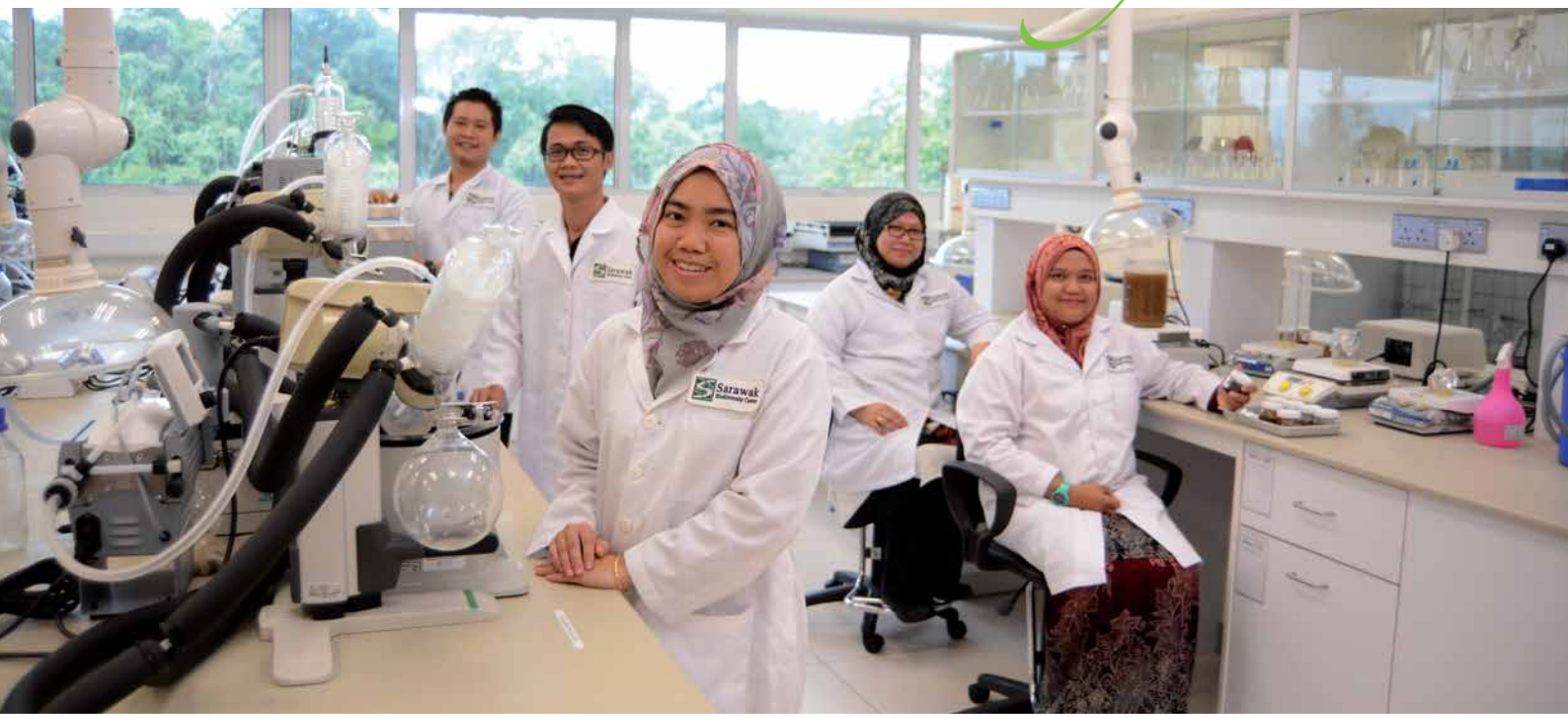
Sarawak
Biodiversity Centre
www.sbc.org.my

# The Sarawak Biodiversity Centre's *Journey*



*Celebrating* ***21*** *years of*

***Discovery*** *and* ***Innovation*** *in* ***Biodiversity***

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***Discovery*** *and* ***Innovation*** *in* ***Biodiversity***


ANA (1) 031

# Contents

## Vision

Enriching Lives with
Breakthrough Innovations
in Biodiversity.

## Mission

To Decode Biodiversity
for the
Benefit of Mankind.

# Biodiversity for a Better Tomorrow

# Foreword

## YBhg Tan Sri Datuk Amar Wilson Baya Dandot

*Chairman, Sarawak Biodiversity Council*

It is my privilege to present this Journey Book to celebrate, and as an opportunity to momentarily look back at the historical events and achievements that brings forth to what SBC is today.

The Sarawak Biodiversity Centre was physically set up in 1998 under an Ordinance that was passed on 17 November 1997. The physical structure of SBC started with an old forestry school of wooden offices and barracks that spans an area of about 50 acres, which is located next to the Semenggoh Nature Reserve, a world-renowned Orangutan Rehabilitation Centre.

Today, SBC has the capacity to do extensive biotechnology and chemistry-based R&D on Sarawak biological resources with access of high-technology equipment at our fingertip.

Not forgetting the hard work of documenting the traditional knowledge of indigenous communities on the utilisation of biological resources, which aids in the extensive scientific research. It is after all also known as a shortcut to drug discovery among scientists.

Throughout the 21 years journey, SBC has shown its capability to shine and excel in realizing their vision of enriching lives with breakthrough innovations in biodiversity.

With the implementation of Access and Benefit Sharing, SBC continues to look for both local and international partners to propel the commercialisation potential of its biodiversity breakthrough.

A step in the push towards commercialisation of the findings of SBC's research has been made following the approval by the Government to set up the State Bioindustrial Park at Samarahan and this has been further under pinned by the allocation of a 100 acres industrial land in Samarahan for the park. At the same time, the Government has also provided RM20 million under the *Projek Rakyat Fund* to start the implementation of the project.

Finally, I must express my gratitude and thanks to the Sarawak Government for their foresight in according priorities and support for the bright future in our biodiversity research. And equally, for their vision to drive the development of SBC into one of the preeminent biodiversity-based institutions in the region today.

**Tan Sri Datuk Amar Wilson Baya Dandot**
*Chairman, Sarawak Biodiversity Council*

Sarawak
Biodiversity Centre

# How SBC was Formed


# Our JOURNEY Thus Far

The Sarawak Biodiversity Centre is a research and development (R&D) agency established under the Sarawak Biodiversity Centre Ordinance. It is committed to documentation of Traditional Knowledge among the indigenous communities of Sarawak, and implementation of a R&D programme to discover novel therapeutic and useful compounds from Sarawak's vast and unique biodiversity.

As a statutory agency, SBC was initially under the purview of the Ministry of Resource Planning and Environment, Sarawak. Following a formation of a new Ministry in year 2017, SBC is now under the purview of the Ministry of Education, Science and Technological Research (MESTR).

