

Babiker Mohamed Ahmed Abdel-Banat, Ph.D.

Associate Professor

Insect Biochemist & Molecular Biotechnologist

Gender: Male

Date of birth: October 29th, 1966

Nationality: Sudanese

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AFFILIATIONS:

- Date Palm Center of Research Excellence, King Faisal University, Saudi Arabia
- Department of Crop Protection, Faculty of Agriculture, University of Khartoum, Shambat 13314, Sudan.
- Department of Applied Molecular Bioscience, Yamaguchi University Graduate School of Medicine, 2-16-1 Tokiwadai, Ube City, Yamaguchi 755-8611, Japan.

EDUCATION:

Ph.D., Insect Biochemistry and Molecular Biology

Tottori University – Japan, 2001

Thesis title: Biochemical Characterization of Chitinases from the Silkworm, *Bombyx mori*, and Their Potentials as Biopesticides

M.Sc., Biological Control

University of Khartoum – Sudan, 1996

Thesis title: Studies on the Natural Enemy Complex of Cereal Stem Borer, *Chilo partellus* (Swinh.) [Lepidoptera: Pyralidae]

B.Sc. (Agric) Class one with Honors [the 1st throughout the Faculty of Agriculture]. University of Khartoum – Sudan, 1993

TEACHING EXPERIENCE:

- Courses taught at the Dept. of Crop Protection, Faculty of Agriculture, University of Khartoum for undergraduate and postgraduate students:-
 - 1- Insects Physiology & Behavior (Master students)
 - 2- Vectors in Relation to Plant Diseases (Master students)
 - 3- Recent Trends of Pest Control (Undergraduates, 5th year students)
 - 4- Economic Entomology (Undergraduates, 4th year students)
 - 5- Vectors of Plant Diseases (Undergraduates, 4th year students)
- Mentored many students for their M.Sc. and PhD dissertations at both Hiroshima and Yamaguchi Universities, Japan for about eight years since 2003 to March 25th, 2011.
- Taught Enzymology and Molecular Biology practical course for students at the Dept. of Biological Science, Faculty of Agriculture, Yamaguchi University, 1999 – 2001.
- Lecturer at the Dept. of Crop Protection, University of Khartoum, 1997 – 2001.
- Taught Agricultural Zoology practical classes for students of Faculty of Animal Production, University of Khartoum from 1994 to 1996.
- Taught the following practical classes for students at the Faculty of Agriculture, University of Khartoum from 1993 to 1996:
 - 1- Agricultural Zoology
 - 2- General Entomology
 - 3- Economic Entomology
 - 4- Acarology
 - 5- Nematology

Adminstration:

- Head, Department of Crop Protection, Faculty of Agriculture, University of Khartoum (January 2013 ~April 2013).
- Coordinator of University of Khartoum Graduate College at the Department of Crop Protection, Faculty of Agriculture (August 2011 ~ January 2013).

FIELDS OF RESEARCH INTEREST:

- Insect biochemistry, molecular biology and genomics.

- Basic and applied molecular biotechnology for environmentally sound energy generation projects (Biofuel Technology).
- Use of eukaryotic cells for biotechnology amendment to develop tools for biopesticides and cancer research.

RESEARCH EXPERIENCE:

Research Project Leader – Dept. of Crop Protection, Faculty of Agriculture, University of Khartoum from 2011 to 2013.

- Led a research project sponsored by DAL Agricultural Company that deals with agriculture production, especially high quality alfalfa production for export. The output of the research was identification of a newly introduced agromyzid fly pest that caused a huge damage to alfalfa industry as well as identification of its natural enemy complex.

Research Associate (Associate Professor) – Yamaguchi University Graduate School of Medicine, Dept. of Applied Molecular Bioscience, April 2007 – March 2011.

Research topics:

- Discovery of novel autonomous replication sequences from the yeast *Kluyveromyces marxianus*.
- Yeast cells spontaneous transformation.
- Fuel ethanol fermentation.
- Eukaryotic chromosomal dynamics.

Visiting Scientist– Hiroshima University, Graduate of Science, Dept. of Mathematical and Life Sciences, 2005 – 2007.

- Executed research project for new technology-based development of gas-gas converting denitrifying plants cells through genetic engineering processes.

JSPS Post-doctoral Fellow – Hiroshima University, Graduate of Science, Dept. of Mathematical and Life Sciences, 2003 – 2005.

- Molecular engineering of fungal denitrification pathway into plant cells.

Post-doctoral Research Fellow – Yamaguchi University, Dept. of Biological Sciences, 2001 – 2003.

