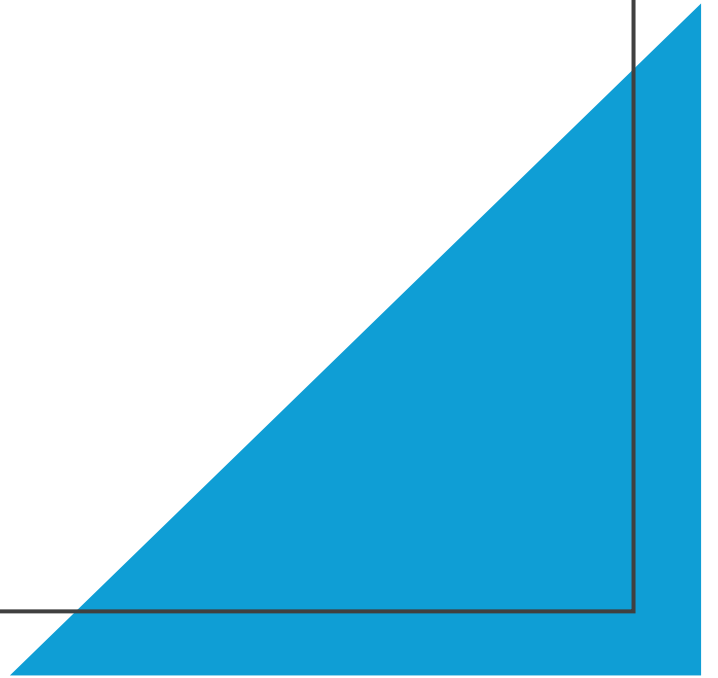


# Cloning-Is it Ethical?





## **ABOUT ME**

Imaginative, knowledgeable, and dedicated research scientist with over 20 years of experience in ion channels research which are essential to nerve function. With a PhD in the field of biological sciences, I managed a robust diabetic lab at the University of Pennsylvania for over a decade. Possess a proven record of scientific innovation and novel discovery, skilled at designing and overseeing advanced experiments of ion channels involved in renal disease, diabetes, cystic fibrosis and cardiovascular diseases for discovery and drug development purposes. Very passionate about sharing my knowledge of science especially with students. For the past 4 years, I have been mentoring high school students, encouraging them to take an active interest in various fields of science such as Microbiology, Medical Sciences, and Ecology. Students I have mentored have won many awards in their science fairs, both at the local and regional levels, with one of the group projects ultimately qualifying for the INTEL International science fair. I enjoy being involved in both the corporate and non-profit worlds of science discovery.

## **EDUCATION & RESEARCH EXPERIENCE**

### **June 2020-present**

Co-Founder and Chief Scientific Officer YARD Sciences  
Co-Founder RAY Sciences, USA

### **July 2024-present**

Co-Partner Bracetek orthotics Services, LLC, USA

### **January 2022-present**

**Co-Founder and Managing partner, KRYSP-R LLC USA and Gene2Go PVT LTD, Bangalore, INDIA.**

Gene 2 Go is headquartered in the USA. Gene2Go PVT LTD, Bangalore, INDIA is a subsidiary of Gene 2 Go.

Our mission is to revolutionize the service sector of CRISPR technology. Our vision is to provide affordable, fast, and accurate genome editing services to our clients, and to bring the power of CRISPR technology within the reach of every laboratory.

# YEAR-ROUND CLASSES

## REGISTER NOW!

- ✓ Premed Workshops
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- ✓ Bioinformatics
- ✓ CRISPR Gene Editing
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SCAN  
ME!



# College Advising and Counseling



A Saint Thomas More School  
& Yard Sciences Partnership:



Join us for a virtual, interactive event open to **7th-12th** graders! If you are seeking additional guidance with your college application process, the full benefits of a consultant to assist you with your unique experience, or just want your questions answered, be sure to ask about our informative free sessions!

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**Meet the students of  
YARD Sciences**

**Sibling Scientists**  
Rohan and Jiya Achieve Top Honors at Coriell Science Fair: Rohan, an 11th Grader from Cherry Hill East, Wins 1st Place in Medicine & Health. While Jiya, a 7th Grader from Rosa International, Takes 1st in Microbiology and Best of Life Sciences. Both advancing to the Delaware Valley Science Fair in April!




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**Meet the students of  
YARD Sciences**

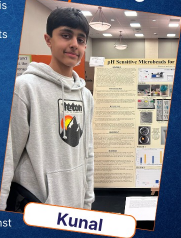


**Dia**

Dia, a brilliant 6th grader from Marsh Creek 6th Grade Center in the Downingtown School District, made waves at the Chester County Science Research Competition! She took 1st place in Biochemistry among all 6th-8th graders, showcasing her impressive knowledge and passion for science. But she didn't stop there—she also secured an outstanding 2nd place overall in her division! Now, with these incredible achievements, Dia is setting her sights on the Delaware Valley Science Fair (DVSF) this week, where she'll take her research to the next level.