## 1997

THE
SARAWAK GOVERNMENT GAZETTE
PART I
("Main" Series)
Published by Authority
Vol. V (NS) 4th December, 1997 No. 2

The following Ordinance passed by the Dewan Undangan Negeri on 17th November, 1997, and assented to by Tuan Yang Terutama Yang di-Pertua Negeri on 27th November, 1997, is hereby published pursuant to Article 26(3) of the Constitution of the State:

Chapter No. — Short Title
Chapter 24 — Sarawak Biodiversity Centre Ordinance, 1997

Enactment of the
Sarawak Biodiversity Centre Ordinance.

*"Sarawak is often touted as one of the biological hotspots in the world. Hence, we must protect these valuable biological assets and harness its potential to propel the State beyond the industrial era and the information age into the biotechnological era of the future."*

**YAB Datuk Patinggi Tan Sri (Dr)**
**Haji Abdul Taib bin Mahmud**
*Chief Minister of Sarawak and Minister of Resource Planning*
Fourteenth Dewan Undangan Negeri,
Rang Undang-undang Kerajaan
– Bacaan Kali Yang Kedua. 17 November 1997

## 1998

Enactment of the Sarawak Biodiversity (Access, Collection and Research) Regulations and Establishment of the Sarawak Biodiversity Centre to initiate programmes for the conservation, utilisation, protection and sustainable development of biodiversity in the State. Initial roles of the Centre were to carry out inventory and regulate research on Sarawak's biodiversity.


Sarawak riverine ecosystem

The State took cognizance of the potential for biotechnology based research and product development from this vault of diverse biological resources.

## 2003

The State Legislative Assembly passed the Sarawak Biodiversity Centre (Amendment) Ordinance 2003 and the following year, the Sarawak Biodiversity Regulations, 2004.

The amendment to the Ordinance and Regulations entrusts SBC to initiate intensive biotech based research and development on the State's biological resources and to facilitate the documentation of Traditional Knowledge among the indigenous communities on how they utilise biodiversity around them.

*"This amendment will certainly allow SBC to spearhead research and development programmes and use biotechnology to unlock the wealth of the State's biodiversity. It should also cover traditional knowledge in accordance with Article 8(i) of the Convention on Biological Diversity which provides that parties shall respect, preserve and maintain such traditional knowledge, promotes its wider application with the approval and involvement of the holders of such traditional knowledge and encourage the equitable sharing of benefits arising from its utilisation."*

**YB Dato Sri Haji Adenan bin Haji Satem**
*Minister of Agriculture and Food Industry*

Fifteenth Dewan Undangan Negeri, Rang Undang-undang Kerajaan – Bacaan Kali Yang Kedua. 8 December 2003


Preparing herbarium specimens at SBC

## 2014

In May 2014, the State Legislative Assembly passed amendments to the Sarawak Biodiversity Centre Ordinance to include provisions for Access and Benefit Sharing (ABS) and also implementation of Prior Informed Consent (PIC) from indigenous communities when accessing their biological resources and traditional knowledge.

*"The whole intention of this amendment is to safeguard the interest of the State while ensuring that the provisions of the Ordinance are aligned and consistent with the Convention on Biological Diversity. The Sarawak Biodiversity Centre Bill has provision for Prior Informed Consent and it will extend the Council's authority to ensure benefits are shared with the ethnic communities of Sarawak through mutually agreed terms if benefits are derived from the utilisation of biological resources associated with traditional knowledge."*

**YB Datuk Amar Haji Awang Tengah bin Ali Hasan**
*Minister of Resource Planning and Environment*

Seventeenth Dewan Undangan Negeri Sarawak,
First Meeting of the Fourth Session
6 May 2014


THE
SARAWAK GOVERNMENT GAZETTE
PART II
Published by Authority
Vol. LVIX 10th June, 2004 No. 17
Swk. L.N. 73
THE SARAWAK BIODIVERSITY CENTRE ORDINANCE, 1997
THE SARAWAK BIODIVERSITY REGULATIONS, 2004
ARRANGEMENT OF REGULATIONS
PART I
PRELIMINARY
Regulation
1. Citation and commencement
2. Interpretation
PART II
COLLECTION OF BIOLOGICAL RESOURCES
3. Collection of biological resources
4. Use of biological resources for research
5. Application for permit to collect protected resources
6. Conditions precedent
7. Form of permit
8. Access to protected resources
9. Implied conditions

## 2016

The Sarawak State Cabinet approved the Sarawak Biodiversity Regulations 2016 in tandem with the amendments to the Sarawak Biodiversity Centre Ordinance in 2014.

# Sarawak Biodiversity Council
## *Current Council Members*

| Chairman | Deputy Chairman | Secretary | Council Members | |
|---|---|---|---|---|
| **Present** | | | | |
|  |  |  |  |  |
| **YBhg Tan Sri Datuk Amar Wilson Baya Dandot**<br>Council Member, Sarawak Research Development Council<br>*2018 - Present* | **YBhg Datu William Patrick Nyigor**<br>Permanent Secretary, Ministry of Education, Science and Technological Research (MESTR)<br>*2019 - Present* | **Dr Yeo Tiong Chia**<br>Chief Executive Officer, Sarawak Biodiversity Centre (SBC)<br>*2014 - Present* | **YA Datuk Talat Mahmood bin Abdul Rashid**<br>State Attorney-General<br>*2017 - Present* | **YBhg Datuk Amar Haji Ahmad Tarmizi bin Haji Sulaiman**<br>State Financial Secretary<br>*2004 - Present* |

## Council Members

**YBhg Datu Sr Zaidi bin Haji Mahdi**
Permanent Secretary,
Ministry of Urban Development and Natural Resources (MUDeNR)
*2019 - Present*

**YBhg Dato Sri Haji Mohamad Abu Bakar bin Marzuki**
Deputy State Secretary (Socio-Economic Transformation)
*2018 - Present*

**YBhg Datu Hamden bin Haji Mohammad**
Director,
Forest Department Sarawak
*2018 - Present*

**Dr Alvin Chai Lian Kuet**
Acting Director,
Department of Agriculture Sarawak
*2018 - Present*

**Mr Justine Jok Jau Emang**
Controller,
Natural Resources and Environment Board, Sarawak
*2019 - Present*

**YBhg Dato Goh Leng Chua**
Director, Lawmakers
*2019 – Present*

**Mr Graeme Iain Brown**
Managing Director,
Limar Management Services Sdn Bhd
*2019 – Present*

# Sarawak Biodiversity Council
## *1998 - 2000*

### Chairmen

**Tan Sri Datuk Amar Haji Mohamad Morshidi bin Abdul Ghani**
State Secretary of Sarawak
*2009 - 2018*

**Tan Sri Datuk Amar Wilson Baya Dandot**
State Secretary of Sarawak
*2007 - 2009*

**Datuk Amar Haji Abdul Aziz bin Dato Haji Husain**
State Secretary of Sarawak
*2002 - 2006*

**(Late) Datuk Patinggi Tan Sri Dr Wong Soon Kai**
Science Advisor to the State Government
*1998 - 2001*

### Deputy Chairmen

**Datu Haji Sudarsono Osman**
Permanent Secretary, Ministry of Resource Planning & Environment
*2012 – 2017*

Permanent Secretary, Ministry of Education, Science and Technological Research (MESTR)
*2018*

