



Prof. BHALENDU BHATT

EDUCATION:

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| Makerere University, Kampala: | Award of BSc Honours in Chemistry and Biochemistry in March, 1975. |
| University of Nairobi: | Awarded Msc in Chemistry in November, 1978. |
| University of Oslo (Norway): | Awarded NORAD Diploma for scientific research training in September, 1983. |
| University of East Anglia, Norwich (England): | Award Advanced Diploma in Chemical Sciences in July, 1984. |
| University of Nairobi: | Awarded Ph.D in Chemistry in September, 1986. |

WORK EXPERIENCE

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| Part-time Demonstrator | To organic chemistry laboratory classes, October, 1975 - March 1976, at Department of Chemistry, University of Nairobi. |
| Tutorial Fellow | Department of Chemistry, University of Nairobi, 22 nd January 1984 - 9 th June 1985. |
| Assistant Lecturer | Department of Chemistry, University of Nairobi, 10 th June 1985 to 5 th February 1987. |
| Lecturer | Department of Chemistry, University of Nairobi, 5 th February 1987 to 25 th November, 1993. |
| Senior Lecturer | Department of Chemistry, University of Nairobi, 25 th November 1993 to 12 th . November 2003. |
| Associate Professor | Department of chemistry, University of Nairobi, 13 th November 2003 to present time. |

RESEARCH EXPERIENCE

1975 - 2006: Research in the field of Peptide Synthesis and Natural Products Chemistry at University level.

Peptide Synthesis: Synthesis and applications of several carboxamide protecting groups in the synthesis of short peptides (biologically active) based on oxytocin and its analogues.

Natural Product Chemistry:

- i. Extraction and characterization of the industrial oil 'Vernonia oil' from *Vernonia Galamensis* and its industrial applications.
- ii. Extraction, characterization and derivitization of essential oil from chamomilla.
- iii. The chemical analysis of the leaves of *Azadirachta Indica* and the effect of its extracts on the life cycle of the schistosome with the aim to eradicate Bilharzia.

SUPERVISION OF PHD RESEARCH PROJECTS

- i. Amir O. Yusuf, 'Application of Carboxamide Protected Asparagine and Glutamine residues in solid phase peptide synthesis of oxytocin and interferon.'
- ii. David Nyarango, 'Application of Carboxamide Protected Asparagine and Glutamine derivatives in the synthesis of oxytocin Analogues.'
- iii. Abiy Yenesew, 'Chemical investigations of some Leguminous Plants of Kenya for anti-microbial activities.'
- iv. Reuben Roy Kimwoni, 'Vernonia Galamensis' the reactions of Vernonia oil based on the presence of the epoxy ring and the Unsaturated double bond.'
- v. Charles Anthony Ang'edu, 'Anti-viral activity and phytochemical evaluation of Kenyan Hypericaceae and Myrinaceae species.'
- vi. Wawira M. Muriithi, 'Chemical and Pharmacological Studies of some 'Kenyan medical plants traditionally used for the treatment of malaria and leishmanosis.'

SUPERVISION OF MSC RESEARCH PROJECTS

- 1) Amir O. Yusuf, 'Application of Tetralinylamines as carboxamide protecting groups in peptide synthesis.'
- 2) David Nyarango, 'Carboxamide protection in peptide synthesis.'
- 3) Abiy Yenesew, 'Phytochemical studies on some Aloe species of the Saponaria group.'
- 4) Reuben R. Kimwoni, 'The extraction and characterization of Vernonia oil from Vernonia Galamensis seeds and its conservation into dibasic acids and some adhesive resins.'
- 5) F.A.O. Owuor, 'Chemical composition and Biological Activity of the leaf exudates of *Psiadia punctulata*.'
- 6) Ochoki, P.S. 'Phytochemical screening of Certain *Annona*, *Cedrela*, *Ocimum* species and the Biological and Pharmacological activities of their constituents.'
- 7) Okeyo, H., 'Vernonia Galamensis seed: on some of natural epoxy oil used as coatings diluents and plasticizer.'
- 8) Peter K. Cheplogoi, 'Extraction of essential oils, active compounds from *Matricaria chamomilla* L, and their application in toilet soap preparation.'
- 9) Mary Wawira Arthur, 'Extraction and characterization of Vernonia oil and synthesis of N-(Aminoalkyl) Vernolamides and N,N' - polymethylene Bis (Vernolamides).'
- 10) Fred Nyongesa, 'Identification of some of the host-derived attractant compounds for adult tick, *Rhipicephalus Appendiculatus* from cattle ears.'
- 11) Jeremiah Kamau Mwaura, 'Investigation of major chemical components in the roots of *Vernonia Galamensis* ssp. *Nairobiansis*.'
- 12) Mbugua, M.N. 'Chemical identification and characterization of amino and Phosphorated Derivatives of Vernonia oil extracted from *Vernonia galamensis* seeds.'