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**Meet the students of  
YARD Sciences**



**Kunal**


Kunal, an 8th-grade student at William Allen Middle School, delivered an outstanding performance at this year's Coriell Science Fair, earning top honors in Chemistry among 6th-8th graders. His achievements include:

- 1st Place in Chemistry (Grades 6-8)
- Chemistry Council of NJ Award – Best in Chemistry (Middle School)
- American Chemical Society Southern NJ Chapter Award
- Dr. Lewis L. Coriell Award – Best in Fair (Middle School)

With an impressive display of scientific excellence, Kunal now sets his sights on the Delaware Valley Science Fair this week, where he will compete against top young scientists from the region.

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**Meet the students of  
YARD Sciences**



**Radika**

Radika, an exceptional 8th grader from Voorhees Middle School, showcased her incredible talent in science by securing 1st place in Environmental Science among all 6th-8th graders! But she didn't stop there, her hard work and passion for discovery also earned her the prestigious Coriell Special Award in Physical Science! With two major wins under her belt, Radika is now setting her sights on the Delaware Valley Science Fair (DVSF), where she'll take her research to the next level.

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**Ananya**

Ananya, a 9th grader at Eastern High School, crushed it at the Coriell Science Fair! She snagged 3rd place in Microbiology out of all the 9th-10th graders—that's some next-level science magic! But wait... she's NOT DONE YET! Ananya is taking her brilliance to the Delaware Valley Science Fair next week!

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# 2024-2025 Science Fair Students

**Meet the students of  
YARD Sciences**



**Darsh**

Darsh, a 9th grader from Cherokee High School, just crushed the competition, claiming 1st place in Biochemistry among all 9th and 10th graders at this year's Coriell Science Fair! Now, he's leveling up and heading to the Delaware Valley Science Fair next week to take on the best of the best.

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**Meet the students of  
YARD Sciences**



**Parv**

Parv, a freshman at Eastern Regional High School, showcased his incredible scientific skills by taking 1st place in Microbiology among all 9th and 10th graders at this year's Coriell Science Fair! His dedication to research and discovery has earned him top honors, setting the stage for even greater achievements. Now, with this impressive win under his belt, Parv is heading to the Delaware Valley Science Fair (DVSF), where he'll compete at the next level.

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**Meet the students of  
YARD Sciences**



**Ishan**

Ishan, a talented 10th grader from Cherry Hill East, for earning an impressive 2nd place in biochemistry at this month's Coriell Science Fair! Competing against some of the brightest 9th and 10th graders, Ishan's hard work, dedication, and passion for science truly stood out. But the journey doesn't stop here! Up next, Ishan is set to take on an even bigger challenge at the Delaware Valley Science Fair this week, where he'll showcase his research on a larger stage.

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**Avnee**

Avnee, a brilliant 11th-grade student from Moorestown High School, has emerged victorious at the prestigious Coriell Science Fair, claiming 1st place in Botany among all competing 11th and 12th graders. This remarkable achievement is a testament to her dedication, scientific curiosity, and hard work in the field of plant sciences. With this outstanding victory, Avnee now advances to the renowned Delaware Valley Science Fair next week, where she will compete against the region's most talented young scientists.

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**Meet the students of  
YARD Sciences**



**NAVYA**

Navya, an 11th grader, just crushed it at the Jersey Shore Science Fair, taking home 3rd place in Biochemistry against some serious competition from 11th and 12th graders! Now, she's gearing up for the next big challenge—the Delaware Valley Science Fair next week.

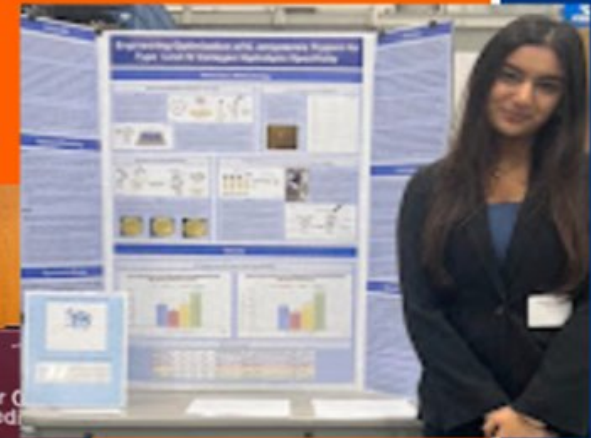
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For their student's exceptional achievements in this year's Coriell Science Fair, Jersey Shore Science Fair, and Chester County Science Research Competition