**Datu Dr Haji Wan Lizozman bin Wan Omar**
Permanent Secretary, Ministry of Urban Development and Natural Resources (MUDeNR)
*2017 – 2018*

**Datu Wan Alwi Dato Sri Wan Hashim**
Permanent Secretary, Ministry of Planning & Resource Management
*2005 - 2011*

**Datu Haji Hamzah bin Haji Drahman**
Permanent Secretary, Ministry of Planning & Resource Management
*2002 - 2004*

**Tan Sri Datuk Amar (Dr) Hamid Bugo**
State Secretary of Sarawak
*1998 – 2001*

### Secretaries

**Dr Rita Manurung**
Chief Executive Officer, Sarawak Biodiversity Centre (SBC)
*2007 – 2014*

**Datin Eileen Yen Ee Lee**
Chief Executive Officer, Sarawak Biodiversity Centre (SBC)
*2001 - 2006*

**Chua Teck Kheng**
Chief Executive Officer, Sarawak Biodiversity Centre (SBC)
*1998 – 2001*

# Council Members

**Datu Haji Abdul Razak Tready**
State Attorney-General
*2008 – 2016*

**Dato Sri Fong Joo Chung**
State Attorney-General
*1998 – 2007*

**Datu Chin Jew Bui**
State Financial Secretary
*2002 – 2003*

**Datuk Wan Ali Tuanku Yubi**
State Financial Secretary
*1998 - 2001*

**Datu Haji Ismawi bin Haji Ismuni**
Deputy State Secretary
(Socio Economic Transformation)
*2016 - 2017*

**Datu Haji Misnu bin Haji Taha**
Deputy State Secretary
(Administration, Security and Corporate Affairs)
*2011 - 2016*

**Datu Abdul Ghafur Shariff**
Deputy State Secretary
(Human Resource)
*2007 - 2011*

**Tan Sri Datuk Amar Wilson Baya Dandot**
Director of SPU
*1998 - 2001*
Deputy State Secretary
(Planning & Development)
*2002-2006*

**Datu Dr Haji Wan Lizozman bin Wan Omar**
Permanent Secretary,
Ministry of Urban Development and Natural Resources (MUDeNR)
*2019*

**Haji Zaidi Khaldin Zainie**
Permanent Secretary,
Ministry of Resource Planning
*1998 – 2001*

**Datu Lai Kui Fong**
Director of Agriculture
*2011 - 2017*

**Paul Vincent Ritom**
Director of Agriculture
*2006 - 2011*

**Datu Haji Mohd. Sepuan Haji Anu**
Director of Agriculture
*2002 - 2006*

**Haji Sapuan Ahmad**
Director of Forests/
Controller of Wildlife
*2013 - 2018*

**Datu Haji Ali bin Yusop**
Director of Forests/
Controller of Wildlife
*2011 - 2013*

**Datu Haji Len Talif Salleh**
Director of Forests/
Controller of Wildlife
*2007 - 2011*

**Datu Cheong Ek Choon**
Director of Forests/
Controller of Wildlife
*1998 - 2006*

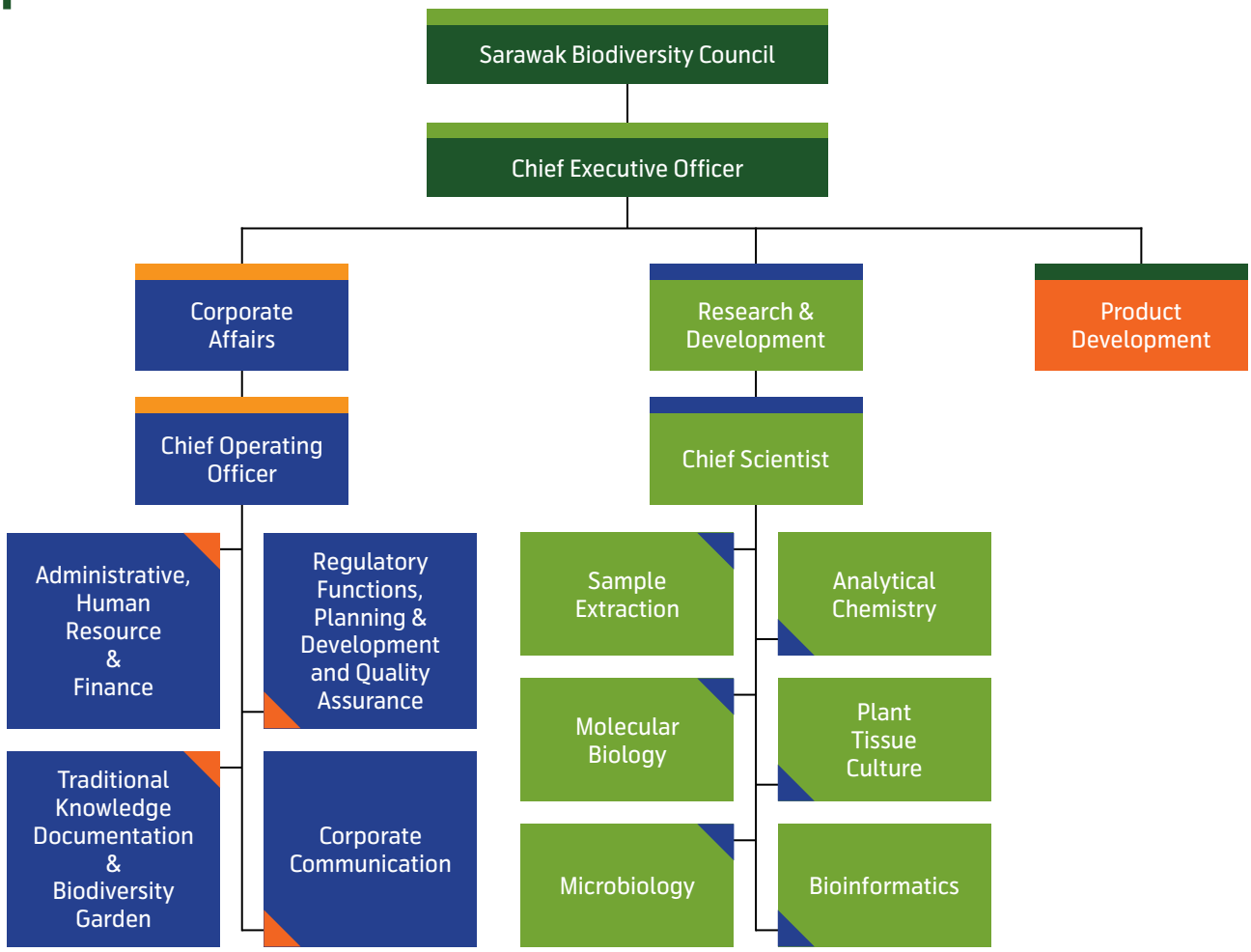
**Peter Sawal**
Controller,
Natural Resources and Environment Board, Sarawak
*2009 - 2018*

