

Presidential Address

Shaping Minds to Break Through Frontiers in Chemical Research

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I am honored to have been inducted as the President of the Institute of Chemistry Ceylon for the Year 2021/2022 and have now come to the end of my tenure.

Having served as a Senior Academic at University of Colombo for over 4 decades, I have also been associated with the Institute of Chemistry for about 35 years. I have watched the Institute of Chemistry grow productively in many spheres in keeping with the Vision and Mission of the Institute and encompassing the fact that Chemistry is the Central Science. To this end we were able to conduct many activities in spite of the fact that Universities and Schools were not functioning till almost the beginning of the year.

1. Activities

At the **Tertiary Level of Education** we were able to conduct Inter University debate. University of Peradeniya, University of Jaffna, University of Kelaniya, University of Ruhuna, University of Sri Jayawardenapura and College of Chemical Sciences (CCS) participated. University of Jaffna emerged the winners. The Inter University Chemistry Magic Competition was a new activity that was introduced this year in order to enhance creativity among students at the tertiary level. Four teams participated including CCS. Some of the universities although keen on participating could not meet the deadline as students were heavily occupied with continuous examinations in order to catch up the

time lost to the pandemic. The university of Colombo emerged winners with University of Peradeniya securing the 2nd place. Interview of Eminent Scientist is also a new activity introduced this year for the College of Chemical Sciences (CCS) students, in order to expose young minds to frontiers in chemical research, to gain experience in compiling a profile on eminent scientists and their research/inventions and to develop soft skill. Our students were highly praised for their performance by the Scientist being interviewed. e- Colloquiums were held for our CCS students. Most of the speakers were our own students who have succeed in breaking through the frontiers in chemical research. Three such colloquiums were organized during this year. This gave much inspiration to our present students

At the **Secondary Level of Education**, we were able to conduct National Level Chemistry Olympiad 2022 in May this year. This year it was held via Zoom. Those who secure the first four places will enter the International Olympiad 2022 to be held in July. The International Olympiad of 2021 was held in July 2021. Sri Lanka gained 3 bronze medal and one Honorable mention. The Inter School Chemistry Quiz was conducted by the Institute of Chemistry in May this year. Each year the Institute of Chemistry conducts the Australian Chemistry Quiz in Sri Lanka among school children. This has been postponed to July.

Services to Industry

Through the initiative of Dr Sisira Weliwegamage we have been engaged in services to industry, mainly to the paint industry.

The Institute of Chemistry facilitated a Panel discussion on the causes of the LP gas leaks which was moderated by Dr Ranmal Gunathilake. The distinguished panelists were Professor K.R.R. Mahanama, Senior Professor in Chemistry, University of Colombo; Mr. Cyril Suduwella, Former Chief Chemist/ Head of

Laboratories, Ceylon Petroleum Corporation and Mr. Nimal Rathnasiri, Former Chief Chemist of Ceylon Petroleum Corporation.

Three **Popular Lectures** were held this year. One was by experts in the area of Genes, Immunity and Covid 19 Vaccines which was held during the Covid period. Experts in the area of Natural Product Chemistry were resource persons for a Seminar on Advances in Natural Science Research. We also had a very informative seminar on Bioassay Techniques for Life Science Research by Experts in the relevant areas.

The **Women Chemist Committee (WCC)** has been quite active these years. For the second consecutive year, the Women Chemists' Committee of the Institute of Chemistry Ceylon successfully organized "The Sri Lankan Women Chemists Breakfast" to coincide with the IUPAC Global Women Breakfast. The event was held on 15th February 2022 at the Adamantane House, Institute of Chemistry Ceylon along with a live streaming via zoom. To coincide with this event this year, an Essay competition on Women in Chemistry was held. A Photographic abstract competition was also held. The WCC also organized 2 popular lectures. One on "Towards a more inclusive chemistry culture" by Dr Alejandra Palermo, Senior Manager, External Relations, Royal Society of Chemistry, and another inspirational talk on "Multiple Pathway to Success" by Prof. Alison Rodger from the Department of Molecular Sciences, Macquarie University, NSW Australia.

