



Name:	ASIS DATTA , Ph.D., D.Sc., FNA., FASc., FNASc., FTWAS
Designation:	Professor of Molecular Biology & Distinguished Scientist Formerly Founder Director & Professor of Eminence, National Institute of Plant Genome Research and Vice Chancellor, Jawaharlal Nehru University, New Delhi) National Institute of Plant Genome Research (NIPGR) Aruna Asaf Ali Marg, JNU Campus, New Delhi- 110067, India
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Area of Specialization	Biochemistry, Molecular Biology, Genetic Engineering & Biotechnology

Career

- Government of India Fellow Bose Institute, Calcutta, (1964-1968)
- Research Associate, Public Health Research Institute New York, USA (1968-1971)
- Assistant Virologist, University of California Los Angeles, USA (1971-1973)
- Visiting Scientist, Roche Institute of Molecular Biology, NY USA (1976-1977, 1980- 1981)
- Associate Professor, School of Life Sciences, JNU (1975-1978)
- Professor, School of Life Sciences, JNU (1978 – 2008)
- Dean & Professor, School of Life Sciences, JNU (1983-1985)
- Rector & Professor, JNU (1993-1996)
- Vice-Chancellor (1996-2002) & Chairman, National Centre for Plant Genome Research, (1998-2002)
- Director, National Institute of Plant Genome Research (June 2002- 2008)
- Professor of Emeritus, Jawaharlal Nehru University (2008 – till date)
- Professor of Eminence, National Institute of Plant Genome Research (2008 – February 28, 2013)
- Distinguished Emeritus Scientist, National Institute of Plant Genome Research (March 1, 2013 –till date)

Major Awards

- **Shanti Swarup Bhatnagar award in Biological Sciences by the CSIR, Government of India (1980).**
- Guha Memorial award (1988)
- **First G.D. Birla award for SCIENCE AND TECHNOLOGY (1991)**
- Dr. Nitya Anand Endowment Award, INSA (1993)
- **FICCI award for R & D in Life Sciences (1994)**
- Om Bhasin award for Science & Technology (1995)
- **Third World Academy Award (TWAS) for Biology (1996)**
- Goyal Prize in Life Sciences for the year 1996
- **Ranbaxy Award in the field of Medical Sciences (Basic Research) for the year 1996.**
- **"Padma Shri" a civilian award of the Govt. of India for the contribution in the field of education (1999)**
- **Indira Gandhi "Priyadarshini Award" (2000)**
- **R.D. Birla National Award for 2000 in Biochemistry /Molecular Biology**
- **Dr. B.R. Ambedkar Centenary Award for Excellence in Biomedical Research, ICMR, Government of India (2003)**
- Bashambar Nath Chopra Memorial Award, INSA (2004)
- **Indian Science Congress –Asutosh Mookerjee Gold Medal Award during 92nd Indian Science Congress at Ahmedabad (2005)**
- **Life time achievement award** in the 93rd Session of Indian Science Congress (January 2006)
- **"Padma Bhusan" a civilian award of the Govt. of India for the contribution in the field of Science and Technology (2008)**
- **Life time achievement award, Biotech Research Society (2011)**
- **Priyadarshini Gold Medal award for outstanding achievements (2011)**
- **G.M. Modi Science award for innovative Science and Technology (2011)**

