

# **Curriculum Vitae, Sameh S.M. Soliman**

## **Personal Statement and bibliography**

For more than 15 years, I got extensive training experience in detection, purification, and manipulation of natural products/ drugs either from plants or microbes. My research interest can be categorized as of two major subjects; Natural Products as potential medicines and Microbial Products. Microbial products can be virulent such as toxins and can be beneficial. Beneficial microbial products can include medicinal products, protein or engineered products and antigens. Microbes can be engineered into a biological device that can be used to produce medicines or antigens and hence can be used to develop antibodies and vaccines for both diagnosis purpose and protection purpose from diseases and infections.

Several tools have been used and developed during my scientific carrier that can help to understand the production habit of natural products (medicines or toxins) and hence their manipulation in particular through biotechnology, genomic analysis and chemical engineering. During my scientific carrier I have been able to contact and collaborate with several institutes in Middle East, Europe and North America which strengthen my knowledge and training experience and hence make me able to develop and improve techniques demanded by the community. Furthermore, I am in a process of developing an entrepreneurship program that help our young university graduates to build their own industry carrier in Pharmaceutical and natural product biotechnology.

During my carrier I was able to publish in highly reputable journals including Current biology, Nature Communication, Journal of Natural Products, Frontiers and BMC, etc... Furthermore, I was able to supervise and teach several graduate students and help them to get several awards or to finish their projects successfully.

My long term plan is to establish a unique well-recognized laboratory in the Middle East with unique experts in natural products and herbal drugs in particular products from engineered microbes. The laboratory will help to develop young and strong scientists and entrepreneurs in the field of natural products and their ability to use several biotechnology techniques.

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## Sameh Soliman, Ph.D

**Department** Medicinal Chemistry  
**Title** Faculty  
Assistant Professor  
**Specialties** Pharmacognosy & Natural Products

## Contact Information

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## Education and Training

INSTITUTION AND LOCATION	DEGREE	Completion Date	FIELD OF STUDY
University of Zagazig, Egypt	B.S.	06/1999	Pharmacy
University of Zagazig, Egypt	M. Sc.	04/2004	Pharmaceutical science/ Pharmacognosy and Natural products Biotechnology
Atomic Energy Organization, Egypt	Training Research Fellow	12/2003	Plant natural products biochemistry and biotechnology
National Research Centre, Cairo, Egypt	Training Research Fellow	08/2005	Biotechnology (molecular biology) of natural products
University of Guelph, Canada	Ph.D.	02/2011	Pharmaceutical Science/ Chemical ecology of natural products
Science and Technology Labs, Government of Canada, Guelph, Canada	PostDoc followed by Research Scientist	06/2013	Fungal toxins and their structural modification by bacterial biotransformation
Chemical and Biomolecular Engineering, UCLA, USA	PostDoc Teaching and Research Fellow	11/2014	Synthetic Biology and Combinatorial Biosynthesis of natural products

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## Employment

Dates	Position	Place
Currently	Faculty Member at Department of Medicinal Chemistry (pharmacognosy and natural products medicine), College of Pharmacy	University of Sharjah, Sharjah, UAE
2014-2015	Assistant Research Professor at School of medicine (fungal pathogenesis by natural metabolites and relevant treatment)	University of California, Los Angeles (UCLA)
2013-2015	PostDoc research and teaching fellow at the Chemical and Biomolecular Engineering Department	University of California, Los Angeles (UCLA)
2012-2014	Assistant Professor, Pharmacognosy and natural products Biotechnology	University of Zagazig, Egypt Guelph
2011-2013	Research Scientist, mycotoxins biotransformation, molecular biology, genomics and proteomics	Science and Technology Centre, Guelph, Canada
2010-2011	Research associate, molecular biology, OAC	University of Guelph, Canada
2007-2010	Research assistant, Chemical Evolution and biochemistry, OAC	University of Guelph, Canada
2006-2007	Instructor, Biochemistry Department, Faculty of Forestry and Environmental biology	University of Newbrunswick, Newbrunswick, Canada
2003-2006	Instructor, pharmacognosy and phytochemistry	Zagazig University, Egypt
1999-2003	Teaching Assistant, Pharmacognosy and Natural Products Biotechnology Department, Faculty of Pharmacy	Zagazig University, Egypt