JNO Fernando Commemoration

The commemoration of the 78th birth anniversary and 7th death anniversary of Emeritus Professor J.N.O. Fernando was held on 2nd March 2022. The 7th Prof J.N.O. Fernando memorial oration speech was delivered by Dr. Sathy Iqbal on the topic "Diversity and Inclusivity in Science – An Impediment to Achieving Sustainability". As a part of the series of events in this year's commemoration, the inaugural Prof. J.N.O. Fernando memorial Inter Level Chemistry Knowledge Quiz was held on 1st and 2nd of March. A floral tribute was placed at the statue of Prof JNO Fernando. A fundraiser to collect funds to donate medicines to the Children's ward of the Cancer hospital was very successful. Also, at this event the Dr ROB Wijesekera Commemoration lecture and

the Prof K Balasubramaniam Commemoration lecture were delivered.

This year two volumes of the CCS newsletter and 2 volumes of Chemistry in Sri Lanka were published by the Editorial committee headed by Editor Dr Ranmal Gunethilake. This last issue is dedicating to 20 Years of CCS and has interviews from some eminent persons who were instrumental in establishing the College of Chemical Sciences within the Institute of Chemistry

Infra Structure Development

Our much-awaited new building at Malabe got off the ground in November 2021 and is progressing well. The piling work has been completed. Pile testing also has been carried out and now it will proceed upwards. At least let's hope we can complete 3 or 4 floors of one of the wings expeditiously. This will enable us to increase our intake. With the new laboratories coming up we should be able to provide more students opportunity to carry out research.

2. Educational Programmes

The Institute of Chemistry has played a pivotal role in being the largest provider of Graduate Chemists to a vast array of organizations in the country. This has been largely due to the 'Educational Arm' of the Institute of Chemistry, the College of Chemical Sciences (CCS), which administers the Graduateship in Chemistry (GIC) course (since 1979). A University Grants Commission accredited B.Sc. program in Chemical Sciences got off the ground (commencing 2020) with the 3rd batch of students being just enrolled.

The graph shows the students passing out from the GIC course since 1983. The recipients have not only gained employment in private sector, but many have secured scholarships to universities in developed countries to pursue their higher studies leading to a Doctoral Degree.

At the Convocation held in November 2021, 163 qualified as Graduate Chemists; some of them have already gained scholarships to pursue higher studies in Universities abroad

I am happy to announce that in January this year the Ministry of Education approved the lateral intake

into the BSc (Chemical Science) program. This means that students who enter the Graduateship course have the opportunity to cross over to the degree program provided of the original entry qualifications and other criteria are met.

The LTCC which commenced in 1973 was upgrade to the Diploma in Laboratory Technician Course (DLTC) in 1998 has also been very successful in providing the industry with technical personnel of high quality and in-depth knowledge. The DLT program is now enrolling its 49th batch. The DLT program also received MLT status in 2021 for those following in the Clinical pathway

3. Theme - Shaping Minds to Break through Frontiers in Chemical Research

The introduction of the research project into the curriculum has been a great opportunity to students towards an in-depth interest in research which has no doubt helped them in their studies in developed countries; some of whom have excelled in breaking through the frontiers. I am proud and so would most of you in the audience to have been associated with the CCS for many years and thereby had the opportunity to “shape” the minds of students enabling them to carry out cutting edge research in countries overseas.

Six students College of Chemical Sciences Institute of Chemistry Ceylon and University of Colombo will be present their breakthrough Research at the Theme Seminar to be held on 23rd June.

Dr Chandrasiri Jayakody was my first Post graduate student (jointly with Prof L M V Tillekeratne). He obtained his Ph D in Organic/ Polymer Chemistry from Marquette University, Milwaukee, Wisconsin, USA and at present he is the Director of Innovation and Product Development, Porex Technologies Corporation, Filtration Group, St. Charles, Michigan USA. Dr Angelo Gunsekera was my first undergraduate student. He is at present Senior Director, R&D Chembio Diagnostic Systems Inc, New York, USA & Associate Professor, Department of Chemistry, Stony Brook University, New York, USA. Dr Chandarsiri Jayakody and Dr Angelo Gunsekera have come from USA and are with us on stage. Dr Wasundera Fernando – also did her undergraduate research project under my guidance much later on. She obtained her PhD from Dalhousie