- 13) Charles Mambo Keyari, 'The synthesis of Vernolamides from Vernonia galamensis oil.'

In addition, I have examined several Ph.D and M.Sc. thesis.

UNDERGRADUATE RESEARCH PROJECTS SUPERVISED

- 1) 'Extraction of oil from a Plant-Lacryma-Jobi,' G. Awinyo, 1990.
- 2) 'Extraction and identification of Vernonia galamensis seed oil.'
- 3) '4-methoxy-2-methylbenzyl group as a carboxamide protecting group in Glu-Glu (NH₂) Peptide synthesis, A.D. Delere, 1990.
- 4) 'Application of 1-Amino-5, 7-dimethyltetration and 4-methoxy-1naphthalene as carboxamide protecting groups in peptide synthesis,' N.O. Owino, 1990.
- 5) Synthesis of cabonyl compounds and their conversion to Amines by Leuckart Reaction for 'Use of Carboxamide Protecting Groups in peptide synthesis' H. .M. Kimani, 1988.
- 6) 'Reaction of Histamine with Amino Acids to form Peptidal Compounds,' B.I. Indulji, 1987.
- 7) 'Isolation of Essential oil from matricartia chamomilla (Kibwezi sample)' C.C.W. Wanjala, 1991.
- 8) 'Extraction of oil from Vernonia galamensis and synthesis of Dibasic acids,' M.A. Wawira, 1991.
- 9) 'Extraction and studies of Physico-chemical Properties of Vernonia oil' C.R. Kivuti, 1991.
- 10) 'Study of the Peptide chains present in the Defatted Residue of Vernonia galamensis seeds,' W.A. Maranga, 1991.
- 11) 'Synthesis of carboxamide protected Amino acid derivatives,' C.N. Wachira, 1995.
- 12) 'Evaluation of Vernonia oil content in three sub-species of Vernonia galamensis, its reaction with 2-Aminopyrimidine and n-Butylamine and its uses for metallic surface coating, B.M. Matheka, 1995.
- 13) 'Synthesis of Asparagine and Glutamine containing peptides, Mburu, 1994.
- 14) 'Extraction and studies of Physio-chemical Properties of Vernonia oil, C.R. Kituti, 1990.
- 15) 'Phytochemical studies of the Leaves of Azachirachta Indica, Kimani, N.J. 1997.
- 16) Synthesis of 1,8- bis (Boc-alanylglycyl) 1,8- diazaoctane and Boc-Tyr (Bzl)-pro-phe - Glu(R')- Asn (R) Gly-benzhydrylamine resin, Ndungu T.M., 1997.
- 17) 'Chemical analysis of the leaves of Azadirachta Indica' by Njagi Eric Chomba, 2001.
- 18) Solid phase peptide synthesis of oxytocin analogue using Fmoc synthetic protocol' by Warui Douglas Mwangi, 2002.

CURRENT RESEARCH INTERESTS

- 1) Synthesis of novel carboxamide protecting groups, testing their suitability as carboxamide protecting groups and their application in peptide synthesis.
- 2) Extraction, purification and chemical modification of vernonia oil, from Vernonia galamensis species. Vernonia galamensis is indigeneous plant of Kenya and can flourish in semi-arid and arid areas in Kenya. Special feature of the Vernonia oil is that it is environmentally safe and has a number of important industrial applications. Thus, a promising new seed crop for establishing an agro-industry in Kenya.