## Selected Awards and Scholarships

9. First place winner in the 5th UAE Undergraduate Research Competition (Undergraduate)
8. Seventh best oral presentation in Duphat (Undergraduates)
7. Fungal secondary metabolites discovery, detection and modification (NSERC) proposal grant (\$50000.00/year for three years), 2013
6. Natural Sciences and Engineering Research Council of Canada (NSERC) award (\$46000.00/year for two years), 2011-2013
5. Faculty Dean's award, Canada 2010 (\$2000.00)
4. Mrs Fred Ball scholarship, Canada 2007 (\$5000.00)
3. Egyptian Higher education scholarship for four years to pursue PhD in molecular biology and biotechnology, Canada (2006)
2. Best undergrad student at Faculty of Pharmacy (1996)
1. High school best scientific student, Egypt (1993)

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## Professional Service

3. Special research designer for undergrad pharmaceutical and natural products chemistry courses, faculty of pharmacy, Egypt (2005-2006)
2. Assist in designing and writing practical notes for fifth year students, department of Pharmacognosy and Natural Products Biotechnology, Faculty of Pharmacy, Egypt (2004-2006)
1. Assist in writing and reviewing Chromatography, Spectroscopy and medicines of natural products text books for fifth year undergrad students at the Pharmacognosy and Natural Products Biotechnology Department, Faculty of Pharmacy, Zagazig, Egypt (2004-2006)

## Highly Qualified Personnel Trained

- Computer skills, including instat statistics. R- Package, BioPerl, SOAPdenovo genome assembly, BLAST local databases, GraphPad Prism, and Illustrator Photoshop.
- Bioinformatics including Transcriptomics, Genomics (genome assembly and annotation) and Proteomics.
- Spectroscopic analysis including Mass, NMR, UV and IR.
- Chromatographic skills including different chromatographic techniques; TLC, HPLC, Column and Paper, GC-MS and others.
- Molecular Biology, Metabolic engineering and Tissue culture.
- Pharmacology, including Anticancer, Antispasmodic, and Mydriatic assays
- Developing ELISA assay for detection of diseases and toxins
- Several Microscopy techniques including Immunohistochemistry of plant, fungal and microbes, light, dissected Confocal and EM.
- Designing colorimetric assays and Biosensors
- Bacterial Biotransformation
- Fungal and Bacterial transformation
- Mycotoxins and other fungal metabolites analysis
- Biochemistry include protein purification and functional analysis

## Courses Taught

- Pharmacognosy and Natural products for Pharmacy Students, University of Sharjah, UAE.
- Natural products Biopharmaceutics (from gene to metabolites), UCLA, USA
- Metabolomics and Natural Products, University of Guelph, Canada
- Plant Biochemistry and natural product phytochemistry, Faculty of Forestry and Environment, NewBrunswick, Fredericton, Canada
- Introduction to Natural medicines, first year, Faculty of Pharmacy, Egypt
- Pharmacognosy and Natural Products Biotechnology, first and second year, Faculty of Pharmacy, Egypt
- Phytochemistry and Natural Products Biotechnology, third year, Faculty of Pharmacy, Egypt
- Forensic-related medicine, fourth year, Faculty of Pharmacy, Egypt

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- Chromatography, fourth year, Faculty of Pharmacy, Egypt
- Applied pharmacognosy and spectroscopy (Mass, NMR, UV and IR), Faculty of Pharmacy, Egypt.
- Medicines from natural sources, faculty of pharmacy, Egypt