Distinctions

- UGC National Lecturer (1985)
- NBTB Overseas Associateship (1986)
- Fulbright Fellowship (1987)
- Rockefeller Foundation Fellowship (1988-1992)
- **Fellow, Indian National Science Academy, New Delhi**
- **Fellow, Indian Academy of Sciences, Bangalore**
- **Fellow, National Science Academy, Allahabad**
- **Fellow, Third World Academy of Sciences**
- Sisir Mitra Memorial Lecture, Delhi University, (1992)
- Sectional Presidential address, National Academy of Sciences, Allahabad (1994).
- First Foundation Day Lecture, Sanjay Gandhi PGI of Medical Sciences, Lucknow (1994)
- CSIR Foundation day lecture, Centre for Biotechnology, Delhi, 1994
- CSIR Foundation day lecture, CFTRI, Mysore (1995)
- Platinum Jubilee Lecture, Indian Science Congress Association, Calcutta (1995)
- **Gold Medal for delivering D.M. Bose Endowment Lecture organized by Indian Science News Association (1996).**
- Golden Jubilee Lecture, CFTRI (2000)
- DBT Sponsored Lecture on "Impact of Plant Genomics in Crop Productivity", CIMAP, Lucknow (2000)
- Asia-Pacific Chambers of Commerce & Industry sponsored Lecture on "New Technologies and Structural Changes in the Agriculture Sector on the eve of 18th Biennial Confederation of Asia Pacific Chambers of Commerce and Industry Conference in Ho Chi Minh City, Vietnam (2000)
- **Presidential Address on "Stakeholders dialogue on Agricultural Biotechnology": Biosafety and Economic Implications" organized by TERI at Calcutta (2000)**
- Lecture at the First Chemical Engineering Congress of the Millennium, CHEMCON-2000 at the Science City in Calcutta organized by CHEMBIOTEK Research International, Calcutta
- JC Roy Memorial Lecture, IICB, Calcutta (2001)

- CSIR Foundation Day lecture, CDRI, Lucknow (2001)
- **National Science Day Lecture, NCL, Pune (2001)**
- Key note address on "Present status of Biotechnology and its future" at Indian Merchant Chamber Annual Round Table on achieving prosperity through Biotech in Asia pacific Region" Mumbai (2001)
- Keynote address on the Status of Biotechnology in Agriculture in Asia and the Pacific at FAO sponsored and the Asia pacific Association of Agricultural Research Institute (APAARI) Expert consultation, Bangkok (March, 2002)
- **GN Ramachandran Lecture at 16th FAOBMB Symposium, Taipei (September, 2002)**
- Golden Jubilee Celebration of the discovery of DNA double helix-special lecture (2003)
- Annual Day Lecture, CIMAP, Lucknow (2003)
- Inaugural Lecture in the seminar on "Bio-Horizon", IIT, Delhi (2003)
- Prof. L.S. Ramaswami Memorial Oration Lecture, Rajasthan University (2003)
- Technology Day Lecture, Central Road Research Institute (2003)
- **Technology Day Lecture, ICMR (2003)**
- Dr. Nuggehalhi Narayana Memorial Lecture at IISc. Bangalore (2003).
- Inaugural Lecture at University of Agricultural Sciences, Bangalore (2003)
- **Delivered Presidential Address on " Science and Society in 21st Century: "Quest for Excellence" at 91st Session of Indian Science Congress (January 3, 2004)**
- Foundation Day Lecture, Central Jalma Institute (ICMR), Agra (2004)
- Special Guest of honor, University of Information Technology of Science (UITS), Dhaka (2004)
- Golden Jubilee Series Lecture at Birla Institute of Technology, Ranchi (2005)
- Centenary Celebrations Lecture, Federal Hall Society, Kolkata (2005)
- **Prof. P.C. Mahalanabish Memorial Lecture, West Bengal State Council of Science & Technology (2005)**
- Platinum Jubilee Lecture, Visva Bharati University, Santiniketan (2005)
- **Mahendra Lal Sircar Memorial Lecture, Indian Association for the cultivation of Science, Kolkata (2005)**
- **Invited Lecture, Science & Technology in Society Forum, JETRO Symposium, Kyoto/ Tokyo, Japan (Sept 2005)**
- Invited Lecture, TWAS General Assembly Egypt (2005)
- **Conferred fellowship of West Bengal Academy of Science & Technology (2005)**
- **Sir Edward Melbary Memorial oration, CDRI, Lucknow (2006)**
- Foundation Day Lecture, IARI (2007)
- National Science Day Lecture, CSIR Institutes, Lucknow (2007)
- Gold & Silver Trophy & Gold Medal for exception caliber and outstanding performance in the area of Biological Sciences "Rising Personalities of India Award" awarded by International Penguin Publishing House for the year 2007.
- **Adhar Chandra Mookerjee Award, Calcutta University (2009)**
- Foundation Day Lecture, Indian Institute of Integrative Medicine, Jammu (2010)
- Dr J N Baruah award lecture, Baruah Memorial Trust, Assam (2010)
- Annual Day Lecture, National Botanical Research Institute, Lucknow (2010)
- Foundation Day Lecture, NEERI, Nagpur (2011)
- CSIR Foundation Day Lecture, SMCRI, Bhavnagar (2011)
- Foundation Day Lecture, Tezpur University (2012)