**Datu Dr Penguang Manggil**
Controller,
Natural Resources and Environment Board, Sarawak
*2007 - 2009*

**(Late) Chong Ted Tsiung**
Controller,
Natural Resources and Environment Board, Sarawak
*2002 - 2006*

**(Late) Datuk Seri Dr James Dawos Mamit**
Controller,
Natural Resources and Environment Board, Sarawak
*1998 - 2001*

# Organisation Structure




The Sarawak Biodiversity Centre is a Sarawak State Statutory Agency under the purview of the Ministry of Education, Science and Technological Research. Its Council Members who provide policy advice and directions are appointed by the State Cabinet. The Council comprises of:

- The Chairman
- The Deputy Chairman who is the Permanent Secretary to the Ministry of Education, Science and Technological Research, Sarawak
- The Secretary who is the Chief Executive Officer of Sarawak Biodiversity Centre
- The State Attorney General
- The State Financial Secretary
- The Deputy State Secretary (Socio-Economic Transformation)
- The Directors of the Forest and Agriculture Departments
- The Controller of Enviromental Quality, Natural Resources and Environment Board, Sarawak
- YBhg Dato Goh Leng Chua, Director, Lawmakers
- Mr Graeme Iain Brown, Managing Director, Limar Management Services Sdn Bhd

# SBC Team

**Dr Yeo Tiong Chia, PhD**
*Chief Executive Officer*

**Margarita Naming**
*Deputy Chief Executive Officer*

**Clare Heinzie anak Juhin**
*Administrative Officer*

**Christina Wong Hie Ping**
*Accountant*

**Dr Noreha binti Mahidi, PhD**
*Research Officer (Head of R&D Operation)*

**Dr Ng Lee Tze, PhD**
*Research Officer (Head of R&D Collaboration)*

**Elaine Remi anak Douglas Telajan**
*Research Officer (Head of Product Development)*

**Tu Chu Lee**
*Research Officer – Head of TK Documentation*

**Nurulliza binti Murtadza@ Murtada**
*Communication Officer (Head of Corporate Communication)*

**Noor Pahtiwi binti Bohari**
*Research Officer (Deputy Head of R&D Operation)*

**Michele Mejin**
*Research Officer (Deputy Head of R&D Collaboration)*

**Cynthia anak Seta**
*Research Officer (Head of Extraction)*

**Dr Kon Nyuk Fong, PhD**
*Research Officer (Head of Molecular Biology)*

**Holed anak Juboi**
*Research Officer (Head of Microbiology)*

**Nuraqilah binti Othman**
*Research Officer (Head of Analytical Chemistry)*

**Suria binti Johari**
*Research Officer (Head of Plant Tissue Culture)*

**Gilbert Lau Sei Kung**
*Research Officer (Head of Bioinformatics)*

**Hii Mei Mei**
*Research Officer (Head of Algae Research)*

# Our People, Our Strength

Sarawak
Biodiversity Centre

# Our People, Our Strength

1. Dr Yeo Tiong Chia
2. Margarita Naming

**Administrative, Human Resource and Finance**

3. Ainley anak Tumis
4. Alan anak Ringah
5. Ali anak Raos
6. Anna Ng Mei Na
7. Annie Anthoney Empra
8. Bee David anak Lamada
9. Bernardine Ida anak Joseph Jinam
10. Clare Heinzie anak Juhin
11. Elizabeth Alice anak Gabriel Nasib
12. Eskandar bin Ibrahim
13. Hugh anak Doyos
14. Kamarrul bin Tambi
15. Lucy Noraini Mitis
16. Masmah binti Jaya
17. Melvin George Rut
18. Norliah binti Gani
19. Pauline Nawang
20. Romney anak Dawur
21. Rosy anak Tian Lin
22. Sherina Chew Leh King
23. Spencer Russel anak Samuel
24. Sunarjo bin Suip
25. Sylvia Jennifer anak James
26. Voon Boon Ting
27. Wong Hie Ping

**Regulatory Functions, Planning & Development and Quality Assurance**

28. Jadyn anak Nicholas Ningkan

**Corporate Communication**

29. Azeglio Marcio anak Amit
30. Constance Vanessa Victor
31. Nurulliza binti Murtadza@Murtada
32. Selwynn anak Jaoi Edward

**Traditional Knowledge Documentation and Biodiversity Garden**

33. Albert anak Rengga
34. Angelina anak Nguan
35. Antonio Wee anak Ahsian
36. Arlene Alicia anak Toaiang
37. Bernard anak Jerome
38. Cindy Usun Sigau
39. Diviana Tan anak Robert
40. Elevia anak Jugan
41. Fazariah binti Kipali
42. Gabriel Chang
43. Hanas anak Harry Ranip
44. Jovita Elderson anak Ripen
45. Matzen bin Saji
46. Nicholas Harine anak Morshidi @ Chimi
47. Sabatian Jose Hugh
48. Tora anak Ranggon
49. Tu Chu Lee

**Research & Development**

50. Dr Ng Lee Tze
51. Dr Noreha binti Mahidi
52. Michele Mejin
53. Noor Pahtiwi binti Bohari

**Sample Extraction Laboratory**

54. Aziman Ahmad
55. Cynthia anak Seta
56. Kenny anak Freddy Rinyom
57. Mitchel Constance anak George
58. Tuanku Sukri bin Tuanku Rapahie

Sarawak
Biodiversity Centre

## Analytical Chemistry Laboratory

59. Clifford anak Junaidi Kutoi
60. Diana Lim Siok Ley
61. Dr Chia Ying Ying
62. Dr Lau Ching Ching
63. Dr Su Nguok Ngie
64. Julian Voong Cheng Liang
65. Ling Sheau Jing
66. Melissa Chang May Fung
67. Mounsey Muskie anak Moding
68. Nuraqilah binti Othman
69. Siti Muhaini binti Haris Fadzillah
70. Sofina Gari