- Worked on *Bombyx mori* chitinases and strawberry β -1,3-glucanase enzymes. Purification and molecular characterization as well as their potential use as biopesticides.

SELECTED SKILLS & TECHNIQUES:

Molecular Biology Techniques:

- DNA and RNA isolation • cDNA synthesis • DNA sequencing • Genomic and DNA libraries construction and screening • Northern and Southern analyses
- PFGE • PCR, primer construction and cloning, inverse PCR • Plasmid design • Cloning • GFP engineering and visualization • Fluorescence microscopy

Protein Biochemistry Techniques:

- Protein purification • Protein gel electrophoresis • Protein expression • Enzyme assays • Western blotting • Immunoprecipitation • HPLC

Bioinformatics:

- GenBank searching: BLAST, PSI-BLAST, PHI-BLAST, and FTP • GENETX • WebLogos • Phylogeny • Multiple sequence alignment • Protein sequence analysis tools: ExPASy web site etc.

Computer Skills: Word processing, spreadsheets, databases, design, HTML, and imaging tools and softwares.

LIST OF SCIENTIFIC ACTIVITIES:

1) Alhudaib K.A., Rezk A.A., **Abdel-Banat B.M.A.**, Soliman A.M. Molecular identification of the biotype of whitefly (*Bemisia tabaci*) population inhabiting the eastern region of Saudi Arabia. *Journal of Biological Sciences* 14(8): 494-500 (2014) (DOI: [10.3923/jbs.2014.494.500](https://doi.org/10.3923/jbs.2014.494.500)).

2) Hoshida H., Murakami N., Suzuki A., Tamura R., Asakawa J., **Abdel-Banat B.M.A.**, Nonklang S., Nakamura M., Akada R. Non-homologous end joining-mediated functional marker selection for DNA cloning in the yeast *Kluyveromyces marxianus*. *Yeast* **31**: 29-

29 (2014) (DOI: [10.1002/yea.2993](https://doi.org/10.1002/yea.2993)).

3) Abdel-Banat B.M.A., Hoshida H., Ano A., Nonklang S., Akada R. High-temperature fermentation: how can processes for ethanol production at high temperatures become superior to the traditional process using mesophilic yeast? *Appl. Microbiol. Biotechnol.* **85**: 861-867 (2010).

4) Abdel-Banat B.M.A., Nonklang S., Hoshida H., Akada R. Random and targeted gene integrations through the control of non-homologous end joining in the yeast *Kluyveromyces marxianus*. *Yeast* **27**: 29-39 (2010).

5) Hoshida H., Nonklang S., **Abdel-Banat B.M.A.**, Akada R. High-efficiency transformation technique of thermotolerant yeast and its application to develop flocculating yeast". *Chemical Engineering* **54**:20 [752]-25[757] (2009) [Japanese].

6) Nonklang S., Ano A., **Abdel-Banat B.M.A.**, Saito Y., Hoshida H., Akada R. Construction of flocculent *Kluyveromyces marxianus* strains suitable for high-temperature ethanol fermentation. *Biosci Biotechnol Biochem* **73**:1090-1095 (2009).

7) Abdel-Banat B.M.A., Adam S.H.E., Morikawa H. Functional analysis of *Fusarium oxysporum* nitric oxide reductase expressed in plant suspension-cultured cells. *Biotechnology* **8**: 204-211 (2009).

8) Nonklang S., **Abdel-Banat B.M.A.**, Chai-aim K., Moonjai N., Hoshida H., Limtong S., Yamada M., Akada R. High-temperature ethanol fermentation and transformation with linear DNA in the thermotolerant yeast *Kluyveromyces marxianus* DMKU3-1042. *App Environ Microbiol* **74**: 7514–7521 (2008).

9) Adam S.E.H., **Abdel-Banat B.M.A.**, Sakamoto A., Takahashi M., Morikawa H. Effect of atmospheric nitrogen dioxide on mulukhiya (*Corchorus olitorius*) growth and flowering. *American J Plant Physiol* **3**: 180–184 (2008).