- 3) Extraction, purification and quality control of essential oil from chamomilla. 'Chamazulene' the blue oil. Incorporation of the essential oil in soaps; shampoos and cream.
- 4) The chemical analysis of the leaves of Azadirachtha Indica and the effects of its extracts on the life cycle of the schistosome with the aim to eradicate Bilharzia.

Since October, 1990, I am the coordinator of the four University projects viz.

- The University/Industrial cooperation.
- Model making.
- Information informatics.
- Chamomilla research and development.

CONFERENCES, WORKSHOPS, SEMINARS AND SYMPOSIUM PARTICIPATION

- 1) I was the coordinator and chief rapporteur of the seminar/workshop on University-industrial cooperation, March 1991, Nairobi.
- 2) I participated in the workshop on University-Industry-Agriculture cooperation project. 'Chamomilla' at ICCS Ljubljana, Yugoslavia 24th June - 8th July, 1991.
- 3) NORAD Fellowship for Scientific training, at the University of Oslo (Norway), 1980-1983; I used several advanced instruments in relation to my research work - High pressure liquid chromatography, (HPLC), 200 MHz NMR spectrophotometer C-13 NMR spectrophotometer, mass spectrometer and programmable GLC.
- 4) Fifth International chemistry conference in Africa Gabarone, Botswana, July 1992.
- 5) First NAPRECA - National Symposium on Natural Product, Nairobi, Kenya, November, 1992.
- 6) Kenya Chemical Society inaugural conference, June 7th - 11th, 1993, Nairobi Kenya.
- 7) Presented a research seminar 'Amino acids protection and activation,' to the chemistry department on 21st January, 1977.
- 8) First International Chemistry Conference in Africa,' at the Kenyatta Conference Centre, Nairobi, July 28th - 1st August, 1980.
- 9) In November, 1983, I presented a research seminar on peptide synthesis to members of Faculty and postgraduate students at the chemistry department of University of East Anglia, Norwich England.
- 10) 12th November 1985, I presented a research seminar to the chemistry department of University of Nairobi. 'Carboxamide protection of glutamine and isoasparagine in peptide synthesis.'
- 11) Actively participated in UNESCO sponsored University-Industry cooperation workshop in January 1986.
- 12) Attended a training programme on Desk top publishing using Machintosh computer technology at Comprite in November 1989.
- 13) The First Theoretical Chemistry Workshop in Africa, February 20th - 24th, 1995 at Institute of Nuclear Science, University of Nairobi.
- 14) The Second Theoretical Chemistry Conference in Africa, 1996, Nairobi, Kenya.
- 15) Symposium on Science and Technology in Africa, Gigiri, Nairobi, 14th - 15th, February, 1997.
- 16) Environmental Chemistry Sub-Regional Workshop (Atmospheric Pollution), Nairobi, Kenya, March 10th - 22nd, 1986.
- 17) Attended First Regional Conference on trace elements in Africa, Nairobi, Kenya, March 27th - 30th, 2002.