## Molecular Biology Laboratory

71. Barbara anak Ngikoh @ Nyikoh
72. Dr Kon Nyuk Fong
73. Dr Ling How Lie
74. Jorim anak Ujang
75. Mohamad Nasar bin Pawi
76. Noor Mehrunnika Dawood Sha Sulaiman Kamal Batcha
77. Zurien Amiera binti Irwan

## Microbiology Laboratory

78. Ajuwin anak Lain
79. Ann Anni Basik
80. Asma' Saiyidatina Aishah
81. Dr Mohd Farith bin Kota
82. Ellen Tan Chia Min
83. Elsa Isla Jong
84. Holed anak Juboi
85. Jamilah binti Hassan
86. Lai Sin Chai
87. Patricia Rowena anak Mark Baran
88. Reeve Mckay anak John Jeffrey Sirabung
89. Sabda bin Safiee
90. Van Mc Queen anak Thomas
91. Velnetti Linang

## Plant Tissue Culture

92. Cassandra Hazel anak Mijilit
93. Dr Clement Wong Kiing Fook
94. Frankie anak Kumbak
95. Madeleine anak Bujang
96. Mariani binti Omarzuki @ Marzuki
97. Rigep anak Anyain
98. Suria binti Johari

## Bioinformatics

99. Gilbert Lau Sei Kung
100. Mohammad Farhan Darin bin Azri

## Algae Research

101. Chaliy Chang Li
102. Dayang Syahreeny binti Abang Mustafa
103. Dick Brandon anak Devi
104. Fesmuela anak Kagong
105. Freddie anak Ambrose Ambol
106. Hafizah binti Booty
107. Harny anak Chapi
108. Hii Mei Mei
109. Keekoti Sue anak Betin
110. Lee Jong Jen
111. Mohd Fadeli Haironi bin Jemat
112. Ng Yik Han
113. Nur Khairun Nisa' binti Mohd Sallehudin

## Product Development

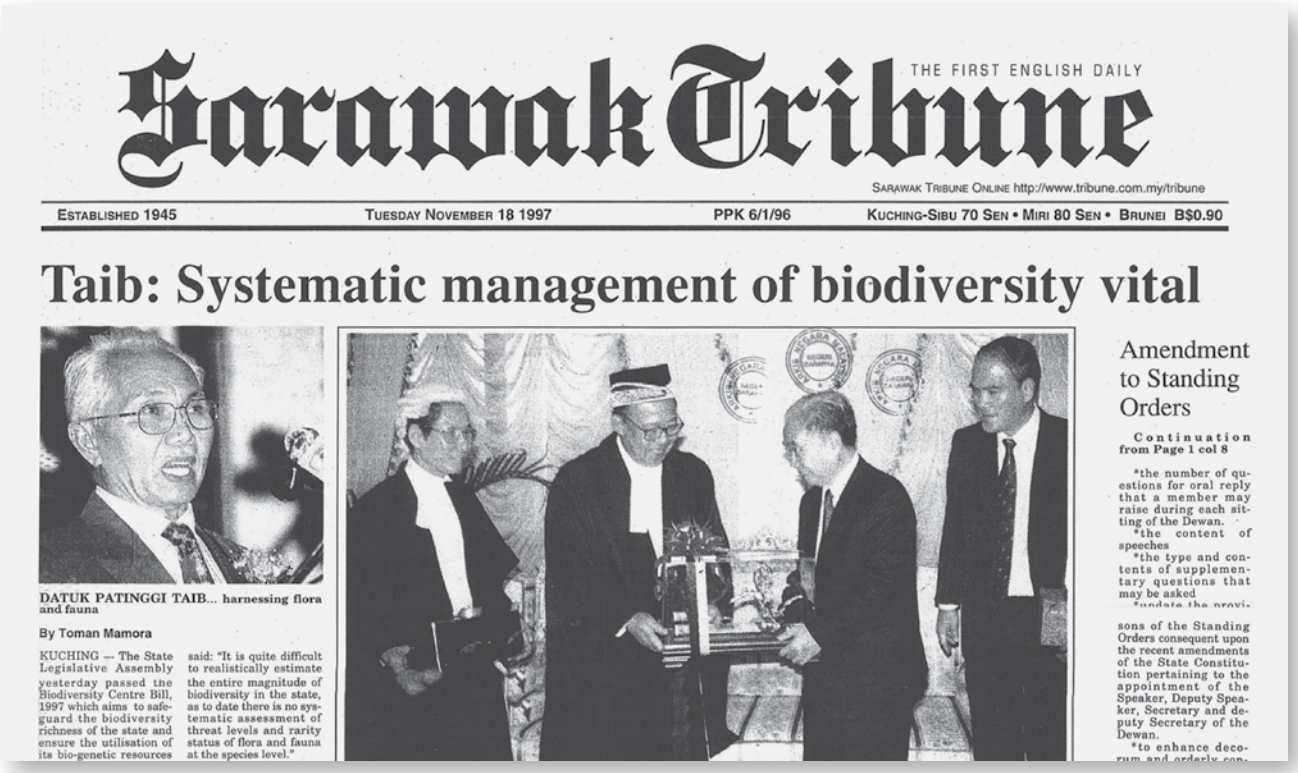
114. Anne Marie Kaben
115. Arzie binti Ramli
116. Elaine Remi anak Douglas Telajan
117. Katrina binti Aslan Joe
118. Siti Aisyah binti Mohd Zaman

Sarawak
Biodiversity Centre

# Our Transformation

# Our Transformation

## 1997 - 2002



Sarawak Tribune

THE FIRST ENGLISH DAILY

Sarawak Tribune Online http://www.tribune.com.my/tribune

Established 1945 | Tuesday November 18 1997 | PPK 6/1/96 | Kuching-Sibu 70 Sen • Miri 80 Sen • Brunei B$0.90

**Taib: Systematic management of biodiversity vital**

DATUK PATINGGI TAIB... harnessing flora and fauna

By Toman Mamora

KUCHING — The State Legislative Assembly yesterday passed the Biodiversity Centre Bill, 1997 which aims to safeguard the biodiversity richness of the state and ensure the utilisation of its bio-genetic resources said: "It is quite difficult to realistically estimate the entire magnitude of biodiversity in the state, as to date there is no systematic assessment of threat levels and rarity status of flora and fauna at the species level."