Congratulations to  
*YARD Sciences*





# Alumni Honors



TOTAL  
SPECIAL  
AWARDS



TOTAL  
NATIONAL &  
INTERNATIONAL  
FINALISTS



TOTAL  
CATEGORY  
AWARDS



**37**

Middle & High School Participants



**95%**

Promoted to Regional Fairs



**16%**

Promoted to National &  
International Levels



**\$151,100**  
WON IN AWARDS &  
SCHOLARSHIPS AT LOCAL AND  
REGIONAL SCIENCE FAIRS



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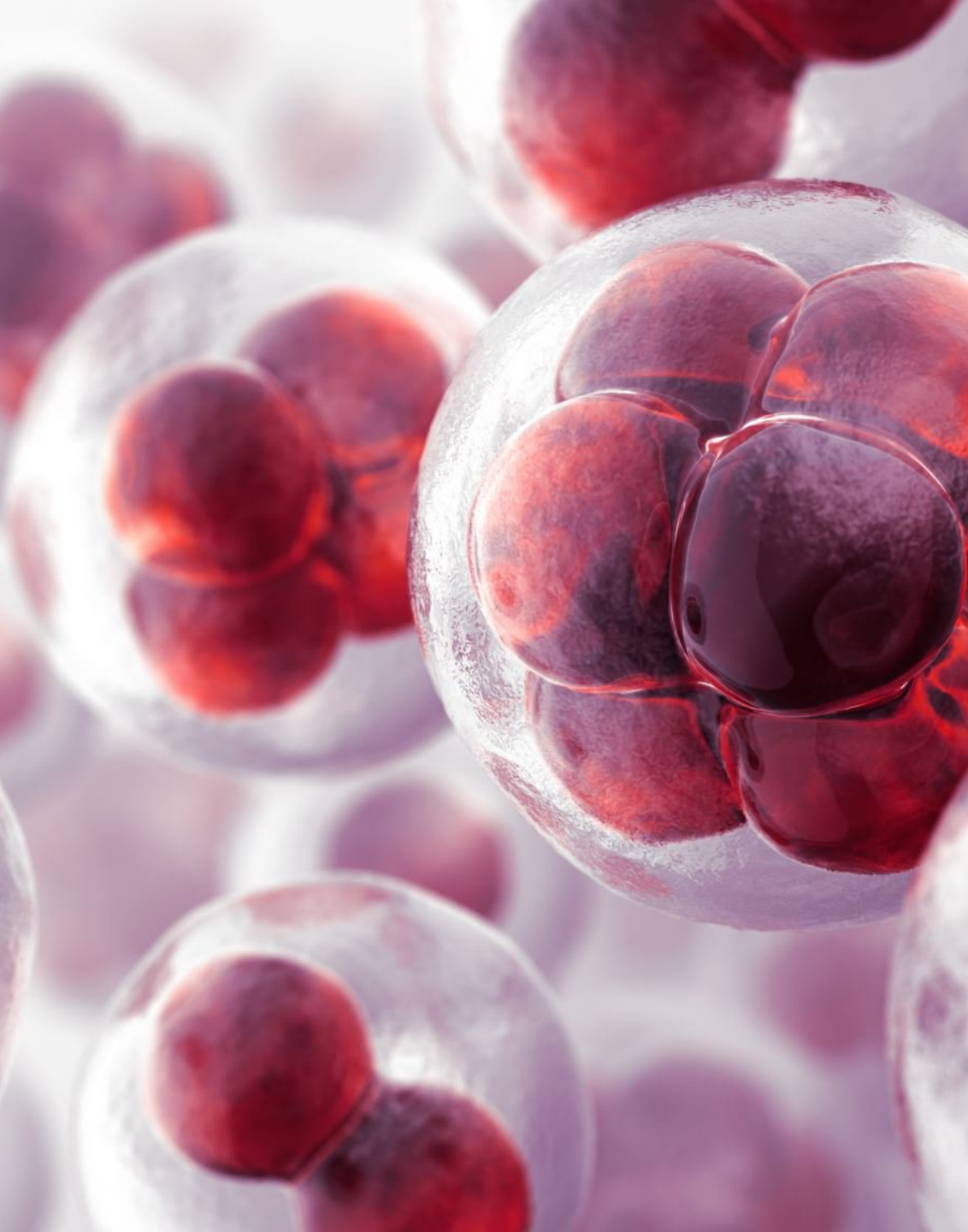
[Yard Sciences in Mount Laurel NJ Lets Kids Experience  
What It's Like to be a Scientist | PHL17.com](#)

Cloning  
Cloning  
Cloning



Roslin Institute,  
Edinburgh  
Dolly and first-born  
lamb, Bonnie.