## Additional Contributions to Undergraduate Education

4. Member in the development of PhD program, College of Pharmacy, University of Sharjah
3. Member in Education Quality Assurance and Accreditation to reform undergraduate education, University of Sharjah.
2. Member in Education Quality Assurance and Accreditation to reform undergraduate education, Egypt (2005-2006).
1. Developing pilot program for undergraduate career mentoring, University of Zagazig, Faculty of Pharmacy, Egypt

## Conferences and Presentations

17. International Conference on Pharmaceutical Drugs, Dubai, UAE, May 2017 (oral presentation)
16. 11<sup>th</sup> World Congress on Pharmaceutical Sciences and Innovations in Pharma Industry, Amsterdam, Netherlands, February 2017
15. Second Abu Dhabi Pharmacy Conference (ADPHAC2017), UAE, April 20-22, 2017
14. 4<sup>th</sup> Biotechnology World Congress, Sharjah, UAE (February 2016)
13. 7<sup>th</sup> International Conference on Drug Discovery and Therapy, Sharjah, UAE (February 2016)
12. Faculty development seminar series, December 15<sup>th</sup>, 2015
11. Brasil basic conference at Harbor-UCLA, Medical School, June 16<sup>th</sup> 2015
10. Guest lecture (Evolution of metabolite in nature), UCLA, Los Angeles, USA (2012)
9. Mycored Conference, Poster (Mycotoxins and fungal natural products secretion in plant), Denmark, (June, 2013)
8. Guest Lecturer (Mycotoxins and Fungal natural products), Guelph, AAFC (January, 2013)
7. Guest Presenter (Evolution of natural product metabolic pathway), Guelph, AAFC (December, 2011)
6. Guest Lecturer (Metabolomics), Guelph (March, 2011)
5. ASPB conference, Montreal (August, 2010)
4. Banff Conference, Oral Presenter (July, 2010)
3. CSPP conference, poster presenter (December, 2009).
2. Gordon Conference for natural products; poster presenter (July, 2009)
1. University of Guelph Retreat, Niagara; poster presenter (January, 2008)

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## Supervising and mentoring students

1. Two PhD students at the Science and Technology centre, Canada: Major; bacterial biotransformation of natural toxins
2. Summer students at Chemical and biomolecular engineering, USA: teaching synthetic biology techniques
3. Master students at UCLA, USA: investigation of novel antimicrobial drugs
4. PhD student at UCLA, USA: Currently to investigate mechanisms of toxin-based pathogenesis and their minimization

## Contribution to Science and Publications

### 1. The anticancer drug Taxol from fungal endophyte: Discovery, biotechnology and chemical ecology.

Taxol is one of the most known anticancer drugs and worth more than \$2 billion in annual sales. Several attempts were used in the past to produce the drug in vitro to overcome the market needs for this unique anticancer. However its complicated biosynthetic pathway prohibited these attempts. I have been able to discover novel endophytic fungus with the ability to produce this drug but not in sufficient quantities. I undertook a project to assign taxol partial biosynthetic pathway in a step forward for its manipulation. The mechanisms of sequestration, production, release and ecological function of this drug in its host plant-fungus were identified. The drug is sequestered in hydrophobic bodies and released by exocytosis in a process of protection against pathogen invasion.