Recognition

General President: Indian Science Congress (2003-2004)

Chairman Recruitment and Assessment Board (RAB), CSIR (2003-2006)

Chairman Integrated Long Term Programme (ILTP), Department of Science & Technology, Government of India (served)

General President: Society of Biological Chemists (2000)

Member Scientific Advisory Committee appointed by Prime Minister of India (served)

Member Steering Committee on Science & Technology for the formulation of Tenth Five Year Plan constituted by the Planning Commission (served)

Member Governing Body, Council of Scientific and Industrial Research (served)

Member Steering Committee on Biotechnology of several State Governments, e.g. Maharashtra, Orissa, Madhya Pradesh and West Bengal.

Fellow (Honorary) West Bengal Academy of Science and Technology

Member Steering Committee, National Bioresource Board

Council Member: Indian National Science Academy (INSA) (served)

Vice-President, National Academy of Sciences India (NASI) (served)

President National Academy of Sciences India (NASI) (served)

HONORS RECEIVED

Conferred D.Sc. (Honoris Causa) of University of Burdwan for life-long contribution in the field of life sciences, (2003)

Conferred D.Sc. (Honoris Causa) of Bidhan Chandra Krishi Vishwavidyalaya (2004)

Conferred D.Sc. (Honoris Causa) of Vidhya Sagar University (2008).

Member Science and Technology Forum, Japan

Member Indian Council of Medical Research (ICMR) 5 Years Review Committee (2005)

Visitor's Nominee (President of India): Delhi University, Central University of Hyderabad, North-Eastern University.

Chairman : Biomedical Board, Indian Council of Medical Research (ICMR)

Chairman : Scientific Advisory Committee (SAC), Vector Control Research Centre, Puducherry (2007 onwards)

Chairman : Scientific Advisory Committee (SAC), National Institute of Cholera and Enteric Diseases, Kolkata (2005-2007)

Member : Governing Body, Indian Council of Medical Research (ICMR) 2007-2010.

Member : Governing Body, Indian Council of Agricultural Research (ICAR) 2007-2010

Member : ICAR Society 2007-2010

Member : General Body, Birla Institute of Science & Technology (2007-)

Chairman : Review Committee IARI (performance of last 5 years)

Member : Board of Governors of ICFAI University, Dehradun

Chairman: Board of Governors, NIT, Silchar

Member: Board of Governors, IIT, Guwahati

Member: Governing body, CSIR Academy (2011-)

Professor Emeritus: Jawaharlal Nehru University

Member, Scientific Advisory Committee of Cabinet (Govt. of India) appointed by Prim Minister.

Immediate Past President: The National Academy of Sciences, India (2009-11).

Chaired and held membership of several academic and professional bodies constituted by the Council of Scientific & Industrial Research; Department of Science & Technology; Department of Biotechnology; Indian Council of Medical Research and several Universities.

Research achievements

Prof. Asis Datta has made significant contributions in the field of molecular biology. The unifying theme of his research has been to unravel the molecular mechanisms, which govern the expression and regulation of eukaryotic genes. The salient features of these contributions are as follows:

I. Allosteric regulation of amino sugar metabolism:

His outstanding contributions led for the first time to the discovery of the role of allosteric enzymes in the regulation of amino sugar metabolism in animal tissues [Biochemistry 9, 3363-3370 (1970) and Biochem. Biophys. Acta 220, 51-60 (1970)]. In recognition of his work, he was invited to contribute two articles in **Methods in Enzymology**.