Amendment to Standing Orders

Continuation from Page 1 col 8

*the number of questions for oral reply that a member may raise during each sitting of the Dewan.
*the content of speeches
*the type and contents of supplementary questions that may be asked
*update the provi-

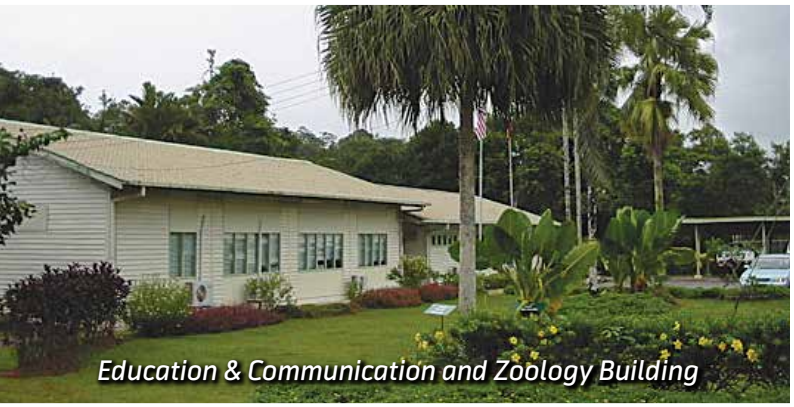
sons of the Standing Orders consequent upon the recent amendments of the State Constitution pertaining to the appointment of the Speaker, Deputy Speaker, Secretary and deputy Secretary of the Dewan.
*to enhance decorum and orderly con-

Front view of centre

Bus Shed

Administration Building (before 1998)

Administration Building (1999 - 2010)



Education & Communication and Zoology Building

Botany and Chemistry Building

Quarters

Multi Purpose Hall

Quarters

Tennis Court

Education and Communication Division

Surau

# 2003

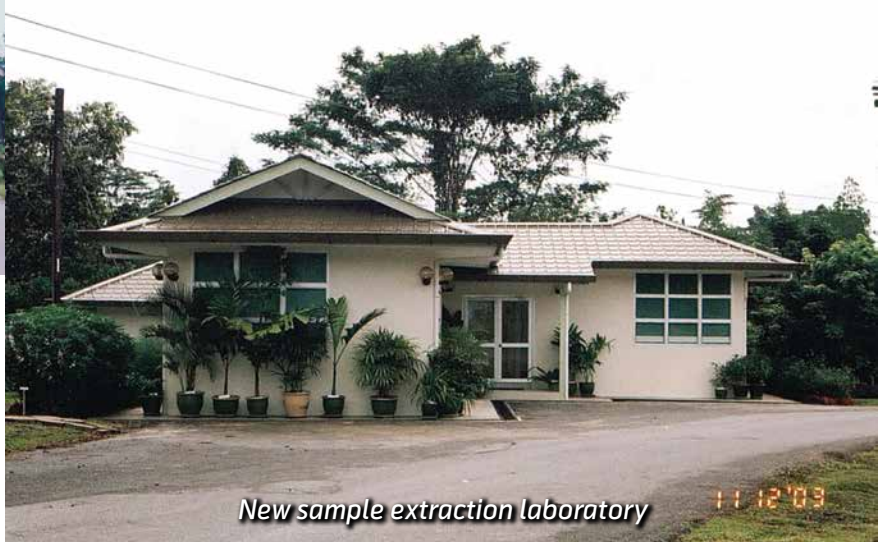
- First Laboratory

The old bus shed

*Renovation started on 18 June 2003*

*Building handover on 20 August 2003*

*Lab Commissioned 3 November 2003*



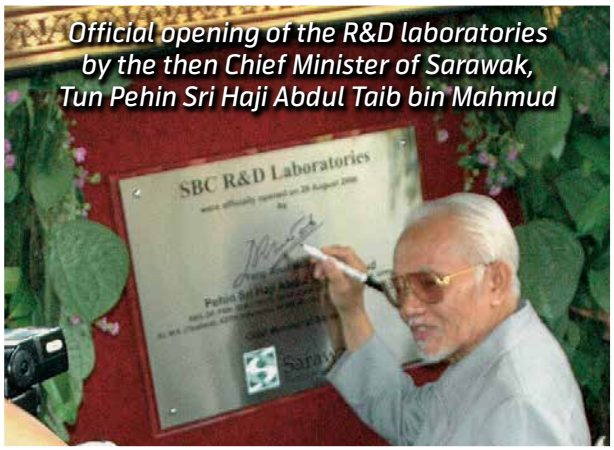
New sample extraction laboratory


Inside the new sample extraction lab

# 2006

## 29 August 2006

- Official Opening of SBC's Laboratories & Dedication of Laila Taib Ethnobotanic Garden




*Official opening of the R&D laboratories by the then Chief Minister of Sarawak, Tun Pehin Sri Haji Abdul Taib bin Mahmud*

*Dedication of the Laila Taib Enthobotanic Garden*


*Tour of the laboratories by Tun Pehin Sri after the opening*

# 2006

## 29 August 2006

- Research and Development / Researchers' Office
- Microbiology Laboratory and Algae Laboratory
- Molecular Biology Laboratory and Bioinformatics Laboratory

