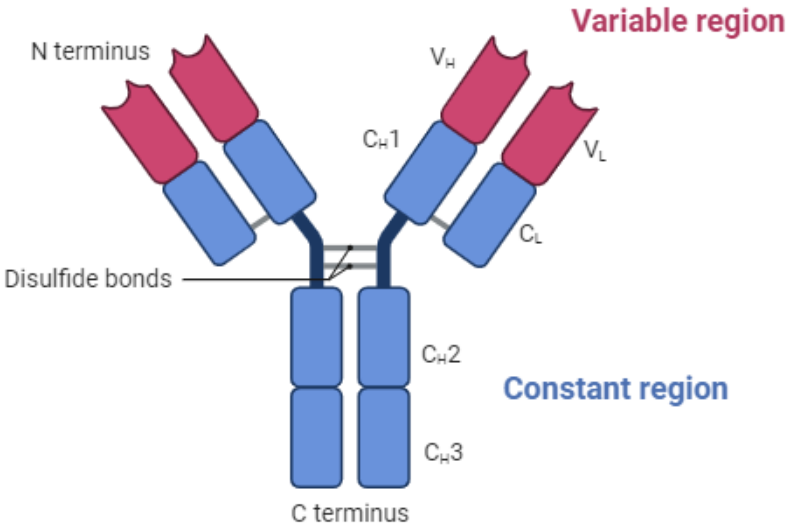
KEY FIGURE (MONOCLONAL ANTIBODIES)



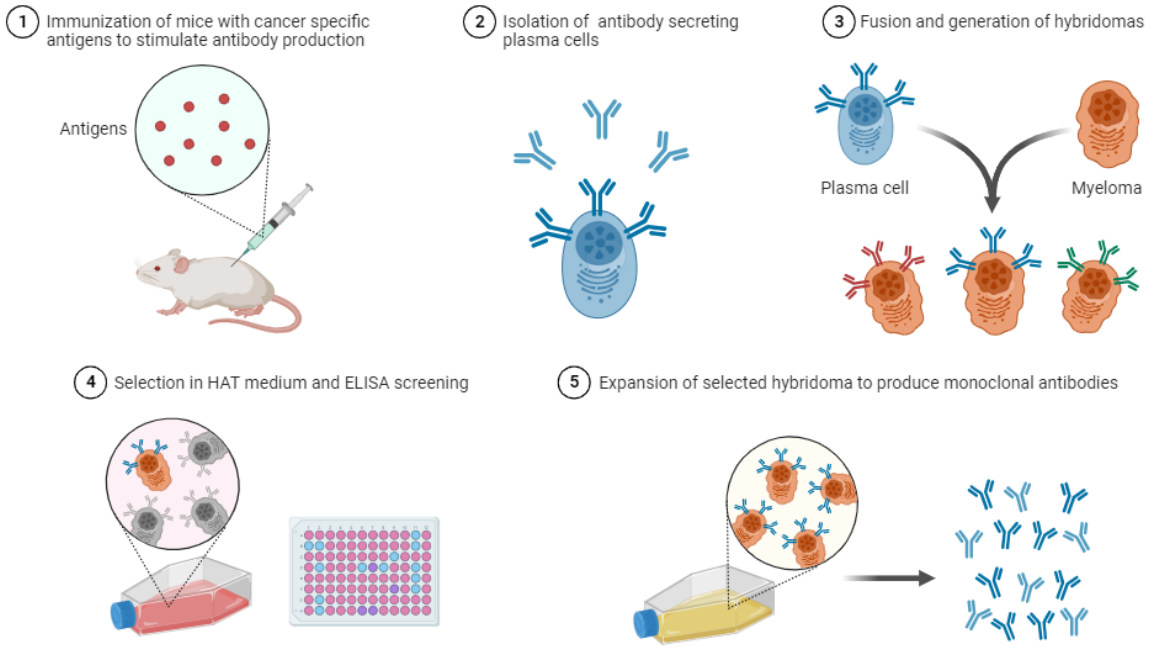
1. « hybridoma technique » period
2. Development of new techniques allowing a direct access of the antibody sequences
3. Direct access of the antibody sequences is now « democratized » (fast and reliable)

MONOCLONAL ANTIBODIES

- Antibodies are made up of two heavy chains and two light chains joined by disulfide bonds so that each heavy chain is linked to a light chain and the two heavy chains are linked together.
- The amino-terminal variable or V domains of the heavy and light chains (VH and VL, respectively) together make up the V region of the antibody and confer on it the ability to bind specific antigen.