II. Molecular virology:

As a post-doctoral researcher in USA, Prof. Datta focussed on the central issues of molecular biology, namely elucidation of structure in relation to the synthesis of macromolecules using lipid enveloped double stranded circular DNA bacterial virus PM2 as a model system. An extensive investigation on bacteriophage PM2 and its host-cell led to some important conclusions concerning the alteration in the host cell membrane leading to synthesis of the viral envelope and on the structure of the virion with particular reference to the membrane **[Virology 45, 232-239 (1971) and Nature 236, 131-133 (1972)].** **The discovery of a novel RNA polymerase as one of the structural proteins of the bacteriophage PM2 was the first report of the presence of an enzyme inside the bacterial virus.** This work was **reviewed twice in Nature News and Views (1972).**

III. Regulation of protein synthesis in eukaryotes:

In reticulocytes, Prof. Datta's work (in collaboration with **Nobel Laureate Dr. Severo Ochoa**) has clearly demonstrated that the initiation of protein synthesis in eukaryotic cells is controlled by phosphorylation of the initiation factor. Thus, for the first time, the role of a new initiation factor (eSP or RF or GEF) was reported. **[Proc. Natl. Acad. Sci. USA 74, 3326-3329 (1977)].** Another notable contribution was related to the development of plant embryo, where certain mRNAs are synthesized during embryogenesis and stored to be utilized during germination. In his attempt to understand the regulation of translation of stored messages, Prof. Datta has reported for the first time the presence of two translational inhibitors – a cAMP independent protein kinase and a small molecular weight RNA. This work clearly demonstrated that the presence of these inhibitors is the reason for the inefficiency of the barely embryo cell-free translational system, inspite of the presence of essential components of translational machinery.

IV. MOLECULAR BIOLOGY OF PATHOGENIC YEAST

Gene Regulation in *Candida albicans*, a pathogenic yeast : Prof. Datta has made significant contributions in the field of molecular biology of pathogenic yeast towards understanding the molecular basis of pathogenicity of *Candida albicans*. Prof. Datta's outstanding contributions, which led to the discovery of an inducible N-acetylglucosamine catabolic pathway in highly pathogenic *C. albicans* [**Biochem. J. 178, 427-431 (1979)**], gave him an opportunity to study the virulence factors involved in this organism. **The catabolic pathway, which comprises permease [J. Bacteriol. 144, 1-6 (1980)], kinase [Biochem. Biophys. Acta. 374, 384-391 (1974)], deacetylase and deaminase [J. Biol. Chem. 268, 9206-9214(1993)] was first discovered in Prof. Datta's laboratory at Jawaharlal Nehru University, New Delhi.** The discovery of this novel inducible pathway provided him with the added opportunity to investigate the control of expression of functionally-linked genes of the same pathway [**Proc. Natl. Acad. Sci, USA 97, 14218-14223 (2000)**]. For this most path breaking work which has received considerable international attention, Prof. Datta was invited to write a review article in Advances in **Microbial. Physiology**, Academic Press, London.

C. albicans is capable of a yeast-to-hyphal phase transition (dimorphic transition) and a variety of high frequency phenotypic transitions. This morphogenesis has attracted particular attention, since it is relevant to the virulence of the organism. Prof. Datta's laboratory has demonstrated **for the first time the involvement of Calcium, Calmodulin and protein phosphorylation in morphogenesis of C. albicans [J. Gen. Microbiol. 136, 2149-2154 (1990)]**. In recognition of this work, he published, on invitation from American Society of Microbiology publication, USA, a review chapter which was acclaimed all over the world.

The genes of N-acetylglucosamine catabolism exist in a cluster in the genome [**Proc. Natl. Acad. Sci, USA 97, 14218-14223 (2000)**]. Disruption of this pathway demonstrates its involvement in pathogenesis [**Infection and Immunity, Vol.69, No.12 7898-7903, (2001)**].