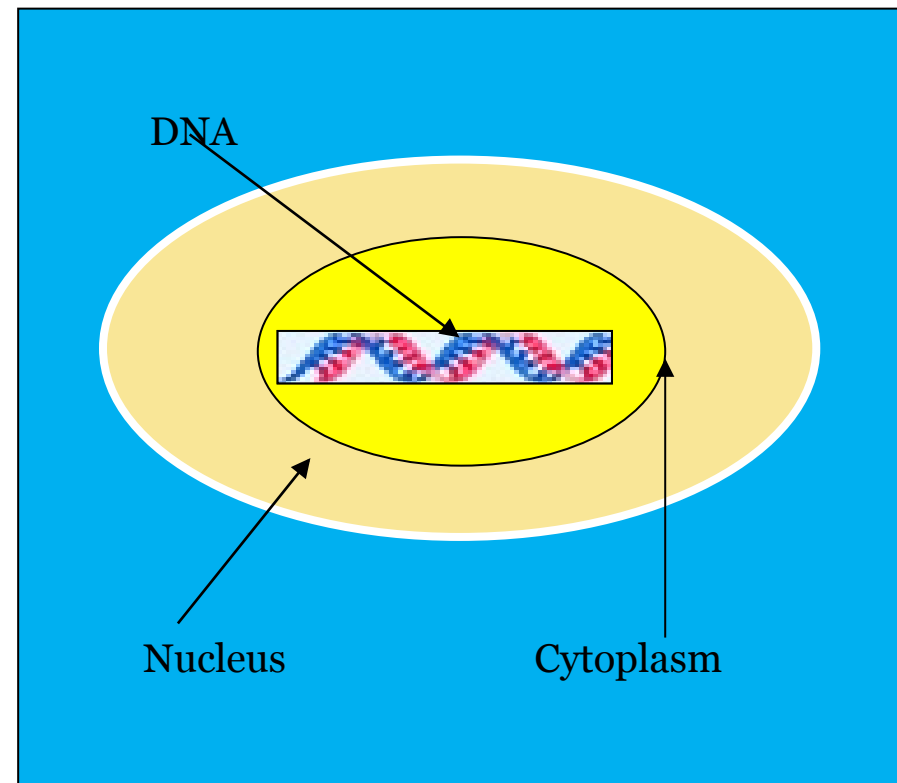
# Overview

- What are cells? Cells are the fundamental, structural, and functional units of living organisms.
- What is cloning? The term, “cloning,” describes several different processes of making identical copies of biological material.
- Why is cloning important? Because it has the potential to treat a wide range of diseases by generating “self ” tissues.



# What Is a Cell?

- Cells are the fundamental structural, and functional units of living organisms.
- Organisms, except bacteria, are made of cells, in which the nucleus is surrounded by a membrane (eukaryotic cells).
- The nucleus contains DNA, which provides instructions for the entire organism.
- As a cell specializes, only DNA related to the particular functions of that cell remains active.