HYBRIDOMA TECHNIQUE



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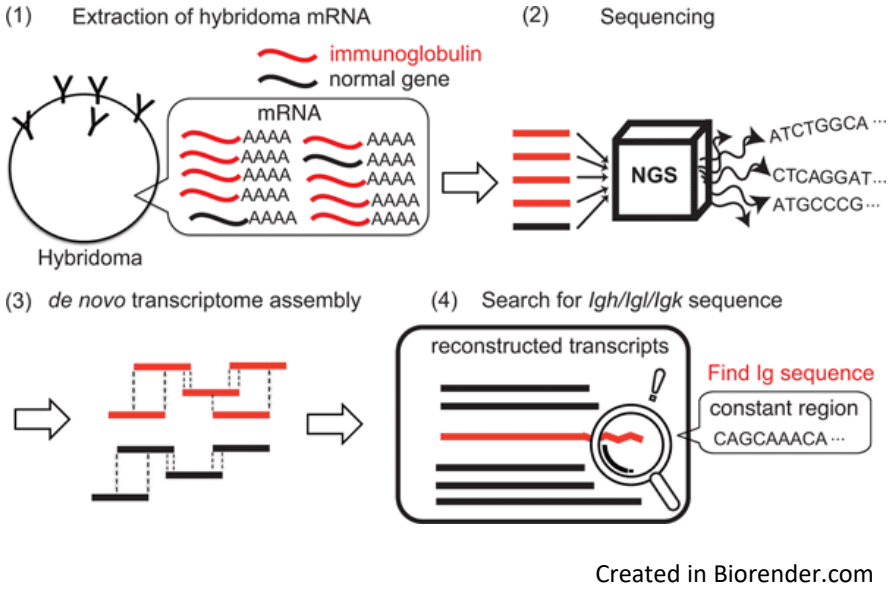
- On 7 August 1975, Nature published a three-page report by César Milstein and Georges J. F. Köhler describing a method for generating large amounts of monoclonal antibodies of a predefined specificity.
- Not only did this method revolutionize biomedical research and diagnostics, it also led to the generation of an arsenal of therapies for many diseases.

First generation of disclosure

- In a particular embodiment, said CD39 antibody is BY40. The inventors have indeed deposited a murine CD39 antibody (BY40) producing hybridoma at the Collection Nationale de Cultures de Microorganismes (CNCM, Institut Pasteur, 25 rue du Docteur Roux, 75724 Paris Cedex 15, France), in accordance with the terms of Budapest Treaty, on the 4th of January 2008. The deposited hybridoma has CNCM deposit number 1-3889. Said CD39 antibody may then be obtainable from the hybridoma deposited as CNCM-I-3889.
- In another embodiment, said CD39 antibody may comprise the VL chain of the antibody obtainable from hybridoma deposited as CNCM-I-3889 and the VH chain of the antibody obtainable from hybridoma deposited as CNCM-I-3889.
- In another embodiment, said CD39 antibody may comprise a variable light chain (VL) comprising the CDRs of the VL chain of the antibody obtainable from hybridoma deposited as CNCM-I-3889 and a variable heavy chain (VH) comprising the CDRs of the VH chain of the antibody obtainable from hybridoma deposited as CNCM-I-3889.

Source : WO2012085132A1

HYBRIDOMA SEQUENCING



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- Hybridoma sequencing involves amplifying and sequencing the cDNA encoding the VH and VL domains from a hybridoma cell line. By utilizing high-throughput sequencing technologies, this technique enables the rapid and efficient determination of antibody sequences.
- The technique was considerably optimized to increase the level of sequence accuracy
- The technology is now commercially accessible, cost effective and the timely compatible with the filing of a patent application (3-5 weeks to get the sequences)