- 10) **Abdel-Banat B.M.A.**, Adam S.E.H., Takahashi M., Sakamoto A., Shoun H., Morikawa H. A fungal cytochrome P-450nor confers denitrifying ability to tobacco BY-2 cells. *Biotechnology* **7**: 250–257 (2008).
- 11) **Abdel-Banat B.M.A.**, Koga D. Alternative splicing of the primary transcript generates heterogeneity within the products of the gene for *Bombyx mori* chitinase. *J Biol Chem* **277**: 30524–30534 (2002).
- 12) **Abdel-Banat B.M.A.**, Zhou W., Karasuda S., Koga D. Analysis of hydrolytic activity of a 65 kDa chitinase from the silkworm, *Bombyx mori*. *Biosci Biotechnol Biochem* **66**: 1119–1122 (2002).
- 13) **Abdel-Banat B.M.A.**, Koga D. A genomic clone for chitinase gene from the silkworm, *Bombyx mori*: structural organization identifies functional motifs. *Insect Biochem Molec Biol* **31**: 497–508 (2001).
- 14) **Abdel-Banat B.M.A.**, Koga D. Molecular cloning of *Bombyx mori* chitinase cDNA: unique insert of 9 base pairs. *Chitin and chitosan research* **7**: 160-161 (2001).
- 15) **Abdel-Banat B.M.A.**, Koga D. Amplification and characterization of a genomic clone for the gene of chitinase from the silkworm, *Bombyx mori*. In *Chitin and Chitosan. Chitin and Chitosan in Life Science*, 473-474 (2001). Edited by T. Uragami, K. Kurita, and T. Fukamizo, Kodansha Scientific Ltd., Tokyo.
- 16) **Abdel-Banat B.M.A.**, Koga D. Nucleotide sequence of *Bombyx mori* chitinase gene from the genomic DNA. *Chitin and chitosan research* **6**: 206-207 (2000).
- 17) **Abdel-Banat B.M.A.**, Kameyama Y., Yoshioka T., Koga D. Purification and Characterization of a 54 kDa chitinase from *Bombyx mori*. *Insect Biochem Molec Biol* **29**: 537-547 (1999).
- 18) **Abdel-Banat B.M.A.**, Hoshida H., Akada R. Autonomously replicating sequences from *Kluyveromyces marxianus* apparently without canonical consensus. In the 2014 Yeast Genetics and Molecular Biology Meeting (July 29 – August 3, 2014), University

of Washington, Seattle, USA. <http://www.genetics-gsa.org/yeast/2014/>

19) Abdel-Banat B.M.A., Asakawa J., Hoshida H., Akada R. Functional validation of *Kluyveromyces marxianus* autonomously replicating sequences. In the 2012 Yeast Genetics and Molecular Biology Meeting (July 31 – August 5, 2012), Princeton University, Princeton, New Jersey, USA.

20) Abdel-Banat B.M.A., Kuroki R., Tokuda S., Hoshida H., Akada R. Repair of DNA double strand breaks in *Kluyveromyces marxianus* generates heterogeneity in chromosomal structure. In the 2012 Yeast Genetics and Molecular Biology Meeting (July 31 – August 5, 2012), Princeton University, Princeton, New Jersey, USA.

21) Murakami N., Abdel-Banat B.M.A., Asakawa J., Kikkawa K., Hoshida H., Akada R. A novel plasmid construction method in the yeast *Kluyveromyces marxianus*. In the 3rd Young Scientist Seminar. Capacity Building and Development of Microbial Potential and Fermentation Technology towards New Era (September 4-5, 2010) Seminar Park, Yamaguchi, Japan.

22) Kuroki R., Abdel-Banat B.M.A., Tokuda S., Hoshida H., Akada R. DNA repair and chromosomal integrity in the yeast *Kluyveromyces marxianus*. In the 3rd Young Scientist Seminar. Capacity Building and Development of Microbial Potential and Fermentation Technology towards New Era (September 4-5, 2010) Seminar Park, Yamaguchi, Japan.

23) Hoshida H., Asakawa J., Abdel-Banat B.M.A., Akada R. Identification and analysis of autonomously replicating sequences of the yeast *Kluyveromyces marxianus* by using efficient non-homologous end joining activity. Chromosome Dynamics: Replication. In the 2010 Yeast Genetics and Molecular Biology Meeting (July 27 – August 1, 2010), University of British Columbia, Vancouver, BC Canada.

24) Abdel-Banat B.M.A., Nonklang S., Hoshida H., Akada R. Insights into random and targeted integrations in the thermotolerant yeast *Kluyveromyces marxianus* DMKU3-1042. Topic 2. Genome stability and recombination. *Yeast*, **26 (S1): S74** (July 2009). In the 24th International Conference on Yeast Genetics and Molecular Biology (19-24 July

2009), Manchester, UK.

25) Abdel-Banat B.M.A., Nakamura J., Nonklang S., Ide M., Sakai R., Cha-aim K., Hoshida H., Akada R. *Kluyveromyces marxianus* as model yeast: high efficiency DNA fragment transformation, gene expression and ethanol fermentation. In the 2008 Yeast Genetics and Molecular Biology Meeting (July 22-27, 2008), University of Toronto, Ontario, Canada.