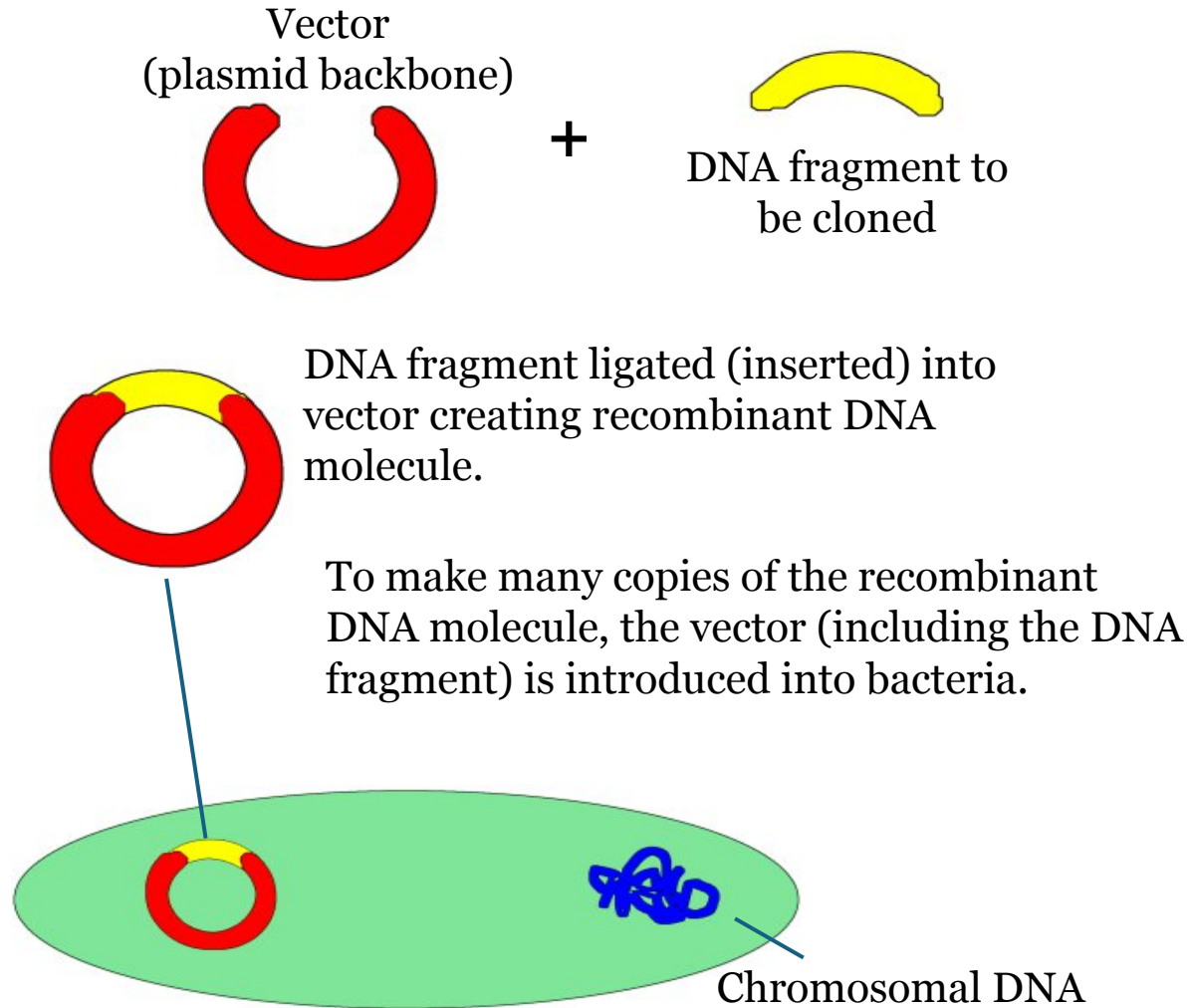


# Cloning Involves Making Identical Copies

“Cloning” can mean several things:

- To make many identical copies of a DNA molecule or a particular stretch of DNA (DNA cloning or molecular cloning).
- To replicate an entire organism (reproductive cloning).
- To produce undifferentiated cells (stem cells) for the purpose of studying and treating diseases (therapeutic cloning).

# Recombinant DNA Technology



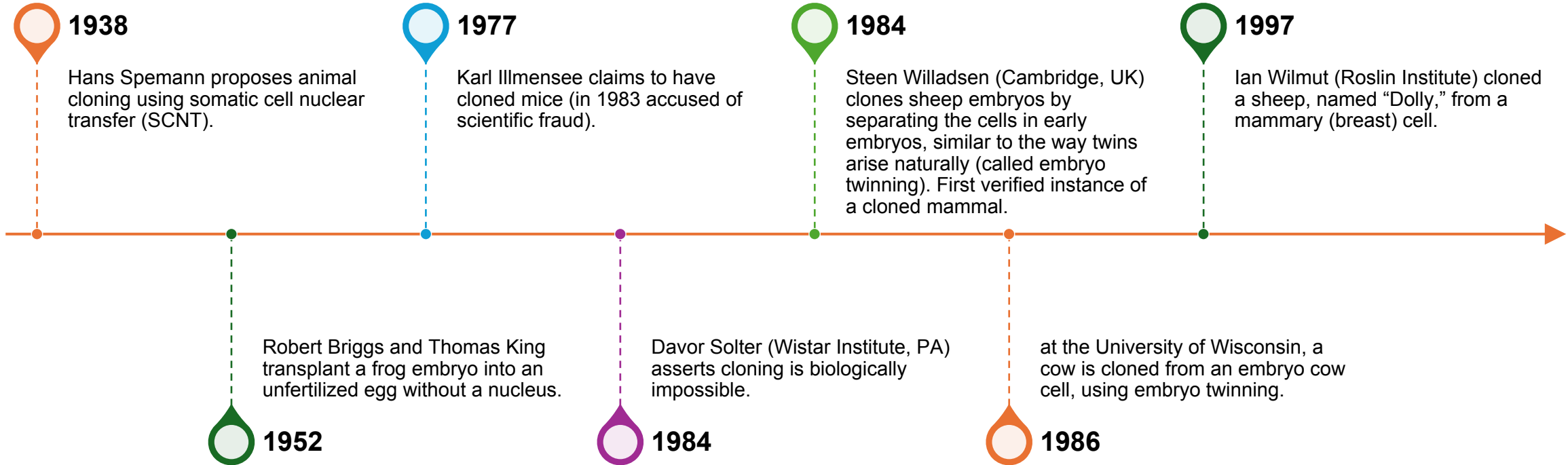
Recombinant DNA technology includes DNA cloning, gene cloning and molecular cloning.


DNA from one organism is transferred to a bacterial plasmid for replication.

Although viruses, bacterial artificial chromosomes, and yeast artificial chromosomes also may be used for replicating DNA, bacterial plasmids are most commonly used in this technology and are called vectors.