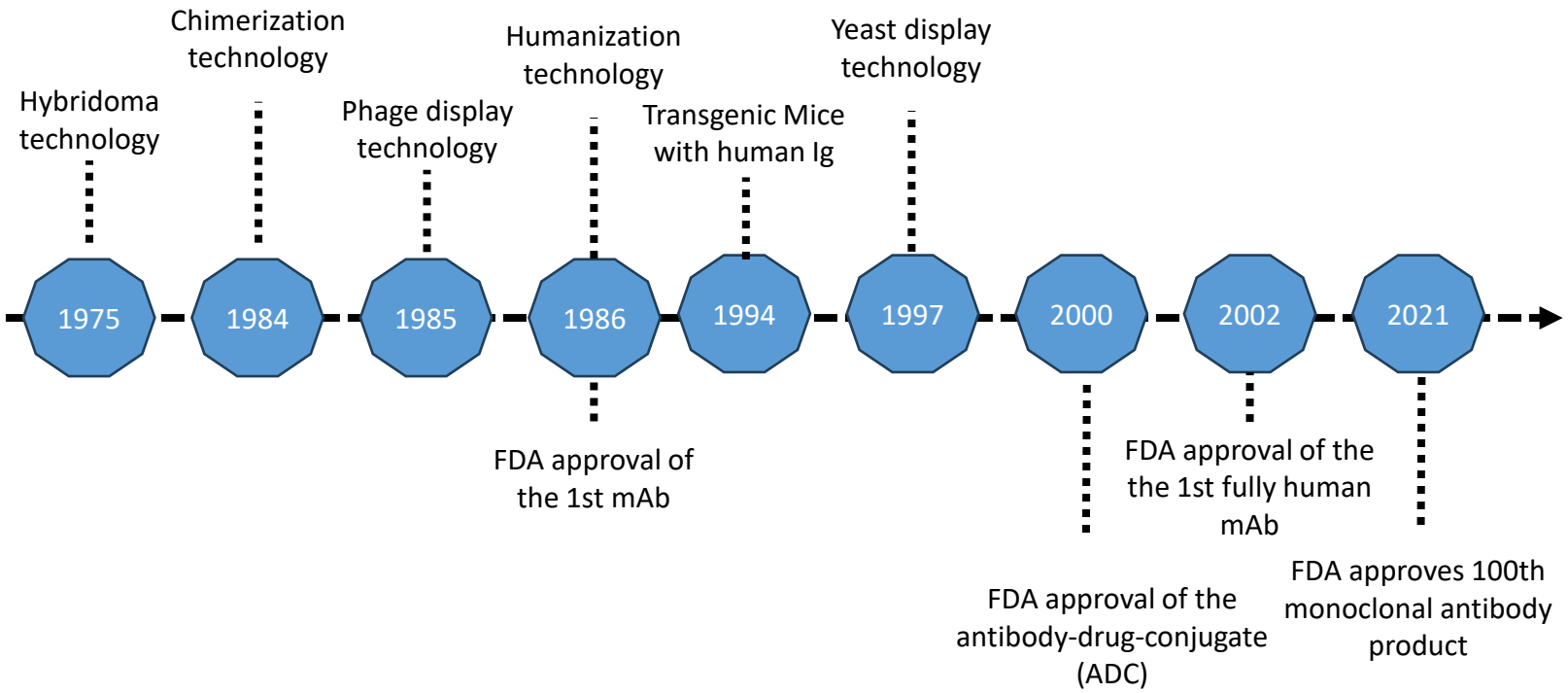
SECOND GENERATION OF DISCLOSURE

- In another embodiment of the invention, said CD39 antibody may comprise a heavy chain wherein the variable domain comprises at least one CDR having a sequence selected from the group consisting of SEQ ID NO:2 for CDR-H1, SEQ ID NO:3 for CDR-H2 and SEQ ID NO:4 for CDR-H3; and/or a light chain wherein the variable domain comprises at least one CDR having a sequence selected from the group consisting of SEQ ID NO:6 for CDR-L1, SEQ ID NO:7 for CDR-L2 and SEQ ID NO:8 for CDR-L3.
- The inventors have cloned and characterized the variable domain of the light and heavy chains of said mAb BY40, and thus determined the complementarity determining regions (CDRs) domain of said antibody as described in Table 1.

Source : WO2012085132A1

OTHER TECHNIQUES FOR GENERATING ANTIBODIES

- Timeline of major improvements in monoclonal antibody development:



- Antibody phage display (APD) is based on genetic engineering of bacteriophages (viruses that infect bacteria) and repeated rounds of antigen-guided selection and phage propagation. This technique allows in vitro selection of mAbs of virtually any specificity, greatly facilitating recombinant production of antibodies

SUMMARY:

The production of monoclonal antibodies has considerably boosted the deposit of biological material under the Budapest treaty for many years.

However:

- the procedure for depositing a hybridoma cell was considered as time consuming
- the characterization by the hybridoma cell that did not allow for a “direct” description of the product had led to uncertainties about the opposition of such claims.