- 18) Presented two papers at the 9th Symposium of the Natural Product Research Network for East and Central Africa (NAPRECA) 27th - 31st August 2001 at Kenyatta International Conference Centre.
 - a. Bhatt B, Synthesis of Vernolamide, containing tertiary amino groups from Vernonia Galamensis oil and their biological activities.
 - b. Gitu P.M., Design and Synthesis of conformationally constraint glucogen analogies.
- 19) B.M. Bhatt and J. Rajdev, 'The effects of extracts from leaves of Azadirachta India on Schistosoma Cercariae and fresh water snail,' presented to the Kenya Chemical Society seminar 14th September 2001 at Chemistry Department, University of Nairobi.
- 20) Gitu, P.M., B.M Bhatt and Amir Yusuf, 'The cleavage studies of the carboxamide protected derivatives of Asparagies and Glutamine in Trifluoro acetic-acid-dichloromethane-anisole (80:48;2 V/V) and Boron trifluoroaceti acid' - Presented to the fifth International Chemisty Conference in Africa, Gabarone, Botswana, July, 1992.
- 21) Gitu P.M., B.M. Bhatt, D. Nyarango, Amir O. Yusuf and V.J. Hruby, 'Applications of Carboxamide protected derivatives in peptide synthesis,' presented to the first NAPRECA - National Symposium on Natural Product Chemistry, Nairobi, Kenya, November, 1992.
- 22) Kimwoni, R.R., P.M. Gitu, B.M. Bhatt, 'Synthesis of 12,13 - dihydroctadec-9-enoic, Octadenoic and nonadecanoic acids from Vernonia galamensis seed oil' - presented to the Kenya Chemical Society inaugural conference, June 7th - 11th, 1993, Nairobi, Kenya.
- 23) Bhatt B.M., P.M. Gitu, 'Synthesis of carboxamide protected glutamine and isoasparagine derivatives and their cleavages in trifluoroacetic acid-methylene chloride and boron trifluoride with acetic acid' to the first International Chemistry Conference in Africa,' at the Kenyatta Conference Centre, Nairobi, July 28th - 1st August, 1980.
- 24) M.A. Wawrra, P.M. Gitu, B.M. Bhatt, S. Grinberg and P. Mills, presented at the Kenya Chemical Society Conference, September 2nd - 6th, 1996.
- 25) Triterpenes and steroids from Vernonia galamensis Nairobiensis, J.K. Mwaura, P.M. Gitu, S. Grinberg and B.M. Bhatt, presented at the Kenya Chemical Society Conference, September 2nd - 6th, 1996, Eldoret, Kenya.
- 26) Tetralinylamine Resin and Amide support in solid phase peptide synthesis, P.M. Gitu and A.O. Yusuf, B.M. Bhatt and V.O. Ogotu, presented at the Kenya Chemical Society Conference, September, 2nd - 6th 1996, Eldoret, Kenya.

PUBLICATIONS

- 1) Amir O. Yusuf, Bhalendu M. Bhatt* and Peter M. Gitu; 'Protection of the Amide-Side-Chain of Asparagine with the 1-Tetralinyl Group in the Solid-Phase Peptide Synthesis of Lysine-Vasopressin,' South African Journal, Chem, 2002, 55, 87 - 96.
- 2) Amir O. Yusuf, Bhalendu M. Bhatt* and Peter M. Gitu; 'Solid-phase peptide synthesis of isotocin with amide of Asparagine protected with 1-tetralinyl. Trifluoromethanesulphoric acid (TFMSA) deprotection, cleavage and air oxidation of mercapto groups to disulphide; Bull, Chem, Soc. Ethiopia, 2001, 15(2), 143 - 149.
- 3) C.K. Mambo, P.M. Gitu, B.M. Bhatt*, T Chweya, S. Grinberg and D. Mills, Synthesis of Vernolamides containing tertiary amino groups from Vernonia Galamensis oil and their biological activities, Bull, Chem, Soc. Ethiop. 1998, 12(2), 121 - 128.