26) Koga D., Abdel-Banat B.M.A. Alternative splicing of *Bombyx mori* chitinase gene (June 2002). In the 5th International Conference of the European Chitin Society (EUCHIS'02), Trondheim, Norway.

27) Abdel-Banat B.M.A., Koga D. *Bombyx mori* chitinase gene from a genomic clone and some trials on its application for pest management strategies. In the Pacificchem 2000 Conference (December 14–19, 2000), Hawaii, USA.

28) Abdel-Banat B.M.A., Koga D. Molecular cloning of *Bombyx mori* chitinase cDNA: unique insert of 9 base pairs. In the 15th chitin and chitosan symposium (June 2001), Tottori University, Japan.

29) Abdel-Banat B.M.A., Koga D. Molecular cloning of a chitinase cDNA from the silkworm, *Bombyx mori*. In the Japanese Agricultural Chemistry Association Symposium (October 9–10, 2000), Okinawa, Japan.

30) Abdel-Banat B.M.A., Koga D. Nucleotide sequence of *Bombyx mori* chitinase gene from the genomic DNA. In the 14th chitin and chitosan symposium (May 17–18, 2000), Kansai University, Osaka, Japan.

31) Abdel-Banat B.M.A., Koga D. DNA sequence of a genomic clone for the chitinase gene from the silkworm, *Bombyx mori*. In the Japanese Agricultural Chemistry Association symposium (October 9–10, 1999), Ehime University, Japan.

32) Abdel-Banat B.M.A., Kameyama Y., Yoshioka T., Koga D. Analysis of hydrolytic

mechanism of *Bombyx mori* chitinases. In the Japanese Agricultural Chemistry Association Symposium (9 October 1998), Yamaguchi University, Japan.

PATENTS:

- 1) **Patent title:** Flocculent yeast and method for production thereof. Patent application numbers in Japan FUJ-H19049, 2008-069329 and 2008-187206; Application number in U.S. PCT/JP2009/001214. Inventors: Akada R., Nonklang S., Hoshida H., **Abdel-Banat B.M.A.**

- 2) **Patent title:** Gene Cloning via non-homologous end joining in the yeast *Kluyveromyces marxianus*. Patent application number in Japan FUJ-H21048 and 2010-058917. Inventors: Akada R., **Abdel-Banat B.M.A.**, Asakawa J., Hoshida H.

GRANTS (name of grant, year, research theme, amount of grant, leading researcher or collaborator):

Name of grant: Program for Promotion of Basic Research Activities for Innovation Biosciences (PROBRAIN)

Fiscal years: 2007 ~ 2011

Research theme: Molecular mechanism of thermotolerant microorganisms and their application to fermentation technology.

Amount of grant: 250 million Yen (\approx 3 million US\$)

Leading researcher: Prof. Dr. Rinji Akada

SPECIAL REMARKS (award, fellowship, invited lecture, etc):

a) Awards and fellowships:

- JSPS Post-doctoral Fellowship – Hiroshima University, Graduate of Science, Dept. of Mathematical and Life Sciences, Japan, 2003–2005.
- Millennium Project Post-doctoral Research Fellowship – Yamaguchi University, Dept. of Biological Sciences, Japan, 2001– 2003.
- A gold medal for an outstanding Ph.D. research achievement - Tottori University, Japan, March 15th, 2001.

- Japanese Government (MUNBUSHO) scholarship to study for Ph.D. (1997–2001).
- The German Academic Exchange Service (DAAD) scholarship to study for master degree (1993–1996).
- A prize for the best final year student from Arab Organization for Agricultural Development (1993).
- Dr. Tothill prize for the best all–round student passing out of the Faculty of Agriculture (1993).
- A prize for the best final year student in Crop Protection from Arab Organization for Agricultural Development (1993).
- Agricultural Bank prize for the best final year student in Crop Protection (1993).
- A prize from the Sudanese Sugar Production Corporation (LTD) for the best student in subjects related to sugar production & sugar technology (1993).
- A prize from Arab Authority for Agricultural Investment and Development for the best final year student in crop protection (1993).

b) Professional Societies membership:

- Member of Genetics Society of America (GSA).
- Member of Japanese Chitin and Chitosan Society.
- Member of Japanese Agricultural Chemistry Association.

c) Community/Leadership activities:

- Global Yamaguchi Goodwill Ambassador; Appointed by Yamaguchi International Exchange Association – Japan, 2001~ to date.
- Consultant, DAL Agric. Co. group - Sudan, August 2011 ~ March 2013.