*Research and Development / Researchers' Office*


*Extraction Laboratory*

A Lecture Theatre

B Research and Development / Researchers' Office

C Microbiology Laboratory and Algae Laboratory

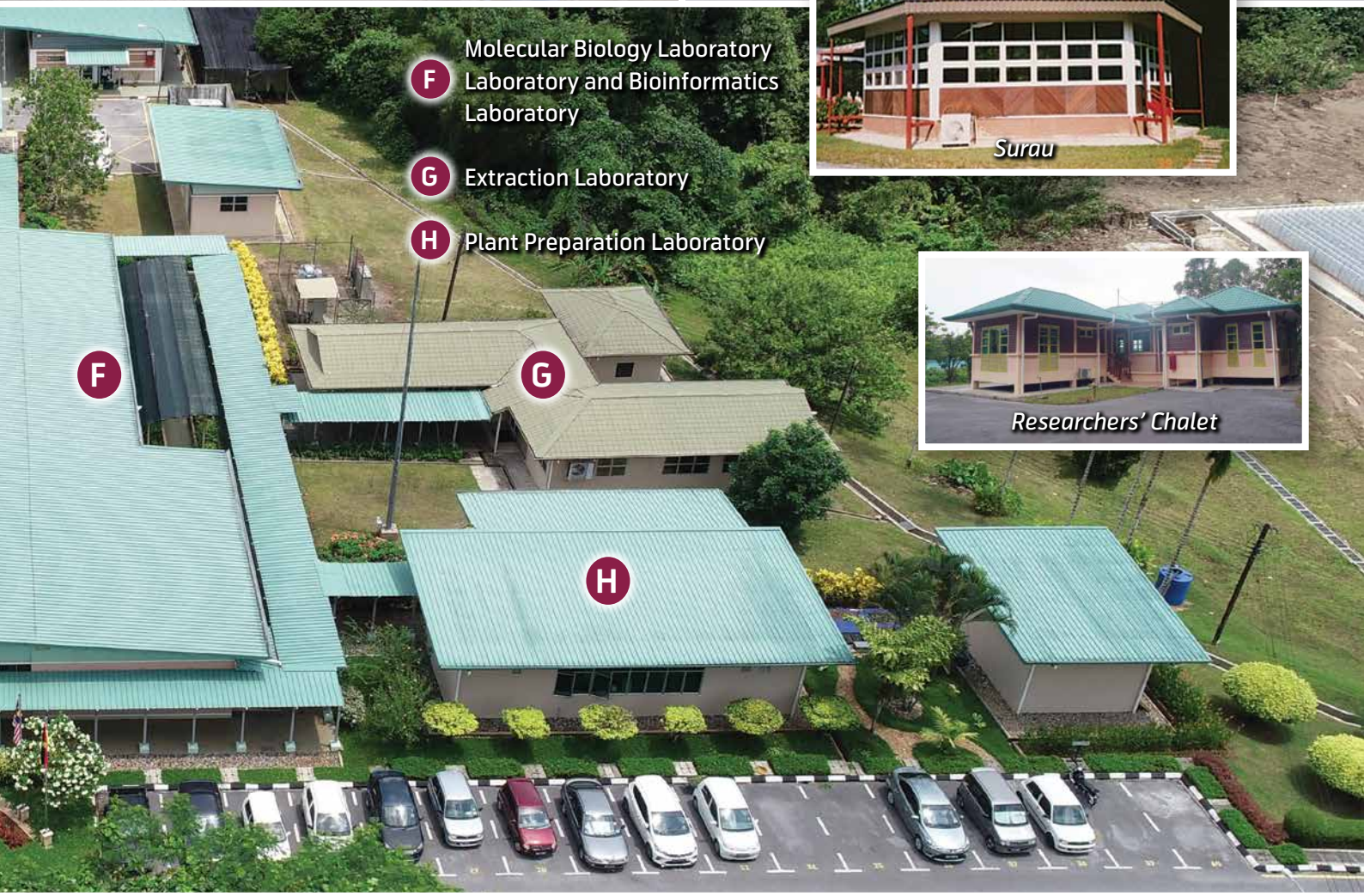
D Laila Taib Ethnobotanic Garden


E *Entrance of Laila Taib Ethnobotanic Garden*

29 August 2006

- Extraction Laboratory
- Plant Preparation Laboratory
- Lecture Theatre
- Researchers' Chalet



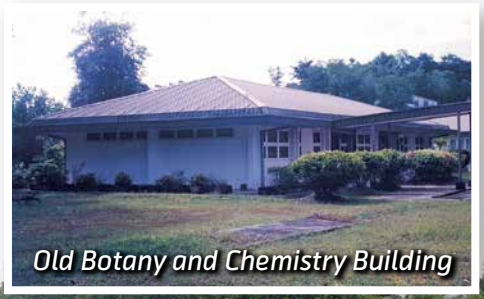



# 2010

- Administration Building

*Old Administration Building*

- Traditional Knowledge Documentation Building



*Old Botany and Chemistry Building*

- Plant Headhouse and Propagation Building

Aerial view of the nursery and headhouse

Propagation room

Mist room

Old Multi Purpose Hall

13 July 2016

- Integrated Biodiversity Research Building (IBRB)


SBC Gallery


Analytical Chemistry Laboratory


Cold room storage for NPL


Researchers' Office


Mass Spectrometry Room


Old Quarters


Front view of IBRB

# 2019

- Algae Cultivation Facility

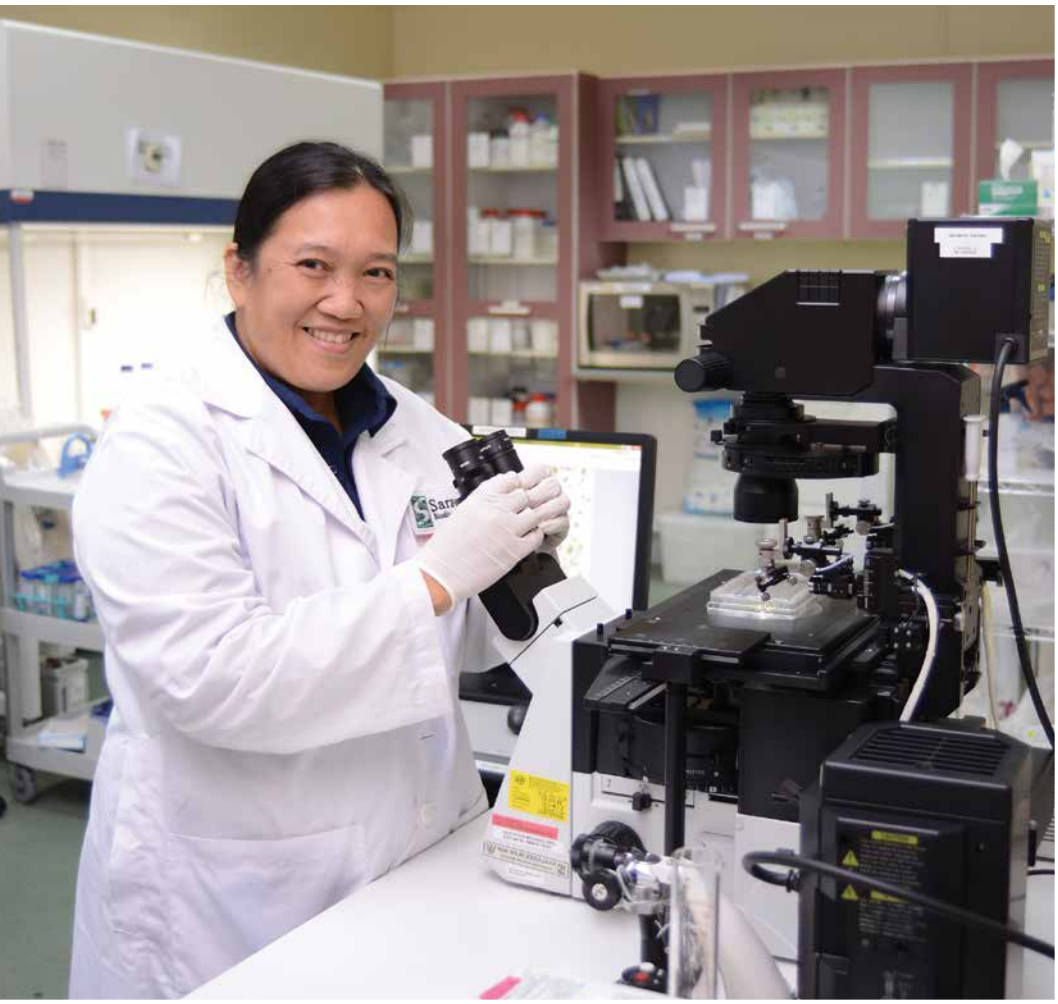
*1000m² Algae Cultivation Facility*

*Propagation Field Plots*

- K Integrated Biodiversity Research Building (IBRB)
- L Propagation Field Plots
- M Asset Building
- N Plant Headhouse and Propagation Building
- O Nursery
- P Lecture Theatre