Prof. Datta's work has established the relationship between secretion of acid proteinase and pathogenicity [**Infection and Immunity USA, 59, 2972-2977, (1991)**]. His group has isolated the gene encoding secretory acid proteinase, which is implicated as a virulence factor. This gene is present in a unique locus in *C. albicans* genome. Interestingly, this gene encodes a novel transcription factor that can complement the mating defect of *S. cerevisiae* [**J. Biol. Chem. 269, 22945-22951, (1994)**]. Moreover, this gene is also involved in the formation of pseudohyphae and hyphae, suggesting a dual function. Results indicate for the **first time the existence of a signal transduction system (mating pathway) in C. albicans [Biochem. Biophys. Res. Commun. 205, 1079-1085, (1994)]**. Furthermore, the isolation of a putative MAP kinase kinase CaSTE7 (*Candida albicans* STE7 homology) from *C. albicans* which can complement mating defects in signal transduction mutants by constitutively stimulating the STE 12 and hence STE12 dependent processes [**Gene, 190, 99-104(1997)**]. *Candida albicans* mutant of N-acetylglucosamine catabolic pathway genes cluster, including deacetylase (*DAC1*), deaminase (*NAG1*) and kinase (*HXK1*) genes showed attenuated virulence in a murine systemic candidiasis model besides establishing direct correlations of this pathway with adhesion and morphogenesis in *C. albicans*. [**Infection and Immunity, 69 (12), 7898-7903, (2001)**]. This finding opened

up an interesting area of research to investigate the prospective routes of the GlcNAc catabolic pathway regulatory virulence and morphogenetic signaling in several pathogens.

V. Gene regulation in plants :

Prof. Datta has done significant work on tumor-inducing (Ti) plasmid of *Agrobacterium tumefaciens*. A defined segment of Ti plasmid (T-DNA) is transferred to the plant cell nucleus depending on the function of virulence (vir) genes. Prof. Datta's work (in collaboration with Dr. E W Nester) clearly demonstrated for the first time the role of virulence gene (Vir C) in T-DNA processing in *Agrobacterium* [**Proc. Natl. Acad. Sci. USA, 85, 858-8562, (1988) and J. Bacteriology, 171, 6845-6849, (1989)**].

The original finding that barley embryos contain stored mRNA and the translation is prevented till germination by two translational inhibitors [**Plant Physiol. USA, 83, 988-993 (1987)**]

VI. CROP IMPROVEMENT

For more than a decade, Prof. Datta's laboratory has been involved in nutritional genomics. One of the goals of nutritional genomics has been to create crops that are tailored to provide better nutrition for human beings and domesticated animals. As part of a long term programme, Prof. Datta's laboratory isolated two novel genes namely lysine-methionine rich storage protein gene (AmA1) from *Amaranthus* [**Proc. Natl. Acad. Sci. USA, 89, 11774-11778, (1992) and Oxalate decarboxylase gene [J. Biol. Chem. 266, 23548-23553, (1991)]** from a fungus *Collybia velutipes* with an aim to develop transgenic plants. A major target has been the improvement of nutritive value of crop plants in particular the amino acid composition. **AmA1**, on which **India stakes its First International Gene Patent (US Patent No.5670635, 5849352 and 5846736)** is also non-allergenic in nature and was cloned from an edible plant source. AmA1, one of the three plant gene **Worldwide** to be used for the development of GM crops has been successfully used to develop GM potatoes with high nutritional value. This gene, which is responsible for the production of a novel protein of a well balanced amino acid composition, when introduced into potatoes **resulting the enhancement of protein quality and crop productivity** [**Proc. Natl. Acad. Sci, USA, 97, 7, 3724-3729 (2000), Proc. Natl. Acad. Sci, USA, 107(41):17533-8. (2010)**]. This work has drawn attention at global level and has been reviewed /cited in Indian and International publications. Prompted by this success, very recently, commercial potato cultivars have successfully completed field trials of India's first GM Potato. The agronomic performance and nutritional equivalence study of the GM potato varieties have proved its safe consumption. The compilation of the work is going to be placed very soon to Regulatory Committee for approval of large-scale cultivation. In addition, the technology in the industrial processing of animal feed supplement using yeast cells expressing AmA1 protein, has been transferred to Cadila Pharmaceuticals for commercial production.

