

*The*  
*Father of Patent Microbiology*  
*Ananda M. Chakrabarty*

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# *The Father of Patent Microbiology*

## *Ananda M. Chakrabarty*

### **Introduction**

Ananda M. Chakrabarty was born in India on 4 April 1938. He attended Sainthia High School, Belur Bidyamandir and St. Xavier's College, Calcutta. Prof. Chakrabarty received his Ph.D. from the University of Calcutta in Kolkata, West Bengal in 1965.

Ananda M. Chakrabarty -Ph.D. is a microbiologist, scientist, and researcher, known for his most notable work in directed evolution and in developing a genetically engineered organism using plasmid transfer while working at GE.

Chakrabarty genetically engineered a new species of *Pseudomonas* bacteria ("the oil-eating bacteria") in 1971 while working for the Research & Development Centre at General Electric Company in Schenectady, New York. Till this time, four known species of oil-metabolizing bacteria were known to exist.

Chakrabarty discovered a method for genetic cross-linking that fixed all four plasmid genes in place and produced a new, stable, bacteria species (now called *Pseudomonas putida*) capable of consuming oil one or two orders of magnitude faster than the previous four strains of oil-eating microbes. The new microbe, which Chakrabarty called "**multi-plasmid hydrocarbon-degrading *Pseudomonas*,**" could digest about two-thirds of the hydrocarbons that would be found in a typical oil spill.

The bacteria drew international attention when he applied for a patent—the first-ever patent for living organism. He was initially denied the patent by the Patent Office because it was thought that the patent code precluded patents on living organisms.

Chakrabarty's landmark research has since paved the way for many patents on genetically modified micro-organisms and other life forms and catapulted him into the international spotlight.

He has isolated a bacterial protein, azurin, with potential antineoplastic properties.

In 2001, Prof. Chakrabarty founded a company, CDG Therapeutics, (incorporated in Delaware) which holds proprietary information related to five patents generated by his work at the University of Illinois at Chicago.

In 2008, Prof. Chakrabarty co-founded a second bio-pharmaceutical discovery company, Amrita Therapeutics Ltd., registered in Ahmedabad, Gujarat, to develop therapies, vaccines and diagnostics effective against cancers and/or other major public health threats derived from bacterial products found in the human body.

Chakrabarty is a Distinguished University Professor in the Department of Microbiology and Immunology in the University of Illinois at Chicago College of Medicine. Apart from being an eminent scientist, Ananda Chakrabarty has been an advisor to judges, governments, and the UN. As one of the founding members of a UNIDO Committee that proposed the establishment of the International Centre for Genetic Engineering & Biotechnology (ICGEB), he has been a member of its Council of Scientific Advisors ever since. He has also served the Stockholm Environment Institute of Sweden. He has been on the Scientific Advisory Board of many academic institutions such as the Michigan



Biotechnology Institute, the Montana State University Centre for Biofilm Engineering, the Centre for Microbial Ecology at the Michigan State University, and the Canadian Bacterial Diseases Network based in Calgary, Canada. Chakrabarty has also served as a member of NIAG, the NATO Industrial Advisory Group based in Brussels, Belgium. He is a member of the Board of Directors of Einstein Institute for Science, Health and the Courts, where he participates in judicial education. More recently, he has been involved in international judicial work, serving as a Scientific Advisor for meetings in Hawaii and Ottawa, Canada, organized by the Supreme Court of Canada. For his work in genetic engineering technology, he was awarded the **Padmashri** by the Government of India in 2007. He is father of **Patent Microbiology**.

#### **Patents of Anand Chakrabarty**

<b>Sr. No.</b>	<b>Title of Patent</b>	<b>Year</b>
1	<b>Mercury Concentration by the use of Microorganisms</b>	1975
2	<b>Microorganisms having Multiple Compatible Degradative Energy-Generating Plasmids and Preparation Thereof</b>	1981
3	<b>Bacteria Capable of Dissimilation of Environmentally Persistent Chemical Compounds</b>	1985
4	<b>Pseudomonas bacteria, emulsifying composition comprising pseudomonas bacteria and method of producing a composition comprising pseudomonas bacteria.</b>	1990
5	<b>Cytotoxic Factors for Modulating Cell Death</b>	2006
6	<b>Compositions and Methods for Treating Conditions Related to Ephrin Signaling with Cupredoxins</b>	2008
7	<b>Compositions and Methods to Concurrently Treat or Prevent Multiple Diseases with Cupredoxins</b>	2009
8	<b>Cytotoxic Factors for Modulating Cell Death</b>	2009
9	<b>Transport Agents for Crossing the Blood-Brain Barrier and into Brain Cancer Cells, and Methods of use Thereof</b>	2010
10	<b>Cupredoxin Derived transport Agents and Methods of use Thereof</b>	2010
11	<b>Compositions and Methods for Treating HIV Infection with Cupredoxin and Cytochrome C</b>	2010
12	<b>Compositions and Methods to Treat Cancer with Cupredoxins and CPG Rich DNA</b>	2011
13	<b>Anticancer Agent</b>	2012
14	<b>Compositions and Methods to Prevent Cancer with Cupredoxins</b>	2012
15	<b>Compositions and Methods to Control Angiogenesis with Cupredoxins</b>	2012
16	<b>Biomedical Device for Cancer Therapy</b>	2014
17	<b>Compositions and Methods for Treating Malara with Cupredoxin and Cytochrome</b>	2014
18	<b>Compositions and Methods for Treating Conditions Related to Ephrin Signaling with Cupredoxins and Mutants Thereof</b>	2015
19	<b>Compositions and Methods for Treating Conditions Related to Ephrin Signaling with Cupredoxins and Mutants Thereof</b>	2016



## References

1. History of Microbiology and Microbiological Methods by A.B.Solunke, R.S. Awasthi, V.S. Hamde, P.R. Thorat. Atharva Publishers Jalgaon.
2. Manual of Methods for Pure Culture Study by A.B.Solunke, V.S. Hamde, P.S.Wakte, R.S.Awasthi. NPI Publishers New Delhi.
3. Compendium of Immunology and virology by A.B.Solunke, S.C. Aithal, V.S. Hamde, R.S. Awasthi. Notion Press.
4. US Patents website.

## Questions.

1. Who is father of patent microbiology?
2. Name of the Microorganism patented by Chakrabarty.
3. How many Patents were done by chakrabarty.
- 34 Name the companies started by Anand Chakrabarty.
5. Name the protein isolated by him that has antineoplastic properties.