University Canada and subsequently climbed to Postdoctoral Scholar, Department of Pathology, Faculty of Medicine, Dalhousie University NS Canada. Very early in her Graduate studies in Canada she has been interviewed on couple occasion by Canadian TV for her break through research in the area breast cancer research. The three younger ones are all student of CCS Institute of Chemistry have all been taught by me though I have not been their research supervisors, Dr Nuwan Bandara, PhD (Rhode Island) Research Fellow, Australian National University, Australia, Dr Buddini Karawdeniya, PhD (Rhode Island), Research Fellow, Research School of Physics, Australian National University, Australia. Ann Sanoji Samarakkody, PhD (North Dakota) Postdoctoral Research Fellow, Boston Children’s Hospital and Harvard Medical School, Boston, USA. They have all reached the heights of breaking through the Frontiers in Chemical Research. This by no means is the list. There are many more of our student form CCS who have reached great heights in their career and have done cutting edge research.

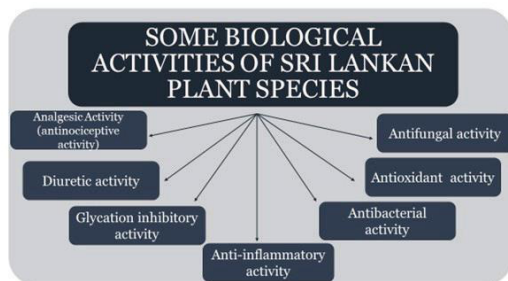
4. Research Overview

At this point I will give an over view of some research carried out at the University of Colombo and at CCS with my Students, which I believe shaped their minds enabling them to engage in cutting edge research and to surpass the frontiers in Chemical research as mentioned above regarding the theme Seminar.

Herbal remedies based on natural products were widely used before the advent of modern pharmacology. Even today, plant-based remedies play an important role in healthcare due to less side effects. Currently majority of the worlds’ population relies mainly on medicinal plants as a source of new drugs which are used to treat various diseases. About 25% of the Drugs form UK and USA have had their origin in plants.

Despite the advances in modern medicine, plant-based remedies are increasingly sort after to alleviate many diseases. Sri Lanka with its great diversity of flora have many plants. Plants, endemic and otherwise which are of pharmacological importance.

Under my supervision students have carried out research on biological activities various parts of plant species.



Anitnociceptive activity (pain relieving)

Aqueous extracts of the leaves of *Pongamia pinnata* (Magul karanda); fruits of *Dillenia retusa* T (Godapara); leaves of *Ixora Coccinea* (Rathmal), leaves of *Tetracera sarmentosa* (Koros wel), bark and stem of *Vernonia zeylanica* (Pupula); leaves of *Justicia gendarusa* (Kalu weraniya); leaves of *Crinum bulbispermum* (Goda manel); bark of *Barringtonia racemosa* (Goda midella), inner stem bark of *Kokoona zeylanica* (Kokun); leaves of *Ficus benghalensis* (Maha nuga) and have been studied for their antinociceptive activity using accepted bioassays in rats. The mechanism of action has also been evaluated in terms of the receptors that are involved and have been related to the chemical constituents that are present in the plant species. In all these studies sedation has been ruled out. Possibility of any overt signs of toxicity, hepatotoxicity, hematoxicity, stress and motor impairment have also been looked into. In some instances, we have been able to validate the use of such plant parts in traditional medicine to combat various ailments.

The aqueous extract of the leaves of *Ficus Bebgalensis* Linn showed hyperalgesic activity.

The Diuretic activity

The Diuretic activity of the aqueous extract of the leaves of *Ricinus communis* (Endaru) was studied on rats. In addition to dose dependent diuretic activity measured in terms of cumulative urine output and diuretic index, mineral ion contents and enzyme levels associated with urinary system were also studied. Toxicity studies were also carried out. This study provided scientific justification for the use of *R. communis* water extract as a diuretic in traditional medicine.

The aqueous extract of *Flueggea leucopyrus* Willd (Katupila) was also the subject of a similar study with positive results.