- a. **Soliman, S.**, Tsao, R., Raizada, M. (2011) Chemical inhibitors suggest endophytic fungal Paclitaxel is derived from both mevalonate and non-mevalonate-like pathways. *Journal of Natural Products*. 74: 2497–2504.
- b. **Soliman, S.**, Raizada, M. (2013) Interactions between co-habiting fungi elicit synthesis of Taxol from an endophytic fungus in host Taxus plants. *Frontier Microbiology*. 4:1-14
- c. **Soliman S.**, Trobacher C., Tsao R., John Greenwood J. and Raizada M. (2013) A Fungal Endophyte Induces Transcription of Genes Encoding a Redundant Fungicide Pathway in its Host Plant. *BMC Plant Biology*. 13:93-103.
- d. **Soliman, S.**, Greenwood, J., Bombarely, A., Mueller, L., Tsao, R., Mosser, D., Raizada, M. (2015) An endophyte constructs fungicide-containing extracellular barriers for its host plant. *Current Biology*. 25 (19):2570-2576.
- e. **Soliman, S.**, Mosa, K.A., El-Keblawy, A.A., Hussein, M.I. (2017) Exogenous and endogenous increase in fungal GGPP increased fungal Taxol production. *Applied Microbiology and Biotechnology*. 101(20): 7523-7533

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## 2. Discovery of novel antispasmodic and mydriatic natural products.

Discovery of new medicines with more effective and less toxic effects is an important target for most pharmaceutical companies. During my master degree I was able to discover novel antispasmodic and mydriatic agents from their natural source, Hyoscyamus plant. Two known and three novel natural products substances were identified using analytical chemistry techniques and spectroscopy. The effectiveness of the drugs was confirmed by testing in rabbits and guinea pigs. Using tissue culture techniques I was able to produce sufficient amounts of one of these substances in a process of developing lead compound.

- a. **Soliman S**, Dora G, El-Dahmy S (2004). Discovery of Novel antispasmodic and mydriatic alkaloid from Hyoscyamus aureus. Zagazig Pharmacy periodical (and master Thesis)
- b. **Soliman S**, Dora G, El-Dahmy S (2004). Production of scopolamine by Hyoscyamus suspension culture. Zagazig Pharmacy periodical (and master Thesis).

## 3. Discovery of new and effective antimicrobial agents

In ten years, the world will notice a huge shortage in antimicrobials in particular anti-fungal agents according to world health organization and FDA. Thus a great world interest and attraction in developing novel generation of antimicrobials.

- a. **Soliman, S.**, Mohammad H. Semreen, Ali A. El-Keblawy, Arbab Abdullah, Priya Uppuluri and Ashraf S. Ibrahim. (2017). Assessment of herbal drugs for promising anti- Candida activity. BMC Complementary and Alternative Medicine. 17:257.
- b. **Soliman, S.**, Alnajdy, D., El-Keblawy, A.A., Khoder, G., Noreddin, A.M. (2017). Plants' natural products as alternative promising anti-Candida drugs. Pharmacognosy Reviews. 11(22), pp. 104-122

## 4. Discovery of novel toxins from lethal human pathogenic fungi (mucorales) and their roles in pathogenesis along with developing neutralizing antibodies.

For the first time, we have been able to discover two toxins that contribute to the pathogenesis of the mucorales fungi. These two toxins are considered not only novel to the group of mucorales but also to the entire filamentous human pathogenic fungi. The mechanism of pathogenesis by these toxins are assigned and antibodies in process of development. The antibodies will be used for deep understanding their roles in pathogenesis, treatment and diagnostic assay.

- a. Chibucos, M. C., **Soliman, S.**, Gebremariam, T., Lee, H., Daugherty, S., Orvis, J., ... & Kumari, P. (2016). An integrated genomic and transcriptomic survey of mucormycosis- causing fungi. **Nature Communication**, 7.
- b. U.S. Provisional Patent Application Serial No. 62/260,054 (November 25, 2015) "NOVEL FUNGAL TOXINS AND METHODS RELATED TO THE SAME"

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November 25, 2015

(Inventors: **Sameh Soliman** and Ashraf S. Ibrahim).

- c. **Soliman, S.**, et al., Discovery of two novel toxins to the entire filamentous human pathogenic fungi (in preparation)

## 5. Designing a biosensor in detection of nitrogenous metabolites

For the last two decades, the scientific community has been interested in developing a sensitive, fast and effective method for detection of metabolites in situ. We have been able to design a biosensor for nitrogen detection in plant leaves and in soil using fluorescent visualization technique.