The discovery of OXDC, the gene encoding oxalate decarboxylase has opened up a new area of research which is relevant to human health. Some green leafy vegetables (e.g. Amaranthus, spinach, rhubarb) are rich sources of vitamins and minerals but they contain **oxalic acid as a nutritional stress factor** because oxalate chelates

calcium and precipitation of calcium oxalate in kidney leads to **hyperoxaluria and destruction of renal tissues**. The production of oxalic acid is an important attacking mechanism utilized by *Whetzelinia sclerotiorum*, a fungus which causes serious damage to crops like sunflower. Recently, his group has developed oxalate –free transgenic tomatoes, which are resistant to pathogenic fungus [**J. Biol. Chem. 275, 7230-7238 (2000)**]. The promising transgenic tomato plants have completed third restricted field trial.

Grass pea is a protein rich pulse crop of dry land agriculture. The only limiting factor associated with this pulse is the presence of a neurotoxin that results in neurolathyrism in humans upon over-consumption. Consumption of *Lathyrus sativus* (Chickling vetch) causes **neurolathyrism**, which is characterized by spasticity of leg muscles, lower limb paralysis, convulsions and death. Hence, despite its rich protein content the pulse is not used as food source. **Four decades of research focusing on the reduction of neurotoxin levels have not resulted in any stable neurotoxin –free lines, till date**. The neurotoxin, β , N-oxalyl, L- α , β -diamino propionic acid (ODAP) is synthesized from oxalic acid. In order to remove ODAP, Dr. Datta's group has developed **low oxalate –ODAP free transgenic grass pea** using OXDC gene, which has completed third year field trial.

For therapeutic usage of OXDC in Nephrolithiasis, both gene and protein therapies in kidney related diseases in rat model have been successful.

Manipulation of genes to increase the shelf- life of fruits and vegetables

The determining factor in the post-harvest deterioration of fruits and vegetables including capsicum and tomato is the rate of softening, which influences shelf- life and limits transportation and storage. These two being the important vegetable fruits for which texture's of utmost importance for consumer acceptance. Thus, softening and subsequent spoilage in these vegetables need to be controlled for extension of shelf-life and effective preservation. In this context, **two novel genes, namely α -D-mannosidase and β -hexosaminidase have been cloned and sequenced**. **Silencing these genes** has given the desired result (**Proc. Natl. Acad. Sci, USA, 107, 4213-4218 (2010), J Exp Bot. 2011 Jan; 62(2):571-82**). These transgenics have been transferred to field for T3 generation.

Expression a single gene leads to many benefits.

In recent years, development of transgenic crops with multiple desirable traits such as drought tolerance pathogen resistance and nutritional quality has emerged as an important area in the field of biotechnology. Introduction of several traits in a crop requires manipulation of more than one gene. **We reported improved drought tolerance and fungal resistance along with the increased iron and polyunsaturated fatty acid content in tomato by expressing a single gene encoding C-5 sterol desaturase (*FvC5SD*) from an edible fungus *Flammulina velutipes* (Scientific Reports (Nature publication) 2: 951 (2012), Nature Protocols. Protocol Exchange doi:10.103 /protex. 2012.061 (2012)]**