In another instance the aqueous leaf extract of *Pongamia pinnata* L (magul karanda), did not possess diuretic activity even though it is claimed as such in traditional and folklore medicine.

Glycation Inhibitory Activity

There is much interest in plant-based medicine with antidiabetic and antiglycation properties. Chronic hyperglycemia plays a vital role in the development of long-term diabetic complications by inducing protein glycation and the gradual formation of advanced glycation end products (AGEs) in various body tissues. *Flueggea leucopyrus* Willd a medicinal plant used in traditional medicine in Sri Lanka. The aqueous extract of the whole plant of *Flueggea leucopyrus* Willd not only inhibits α -amylase enzyme, which is known to break starch to glucose, but also inhibits the formation of AGEs, which occur due to chronic hyperglycemia that leads to the onset of diabetic complications as assessed by bovine serum albumin-fructose fluorescence spectrometric assay. This validates the folklore belief that *Flueggea leucopyrus* Willd could be used as a remedy for diabetes. The extract also possesses radical scavenging activity. This extract also possesses significant antioxidant activity, and hence it has good potential as a remedy for many diseases, which are thought to arise due to oxidative stress.

In another study we have shown that the aqueous extract of ripe (fallen) leaves of *Artocarpus heterophyllus* (Kos) possess antiglycation activity compared to the raw leaves picked from tree itself. The in vitro study of aqueous extract of the leaves *Solanum torvum* (Thibbatu) showed that it possesses glycation inhibitory activity thereby having the potential to be used control AGE formation which could delay the onset of diabetes complications. It also possessed radical scavenging activity.

Antioxidant, Anti-inflammatory and Antibacterial Activity.

Many Medicinal plants have been screened for their radical scavenging activity; but will not be listed here. I will only mention the activities that are mainly from unutilized or discarded parts of the plants.

Aqueous leaf extract of Sri Lankan variety of *Garcinia zeylanica* (Kaha goraka/Ela goraka), prepared according to

the method of “Kasaya” in Ayurvedic medicine has shown in vitro radical scavenging activity, anti-inflammatory activity and moderate antibacterial activity against *Bacillus subtilis* and *Staphylococcus aureus*. The aqueous raw leaf extract of *Persea Americana* (Avocado) showed good antioxidant, anti-inflammatory, and antibacterial activity against *Escherichia coli*, *Streptococcus aureus* and *Bacillus subtilis*. The aqueous extract of the seeds (usually discarded) of *Carica papaya* (red lady variety) showed radical scavenging activity, anti-inflammatory activity and antibacterial activity against *Streptococcus aureus* and *Bacillus subtilis*. Aqueous extracts of the whole plant of *Pouteria campechiana* (Kunth) *Baehni* (Lavalu) and the leaves *Aegle marmelos* (Beli) also showed radical scavenging, anti-inflammatory and antibacterial activity.

Antioxidant and Anti-inflammatory Activity.

The aqueous extract of the peel *Nephelium lappaceum* Linn (Rambutan) which is discarded is a good source of antioxidants and also showed in vitro anti-inflammatory activity as are the aqueous extract of the leaves *Durio zibethinus* (Durian) and *Flacourtia inermis* (Lovi).

Antioxidant and Antibacterial Activity.

The methanol, acetone and ethyl acetate extracts of the skin, leaves and seeds of *Cucurbita maxima* and *Curcubita moschata* while possessing radical scavenging activity to different extents; the methanol and acetone extracts of the skin and the ethyl acetate extract of the seeds of *Curcubita maxima* showed antibacterial activity against *Staphylococcus aureus* and the methanol and ethyl acetate extract showed activity against *Bacillus subtilis*. In the case *Curcubita moschata* all extracts of skin and seed as well as the methanol extract of leaves gave positive results for *Bacillus subtilis*. The three extracts of skin and the acetone extract of leaves showed anti-bacterial activity against *Escherichia coli*.

In another series of studies in search anti bacterialal compounds an Anti MRSA isoflavonoid was isolated from the ethyl acetate water extract of the leaves of *Derris scandens*.