# Brief History of Modern Cloning





# Somatic Cell Nuclear Transfer (SCNT)

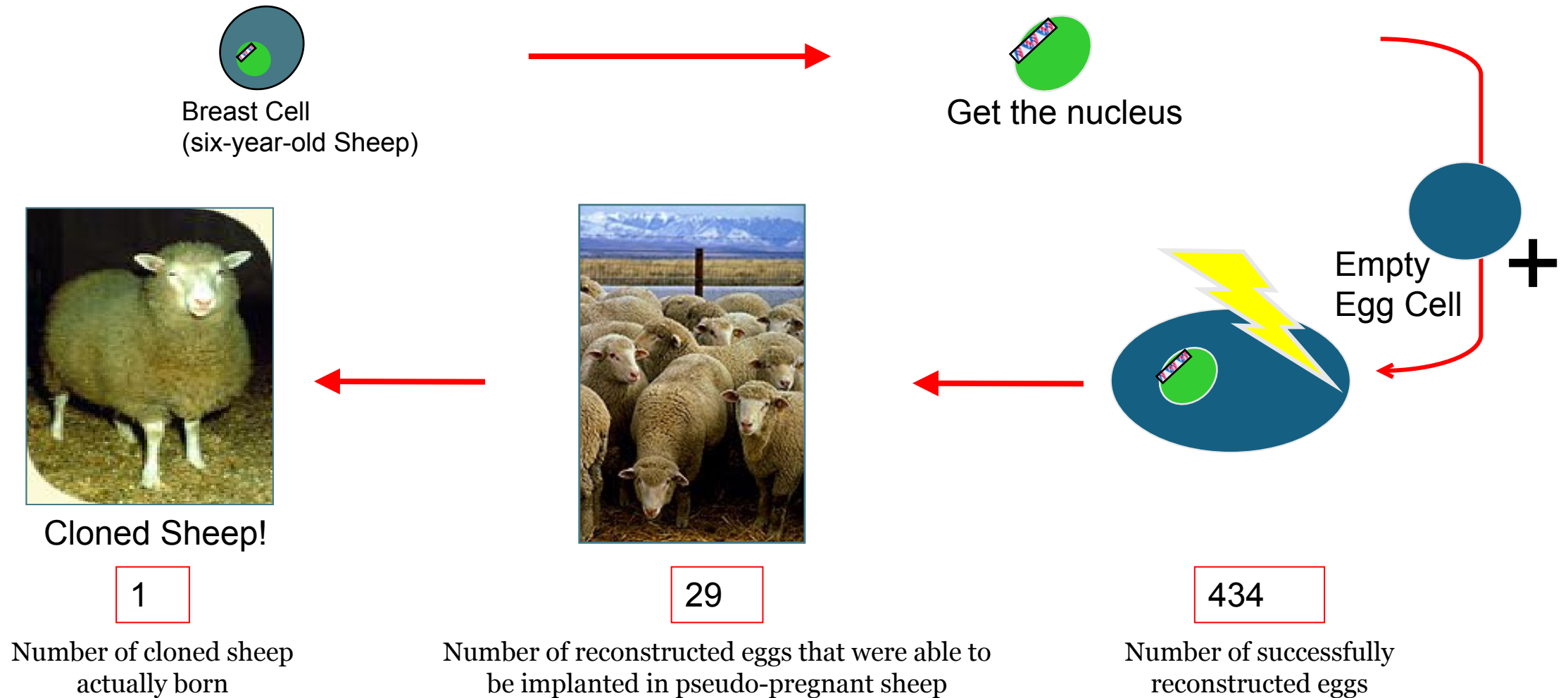
- A somatic cell is any cell that is not a germ cell (egg or sperm).
  - Somatic Cell Nuclear Transfer (SCNT) involves:
    - removing the nucleus from a somatic cell;
    - inserting the nucleus into an egg cell from which the original nucleus has been removed; and
    - “shocking” the implanted cell (chemically or electrically) so it will grow and multiply.
  - The new cell is genetically identical to the donor.
  - SCNT was first demonstrated in 1983 using amphibians.
  - This process was attempted with mammals in 1986, but these experiments were limited to developing embryos.
  - In 1997, the first successful mammal clone from an adult somatic cell was a sheep named Dolly. She was produced by implanting an embryo created by SCNT into a mother sheep.
-