- 4) Peter M. Gitu, Amir O. Yusuf and Bhalendu M. Bhatt*; Application of tetralinyls as carboxamide protecting groups in peptide synthesis, Bull Chem. Society Ethiopia; 1998 12(1) 35 - 43.
- 5) P.M. Gitu, A.O Yusuf, V.O Ogutu and B.M. Bhatt, 'Application of tetralinyl group in solid-phase peptide, synthesis. International Journal of Biochemisphysics vol. 6 & 7, Nos (1&2), 1998, 7 - 10.
- 6) P.M. Gitu, B.M. Bhatt, D. Nyarango and V.J. Hruly, 'Synthesis of carboxamide, Protected Asparagine and Glutamine Derivative,' International Journal of Biochemisphysics, Vol. 3, 1994, p. 42 - 47.
- 7) Amir O Yusuf, Bhalendu M. Bhatt, and Peter M. Gitu, 'l-Tetralinyl group for asparagine side-chain protection, and application to Boc-solid-phase peptide synthesis of mesotocin,' Journal of the Kenya Chemical Society, Vol.2 no. 1 2004.
- 8) B.M. Bhatt, P.M. Gitu, and A.O. Yusuf, 'Synthesis of 1-Aminotetralin and its derivatives by reductive amination of their corresponding 1-1 tetralones (a Leuckart reaction), International Journal of BioChemiPhysics, vol. 2 Nos. 1 & 2, 1993, 55 - 57.
- 9) P.M. Gitu, B.M. Bhatt, D. Nyarango and V.J. Hruly, 'Solvolysis of carboxamide protected Asparagine and Glutamine derivatives with Boron. Tris (trifluoroacetate) in Trifluoroacetic Acid and in Acetic Acid Solution,' International Journal of BioChemiPhysics, vol. 2, Nos 1 & 2, 1993, 161 - 162.
- 10) P.O. Owuor, J.O. Wanyiera, E.K. Njeru, R.M. Munavu and B.M. Bhatt, 'Comparison of chemical composition and quality changes due to different withering methods in black tea manufacture,' Trop. Sci, 1989, 29, 207 - 213.
- 11) Yusuf A.O, Bhatt, B.M., and Gitu P.M., '1-Tetralinyl as carboxamide - protecting group for Asparagine and Application to N^a-t-Butyloxycarbonyl (Boc) solid - phase peptide synthesis of Oxytocin, submitted for publication to Kenya National Academy of Sciences Journal ref. KTS/A/283 letter dated 20th September, 2001
- 12) R.K. Kamwoni, P.M. Gitu, and B.M. Bhatt, 'Synthesis of 12,13 - dihydroxyoctadec-9-enoic and nonanedoic acids from Vernonia gelamensis seed oil, Kenya Chemical Society inaugural conference proceedings, 110, June, 1993.
- 13) P.M. Gitu, B.M. Bhatt, and O. Nyarango, 'The Kenya Chemical Society Inaugural Conference Proceedings, 118, June, 1993.
- 14) In addition, the following articles written by me have been published in the Nairobi University Chemical Club Magazines (1975 - 1980).
- 15) B.M. Bhatt, 'The Penicillines'
- 16) B.M. Bhatt, 'The tetracyclines'
- 17) B.M. Bhatt, 'A new concept of health'
- 18) B.M. Bhatt, 'An introduction of peptide synthesis'
- 19) B.M. Bhatt, 'A comparative study of the preparations of p-nitrophenyl and N-hydroxysuccinamide tert-butyloxycarbonyl amino acids esters, and synthesis of carboxamide protected isoasparagine and Glutamine derivatives, M.Sc Thesis.
- 20) B.M. Bhatt, 'Carboxamide protection of Glutamine and isoasparagine and synthesis of amino acids derivatives as intermediates in peptide synthesis' PhD Thesis.

EXTRA CURRICULAR ACTIVITIES

DEPARTMENTAL

- i. Secretary to the staff meetings.
- ii. A member of the Social Committee
- iii. A member of the Sub-Committee on writing a curriculum of Industrial chemistry option for B.Sc.

- iv. Chairman of Chamomilla project Sub-committee.

FACULTY

- i. Department's representative to Postgraduate Sub-committee.
- ii. I am, department's representative to 8-4-4 desk-top text book publishing committee.

UNIVERSITY

- i. An assistant coordinating editor of Nairobi University Chemical Club (NUCC).
- ii. Active member of Nairobi University Chemical Club.

NATIONAL AND INTERNATIONAL

- i. A member of NAPRECA (Natural Product Research Network for East and Central Africa).
- ii. A member of the NAPRECA Sub-committee for computer database on natural products.
- iii. A member of the Kenya Chemical Society.
- iv. Editor of the proposed Journal of Kenya Chemical Society.

OTHER ACTIVITIES

- i. Academic referee to a number of papers in the African Academy of Sciences, Scientific Journal, 'Discovery and Innovation.'
- ii. Participated in Nairobi International Show 1989, representing Chemistry Departmental exhibit.
- iii. Served as chief Judge at Nairobi Provisional Students Science Congress in 1994 and 1995.