Antifungal activity

Psoralen, isolated from the leaf extract of *Ficus racemosa* (Attikka) was shown to inhibit many plant

pathogenic fungi and was biodegradable as well, with the potential to be developed as a fungicide against pathogens causing disease on crops.

Isolation of scolpoletin from leaves of *Hevea brasiliensis* and its effect on pathogens of *H. brasiliensis*, *Rigidoporus lignosus* and *Cylindrocladium quinqueseptatum* gave positive results. Extracts of the bark of *Barringtonia ceylanica* inhibited the plant pathogenic fungi *Curvularia sp*, *Colletotrichum gloeosporioides* and *Rhizoctonia solani*. Leaf extracts of *Cassia alata* (Eth thora) have shown antifungal activity against plant pathogenic fungi *Rhizoctonia solani* and *Rigidoporus microporus*.

5. Acknowledgments

Last but not least I would like to acknowledge many persons who supported me during my tenure as President.

Members of Council year 2021/2022

Special thanks to Mr N M S Hettigedera, President – Elect and soon to be President, for the tremendous input w r t to accounts, taxes, and audit matters at a time we were sailing in very turbulent weather. Thank you to the two Council Secretaries, Dr Medha Guneratne, and Dr Manuja Lamabadusuriya, both are my former students at university, who in spite of their own busy academic schedule, attended to many communications and documentations. Thank you to the Treasure Prof Kapila Seneveratne for the steering and streamlining the accounts division during rough times. To all the office bearers who contributed in numerous ways a special thank you. To the Elected Members a warm thank you for the support extended in various ways. Your presence in the Council was a strength to me.

Special thanks to Prof Priyani Paranagama, Director Institute of Indigenous Medicine of University of Colombo and Senior Professor University of Kelaniya for enlightening and guiding the Internal Academic staff on how to compile a Corporate Plan and Activity Plan.

Acknowledgments to Activity Coordinators and Committees

- Dr Kushan Weerasiri and committee - Interuniversity debate

- Dr Sisira Weliegamage and Dr Savidya Jayawardena and committee - Interuniversity Chemistry magic Competition
- Prof Ramanee Wijesekera and Ms Binelka Siriwardena for training students to Interview Eminent Scientist
- Dr Ranmal Gunathilake - for organizing e-colloquiums
- Dr Ireshika de Silva and committee - Chemistry Olympiad
- Dr Kushan Weerasiri and committee - Interschool Chemistry Quiz
- Dr Sisira Weliegamage and Dr Chandana Perera - Services to Industry
- Prof Nimal Punyasiri and committee - Seminars
- Professor Priyani Paranagama and Dr Dinusha Udukala and committee - Women Chemist Committee
- Dr Medha Gunaratne and Dr Suranga Wickramarachchi - Essay Competition and Photo Abstract Competition (WCC)
- Mr K R Dayanada and Dr Ranmal Gunathileke - JNO Fernando Commemoration Events
- Dr Ranmal Gunathilke and Committee - CCS Newsletters and Chemistry in Sri Lanka
- Dr Ranmal Gunathilake for leading the student enrollment campaign
- Dr Sisira Weliegamage and Dr Chandana Perera - Malabe Campus liaising with Contactor and Consultant

Academic Staff

The newly appointed Dean, Professor Ramanee Wijesekera took office on 15th July 2021. I thank the Dean, Heads of Department, Dr T Gobika and Dr Sisira Weliegamage and the Internal Academic Staff for their support to me during my tenure.

New appointments - Senior Lecturers Dr S Jayawardena, Dr Asanka Ratnayake and Dr Kushan Weerasiri who were appointed on contract were absorbed into the Permanent cadre w.e.f. 1st January 2022.

To all the Teaching Assistants who are mostly our own students a big thank you for all the support you

gave to the activities that were conducted in addition to your busy schedule in assisting the laboratory classes and other teaching schedules.

Administrative Staff

The appointment of Mr Geeth Karunaratne as Registrar, at the onset of my Presidency was a substantial benefit to streamlining the administrative activities and to the infra structural activities of the Institute; much had to be attended to.