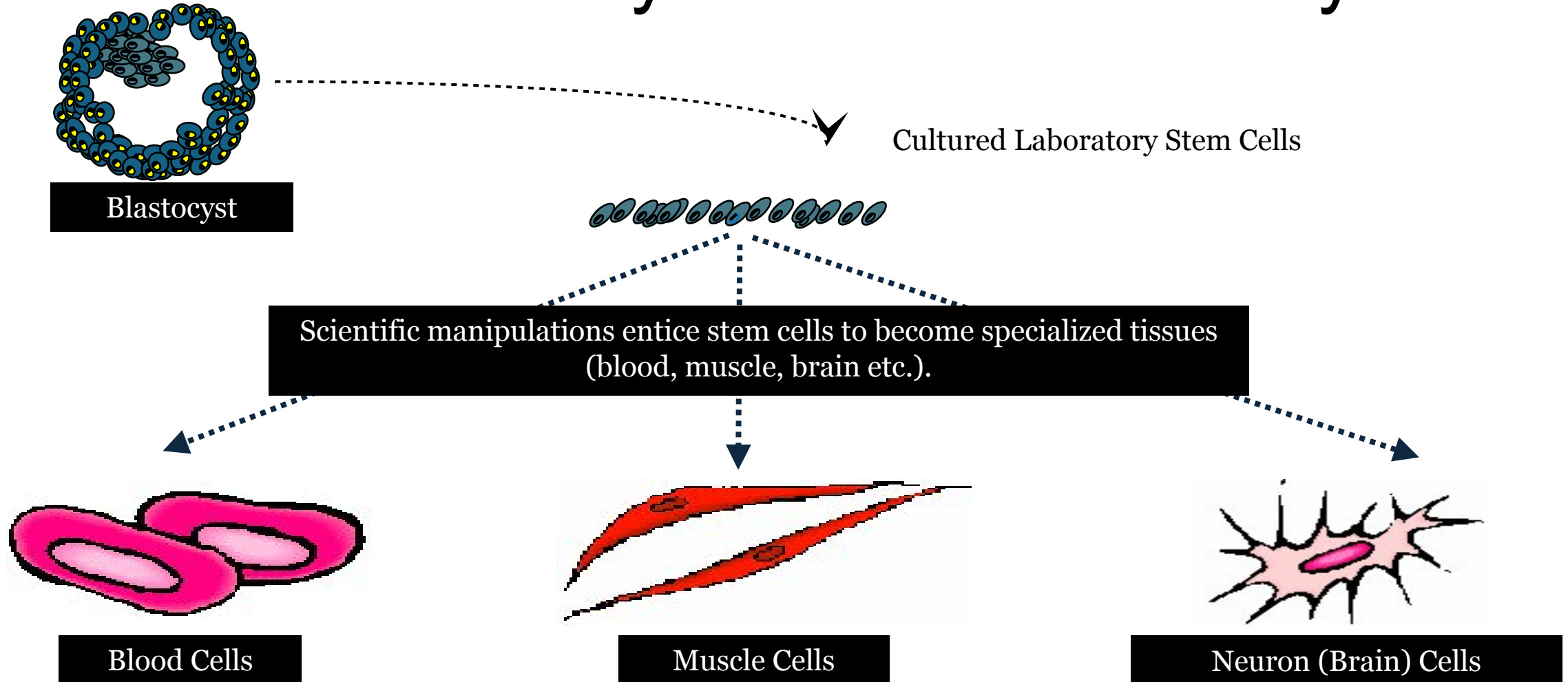
# Nuclear Transfer in Progress



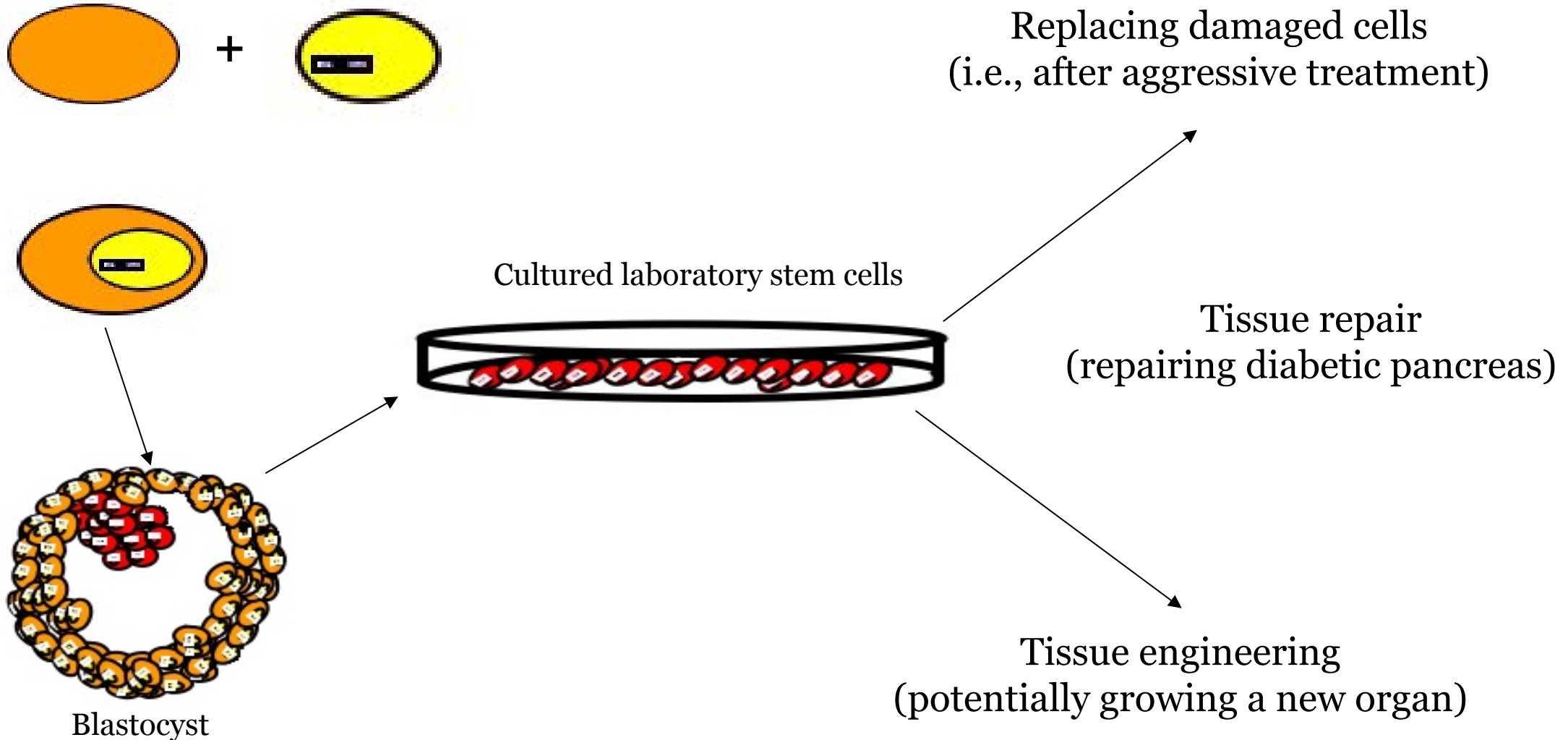
# Somatic Cell Nuclear Transfer (SCNT): Dolly—The First True Clone (1997)