PATENTS

Indian

1. A process for the preparation of fragmented nucleic acid useful for diagnosis Candidosis (Indian PatentNo.177707 dated 15.2.97)
2. A process for the preparation of DNA encoding Oxalate decarboxylase from *Collybia velutipes* (Indian Patent No. 425/Del/92 dated 18.5.92).
3. A process for the isolation of DNA encoding a seed specific protein with nutritionally balanced amino acid composition from Amaranthus (Indian Patent No. 227/Del/93 dated 10.03.93).
4. Polynucleotide sequence of fruit softening associated α -mannosidase and its uses for enhancing fruit shelf life ((1647/DEL/2008 dated July 9, 2008)
5. Polynucleotide sequence of fruit softening associated β -D-N-acetyhexosaminidase and its uses for enhancing fruit shelf life ((1648/DEL/2008 dated July 9, 2008).
6. A process for production of anti-diabetic compound in root culture of "Catharanthus roseus" (1649/DEL/2008 dated July 9, 2008)
7. Mutant microorganisms and uses thereof (622/DEL/2012 dated March 2, 2012)

United States and other countries

- 8.Oxalate decarboxylase (US Patent No 5547870 issued on 20.8.96)
9. Seed storage protein with nutritionally balanced amino acid composition (US Patent No.5670635 issued on 23.9.97)
10. AmA1 protein and presumably a composition containing same (US Patent No.5849352 issued on 15. 12. 98)
11. Method of making seed specific DNA (US Patent No.5846736 issued on (8.12.98).
12. Polynucleotide sequence of fruit softening associated β -D-N-acetylhexosaminidase and its uses for enhancing fruit shelf life [IPA-1647/DEL/2008].
13. Polynucleotide sequence of fruit softening associated α -mannosidase and its uses for enhancing fruit shelf life (PCT/IN2009/000387). Published by WIPO on 14.01.2010 (Pub. No. WO/2010/004582) and by the Indian patent office on 16.04.2010 (1647/DEL/2008).
14. Process for production of ant-diabetic compound in root culture of *Catharanthus roseus*) PCT000389). Published by WIPO on 15.01.2010 (Pub. No. WO/2010/004584) and the Indian patent office on 23.04.2010 (1649 DEL/2008).
15. Polynucleotide sequence of fruit softening associated β -D-N-acetyhexosaminidase and its uses for enhancing fruit shelf life (PCT/IN2009/000388). Published by WIPO on 14.01.2010 (Pub. No. WO/2010/004583) and the Indian patent office on 23.04.2010 (1648/DEL/2008).
16. Extra-cellular matrix localized ferritin-1 for iron uptake, storage and stress tolerance (International application No. PCT/IN2007/000231).
17. Recombinant microorganisms and uses thereof [US Patent 13/451,481]