Mr N I N S Nadarasa continues as Senior Administrative Executive and has kept the institutes activities well publicized in the press through his contacts with no cost to the Institute. I also thank him for his involvement in the Induction Ceremony, Convocation, Annual sessions, and fund raising for the Newspaper advertisements. Besides these duties many other works were handed over to him from time to time which he did very willingly.

New Appointment of a Senior Accountant Mr Kasun Perera strengthened the accounts division and also substantiate the increas in work load of the accounts branch due to institute paying taxes, new building matters and increased amount of activity of the institute.

A big thankyou to Assistant Registrar (Examinations), Assistant Registrar (Administration), Programme Coordinator (DLT) and to the Scientific Officer for their support.

Non-Academic Staff

I am much thankful Non-Academic Staff of the Institute of Chemistry, for their tremendous support to me during my Presidency. A special thankyou to Mr Sahan Jayasingha and Mr Hasantha Abeyrathna for the extend help given to me in numerous ways. Mr Hasantha Abeyrathna was promoted from Educational Assistant to Education and Service Officer.

New Recruitments - Ms. Kumudini Satharasinghe, Management Officer, Examinations and Ms. W Gehani Chamini, Management Assistant, DLT were appointed during this year.

Ms. B P Hemakumara, Librarian (to fill the vacancy due to the resignation of Ms. Ira Hendawitharana) will assume duties in July.

Sponsors

I would like to thank the sponsors who contribute to my Presidential year 2021/2022, A special thank you to Prof Eugen De Silva who contributed very generously. To all my dear Colleagues, Students and Well Wishes around the globe for their contribution. Each contribution is

most welcome. To the few Industries and banks that gave sponsorship once again and thank you. All the names will be displayed on the screen during the Presidential Address on the 22nd of June at Sri Lanka Foundation Institute and also live stream *via* Zoom.

Prof. Srianthie Deraniyagala graduated from the University of Colombo with a BSc (Honours) in Chemistry, and obtained her PhD from Dalhousie University, Canada in the area of Bio-Organic Chemistry. She has over 42 years of service at the University of Colombo where she served as a Senior Professor in the Department of Chemistry. She currently serves as a visiting lecturer at the College of Chemical Sciences, Institute of Chemistry Ceylon.

Chief Guest at the 51st Annual Sessions

Mr. Asoka Hettigoda

Chief Guest's Address

Mr. Asoka Hettigoda

Chairman & Managing Director, Hettigoda Group of Companies



It is a great honor and a privilege to address the annual Sessions of the Institute of Chemistry of Ceylon 2022, especially at a time when your esteemed institute have just celebrated 50 years in 2021. It is also comforting to see many known faces in the audience who have made a tremendous contribution to the field of Chemistry in Sri Lanka.

Let me first congratulate all those who are presenting research papers today and especially who have won various awards. You are embarking on a life long journey using all the skills, learning and experiences to create a better life for yourself and a better environment for all of us. You have shown the ability to withstand strong competition, societal pressures, to successfully complete your course of education. This should be the first of many milestones that you will achieve in life and remember to make alma mater proud in all your future endeavors.

Historically, many countries have faced numerous

economic, political and other uncertainties of varying consequence. Country planners deal with these challenges by relying on past experiences and established structures. Currently, Sri Lanka is in a serious crisis where uncertainty has reached extreme levels. Solutions that we are aware of are inadequate and we are running out of options.

Today, I will discuss how members of your esteemed institution can help our country to overcome the serious crises we are in. Your solutions must be sustainable and should provide immediate results as we are facing huge challenges in food security, shortage of medicines and energy. We all have seen and been part of long queues to obtain these basic essentials and many of us have wasted lots of valuable hours and most importantly dampen the hopes of the future generations.

To resolve these critical issues, I believe new technologies coupled with out-of-the-box thinking can spur sustainable development and give a push to achieving equitable growth in Sri Lanka. Technology has become part and parcel of our lives today, making us demanding for newer technologies. Developed countries are blessed to experience new technologies while due to globalization, poorer countries are not far behind, sometimes leapfrogging the natural introduction cycles. However, not all new technologies are accepted as they now have to be sustainable. Hence, the primary criterion is technologies that promote sustainable development.