# Embryonic Stem Cells Can Become Any Tissue in the Body



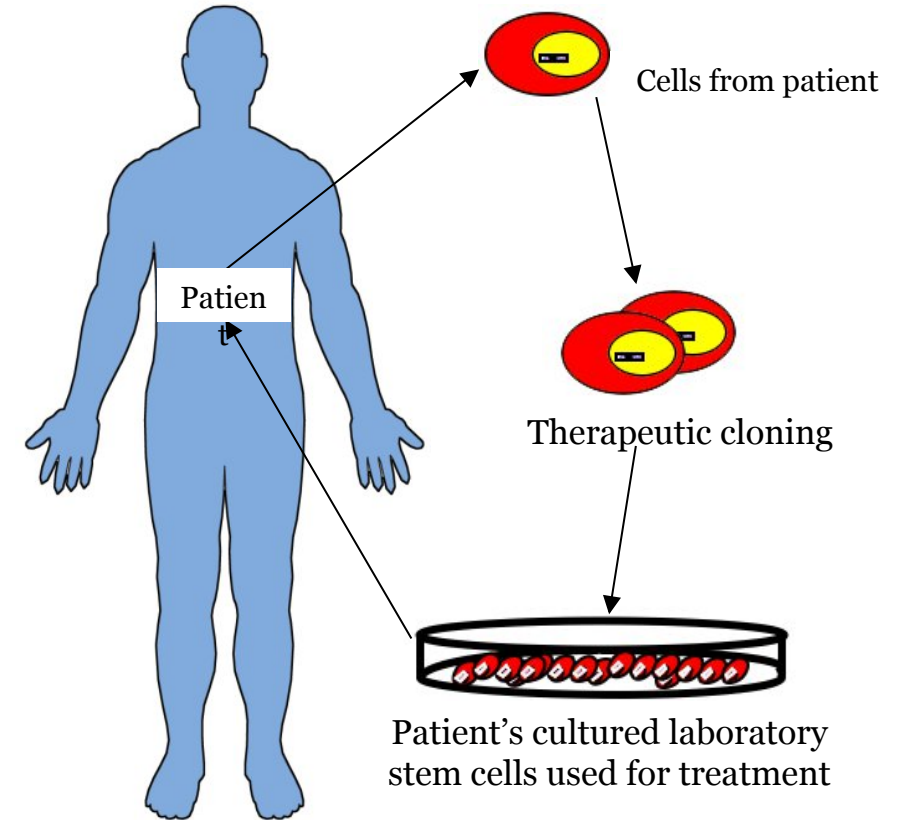
# Stem Cells and Therapeutic Cloning





# Why Use Cloning Technology?

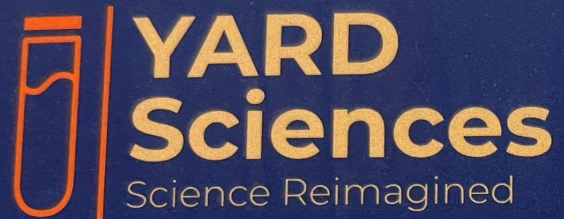
- Using the body's own cells to generate tissues not only provides a plentiful supply but also eliminates tissue rejection.
- The technology potentially could be used to treat a wide range of conditions, from heart damage to diabetes.



# Therapeutic Cloning vs. Reproductive Cloning

- Yields stem cells that have the potential to repair damaged, diseased, or degenerating tissue.
- Could potentially offer a cure for a wide range of diseases.
- No tissue rejection problems.
- Practical clinical applications could take more than 10 years to develop.
- Aimed at production of stem cells only.

- Not generally condoned by scientists.
- Previous cell damage/exposure (UV light, toxic chemicals) is transferred to the clone.
- Potential for a wide range of health problems.
- Shortened life span (cells age more quickly).
- No potential for the treatment of disease. Not practical as a solution for fertility problems.
- Aimed at producing a completely new individual.



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