- a. Michael T., **Soliman S.**, Raizada M. (2012) Bacterial whole-cell biosensor for glutamine with applications for quantifying and visualizing glutamine in plants. *Applied Environmental Microbiology*. 78(2):604.
- b. US Patent Application No. US 61/499286 (filed June 20, 2012). "Screening for Nitrogen Fixation" (Inventors: Manish Raizada, Michael Tessaro, **Sameh Soliman** and Hanan Shehata).

## 6. Discovery of the mechanism of novel protein (tb1) in plant development

In collaboration with Dr. Gaudin (assistant professor at UC Davis) we have been able to assign the mechanism of a protein that controls the development of root in maize plant and its effect on shoot/root relationship.

- a. Gaudin A, McClymont S, **Soliman S.**, Raizada M. (2014) The effect of altered dosage of a mutant allele of teosinte branched 1 (tb1-ref) on the root system of modern maize. *BMC Genetics*.15:23

## 7. Discovery of novel fungal terpenoid gene cluster responsible for production of novel effective natural product.

Genome mining is a developing technique used to fish out important genes (cluster) in order to manipulate its use in production of effective or cryptic metabolite natural products. Prediction of gene clusters will help to address the biosynthetic pathway of medicinal natural compounds by re-assembling of the pathway of drug into model organism step-by-step to understand the systematic biosynthetic pathway. This is followed by transferring the whole pathway into model organism including yeast, E. coli and A. nidulance. Designing a bacterial cell and/or yeast cell that contain the whole pathway with biosynthesis optimization will increase the production level of a target medicine.

- a. **Soliman S.**, Tang Y. (2015) natural and engineering production of taxadiene with taxadiene synthase. *Biotechnology and Bioengineering* 112 (2), 229-235.
- b. **Soliman S.**, Tang Y. (2014) detection, activation and heterologous production of novel antileukemic agent. *Chemistry and Biology* (In submission).

## 8. Discovery of novel tools in detection and detoxification of fungal mycotoxins.



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In a project related to the government of Canada I have been able to identify the mechanism by which pathogenic fungi accumulate their toxins into intact apple fruit. I have been able to find out that several fungi including *Penicillium*, *Aspergillus*, *Fusarium* and others stay in dormant state in the apple core during the fruit development which is then produce their toxins once they find the suitable condition. Also we have been able to discover novel bacteria that can modify the structure of DON toxin to 400 times less toxic Deoxy-DON or Epi-DON.

- a. **Soliman S**, Sjaarda D, Li X-Z, Svircev A, Zhou T. (2015) Potential mycotoxin contamination risks of apple products associated with fungal flora of apple core. *Food Control* 47, 585–591.
- b. Wang W, **Soliman S**, Li X.\_Z, Zhu H.\_h, Lin Y, Yin Y.\_L, and Zhou T. (2015) Transformation of trichothecene acetyldeoxynivalenol to deoxynivalenol by bacterial acetyltransferase. In: *Medicine Science and Bioengineering*. Wang (Ed.), CRC Press. PP, 775-781. (Book Chapter)
- c. **Soliman S**, Li X-Z, Zhou T. (2015) Novel bacteria with potential detoxification and biocontrol of the plant pathogen *Fusarium* in context of its environmental adaptation. *PLoSOne* (in submission).
- d. **Soliman S**, Zhou T. (2015) Apple matrix initiates mycotoxin production by mycotoxin- producing fungi inhabit apple core. *Food Microbiology* (in revision).

## Selected List of Published Work in My Bibliography:

[http://www.ncbi.nlm.nih.gov/sites/myncbi/1X\\_1elrDIgD5G/bibliography/48968026/public/?sort=date&direction=ascending](http://www.ncbi.nlm.nih.gov/sites/myncbi/1X_1elrDIgD5G/bibliography/48968026/public/?sort=date&direction=ascending)