The development of complementary technologies such as sequencing has made it possible to directly characterize the structure of the antibody.

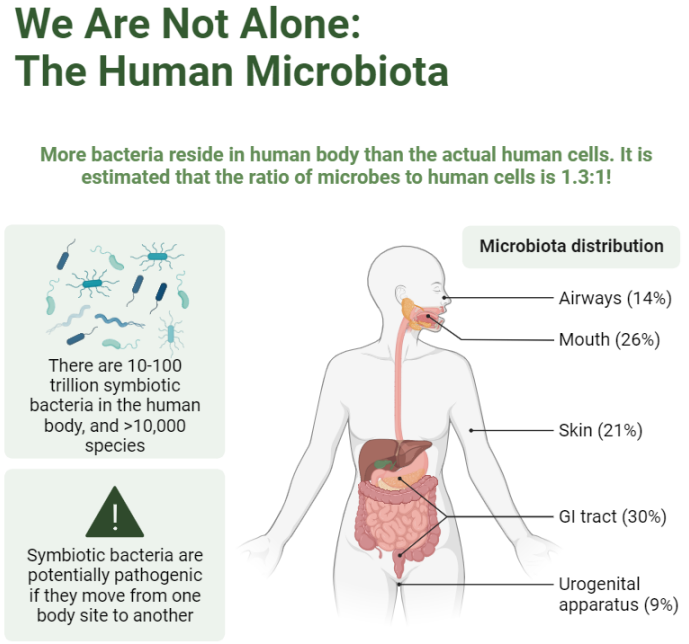
The molecular engineering of antibodies have amplified the need to directly disclose the sequences of the antibodies in patent applications.

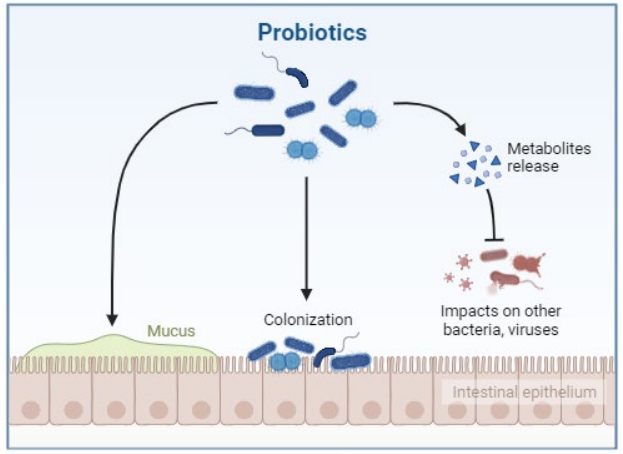
Perspectives

- The developpment of synthetic biology is growing very fast.
- Synthetic biology is a multidisciplinary field of biotechnology that involves engineering the genetic material of organisms—such as cells, viruses, bacteria, yeast, plants, or animals—to reproduce or generate new features.
- The “skilled person” will be able to “finely” characterize the constructions and will be in position to comply with the written description requirements.

BUT EXCEPTIONS STILL REMAIN: THE EXAMPLE OF PROBIOTICS

- Gut microbiota is implicated in the right functioning of many organs, such as lungs, kidneys, liver, heart and brain.
- However, any disruption to the microbiota homeostasis results in the malfunctioning of these affected organs, and the progression of many related diseases.
- Thus, microbiota considerably pays attention in medicine.
- Use of probiotics would be suitable for therapeutic purposes.
- Mechanisms of action are very complex.





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TYPE OF CLAIMS

- A bacterial strain of the species *Parabacteraides distasonis* for use thereof in the treatment and/or prevention of a gastrointestinal disease, or of a disorder associated with a gastrointestinal disease, in an individual, said bacterial strain being selected from the group consisting of:

  - the bacterial strain deposited with the CNCM under accession number CNCM 1-5576; and

  - the bacterial strain deposited with the CNCM under accession number CNCM 1-5578.

Conclusions

- The interest/obligation in proceeding with a Budapest deposit has dramatically decreased in the past years.
- Thanks to the development of synthetic biology, the « skilled person » is able to
  - ✓ get access to the information about how the engineered microorganisms provide the technical effects
  - ✓ can reproduce the features of the claimed material and thus get access to a way of carrying out the invention must be given.
- Generally, applicants can comply with the sufficiency of disclosure requirement.
- However, the interest of the Budapest system remains for some exceptions and must perpetuate.

THANK YOU !

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