Twenty most significant publications

1.	Datta Asis: Regulatory role of ATP on hog kidney N-acetyl-D-glucosamine -2-epimerase. <i>Biochemistry</i> 9, 3363-3370 (1970)
2	Datta Asis. , Camerini-Otero., R.D., Braunstein S.N. and Franklin R.M: Structure and synthesis of a lipid containing bacteriophage VII. Structural proteins of bacteriophage PM2. <i>Virology</i> 45, 232-239 (1971).
3	Datta Asis and Franklin R.M: DNA -dependent RNA polymerase is associated with bacteriophage PM2. <i>Nature</i> 236, 131-133 (1972)
4	Datta Asis. , de Haro, C., Sierra, J.M. and Ochoa, S: Mechanism of translational control by hemin in reticulocyte lysate. <i>Proc. Natl. Acad. Sci. USA</i> 74, 3326-3329 (1977)
5	Reddy A.S.N., Raina A., Gunnery S and Datta Asis: Regulation of protein synthesis in plant embryo by protein. phosphorylation I. Purification and characterization of a cAMP -independent protein kinase and its endogenous substrate <i>Plant Physiol. USA</i> , 83, 988-993 (1987)
6	Toro N., Datta Asis. , Yanofsky, M and Nester, E.W. Role of the Overdrive Sequence in T-DNA border cleavage in Agrobacterium. <i>Proc. Natl. Acad. Sci.USA</i> ,85,8558-8562 (1988).
7	Ganesan K., Banerjee A and Datta Asis. Molecular Cloning of secretory acid proteinase Gene from <i>Candida albicans</i> and its use as a species specific probe. <i>Infection and Immunity, USA</i> , 59,2972-2977,(1991).
8	Mehta A and Datta Asis. Oxalate decarboxylase from <i>Collybia velutipes</i> : Purification, Characterization cDNA cloning. <i>J. Biol. Chem.</i> 266, 23548-23553 (1991)
9	Raina A and Datta Asis. Molecular cloning of a gene encoding a seed specific protein with nutritionally balanced amino acid composition from <i>Amaranthus</i> , <i>Proc.Natl. Acad. Sci .USA</i> 89 11774 - 11778 (1992)
10	Natarajan K and Datta Asis. Molecular cloning and analysis of the NAG1 cDNA coding for glucosamine-6-phosphate deaminase from <i>Candida albicans</i> . <i>J. Biol. Chem.</i> 268,9206-9214.(1993)
11	Malathi K., Ganesan K and Datta Asis. Identification of a putative transcription factor in <i>Candida albicans</i> that can complement the mating defect of <i>Saccharomyces cerevisiae</i> ste12 mutants. <i>J.Biol.Chem.</i> 269. No.37,22945-22951 (1994).
12	Jyothi M.K., Jamaluddin MS., Natarajan K., Kaur D and Datta Asis. Analysis of the Inducible GlcNAc Catabolic Pathway Gene Cluster in <i>Candida albicans</i> . Discrete GlcNAc Inducible Factors interact at the Promoter of <i>NAG1</i> . <i>Proc. Natl.Acad.Sci, USA</i> 97, 14218-14223 (2000)
13	Kesarwani M., Azam M., Natarajan K., Mehta A., and Datta Asis. Oxalate Decarboxylase from <i>Collybia velutips</i> . Molecular Cloning and Its Over Expression to Confer Resistance to Fungal Infection in Transgenic Tobacco and Tomato. <i>J.Biol.Chem.</i> 275, No.10, 7230-7238(2000)
14	Chakraborty S., Chakraborty N and Datta Asis. Increased nutritive value of transgenic potato by expressing a non-allergenic seed albumin gene from <i>Amaranthus hypochondriacus</i> <i>Proc. Natl. Acad. Sci,USA</i> , 97, 3724-3729 (2000).
15	Chakraborty S., Sarma B., Chakraborty N and Datta Asis. Premature termination RNA polymerase II mediated transcription of a seed protein gene in <i>Schizosaccharmyces pombe</i> . <i>Nucleic Acid Research</i> , 30, 2940-2949 (2002).
16	Meli VK., Ghosh S. , Prabha TN., Chakraborty N., Chakraborty S and Datta Asis. Enhancement of fruit shelf life by suppressing N-glycan processing enzymes. <i>Proc. Natl. Acad. Sci, USA</i> , 107 (6):2413-8, (2010)

17	Chakraborty S., Chakraborty N., Agrawal L Ghosh S., Narula K., Shekhar S., Prakash S Prakash S., Naik., Pande P.C., Chakraborti S.K and Datta Asis . Next generation protein rich potato by expressing a seed protein gene AmA1as a result of proteome rebalancing in transgenic tuber. Proc. Natl. Acad. Sci, USA ,107(41): 17533-8, (2010)
18	Ghosh S., Rao KH., Sengupta M., Bhattacharya SK and Datta Asis . Two gene clusters coordinate for a functional N-acetylglucosamine catabolic pathway in Vibrio cholerae . Mol Microbiol. Jun;80(6):1549-60 (2011).
19	Ghosh, S., Meli, VK. Kumar, A., Thakur, A., Chakraborty, N., Chakraborty, S. and Datta, Asis . The N-glycan processing enzymes α -mannosidase and β -D-1 N acetylhexosaminidase are involved in ripening-associated softening in the non climacteric fruits of capsicum. J Exp Bot. Jan;62(2):571-82 (2011).
20	Kamthan A, Kamthan M, Azam M, Chakraborty N, Chakraborty S, Datta, Asis . Expression of a fungal sterol desaturase improves tomato drought tolerance, pathogen resistance and nutritional quality. Scientific Reports (Nature publication) 2: 951 (2012).