- A Administration Building
- B Traditional Knowledge Documentation Building
- C Research and Development / Researchers' Offices
- D Microbiology Laboratory and Algae Laboratory
- E Molecular Biology Laboratory and Bioinformatics Laboratory
- F Laila Taib Ethnobotanic Garden
- G Extraction Laboratory
- H Plant Preparation Laboratory
- I Algae Cultivation Facility
- J Researchers' Chalet


SBC Entrance



Sarawak
Biodiversity Centre

# Core Functions

# Core Functions

## Traditional Knowledge (TK) Documentation

The Traditional Knowledge (TK) Documentation Programme has been implemented since 2001 to facilitate the local indigenous communities in Sarawak in preserving their traditional knowledge through proper documenting and recording techniques.

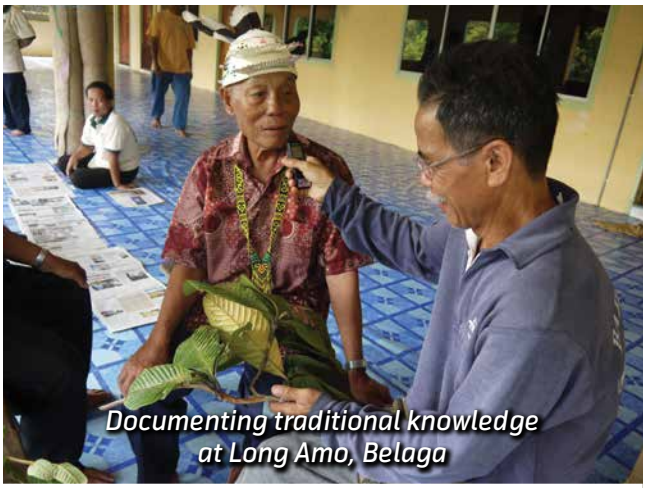
While many of the older generation in these communities still retain traditional knowledge, there is a concern about the loss of knowledge as a result of changing lifestyles; priorities; the availability of modern amenities; and the diminishing dependence of indigenous communities on biodiversity. This has made it increasingly important for traditional knowledge to be documented by the respective indigenous communities and retained as heritage so that it will not be lost.

Under the programme, the participating communities are also encouraged to cultivate useful plants for their own use, for landscape, as conservation and for awareness and appreciation purposes.

The participating communities are also informed of SBC's R&D Programme, which looks into discoveries for pharmaceutical, personal care and cosmeceutical development. They are duly recognized through equitable sharing of benefits when their TK leads to new discoveries and development of products.

As at October 2019, 20 indigenous communities from 92 locations throughout Sarawak have participated in the TK Documentation Workshop and about 6,330 plants have been collected through the workshops.

Out of these, 1,713 plants have been identified and the identification work is still ongoing.



*Documenting traditional knowledge at Long Amo, Belaga*

*TK documentation of useful plants by communities of Rh Entabong, Limbang*

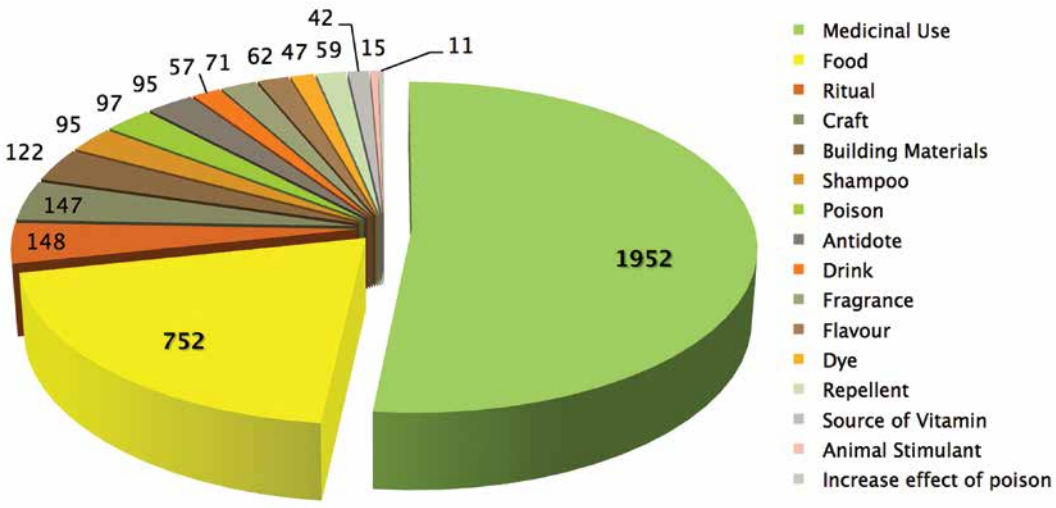
*TK documentation plant review/sharing session at Rh Skatap, Betong*

## Summary of Plants Collected by Communities

| Community | | No. of Plants Documented |
|---|---|---|
| Iban | (27 Sites) | 1,430 |
| Bidayuh | (10 Sites) | 1,183 |
| Penan | (8 Sites) | 1,112 |
| Lun Bawang | (7 Sites) | 617 |
| Kelabit | (4 Sites) | 500 |
| Kenyah | (5 Sites) | 257 |
| Kayan | (4 Sites) | 251 |
| Melanau | (6 Sites) | 252 |
| Malay | (9 Sites) | 198 |
| Selako | (1 Site) | 112 |
| Kedayan | (Mixed with Iban & Lun Bawang - 1 Site) | 85 |
| Sa'ban | (1 Site) | 79 |
| Tabun | (1 Site) | 51 |
| Punan | (1 Site) | 39 |
| Sekapan | (1 Site) | 33 |
| Bisaya | (2 Sites) | 30 |
| Beketan | (1 Site) | 35 |
| Tanjong | (1 Site) | 24 |
| Berawan | (1 Site) | 22 |
| Tagal | (1 Site) | 20 |
| **Total** | **(92 Sites)** | **6,330** |

*Figures as at September 2019*

## Documented Uses of Plants (for TK Documentation)



# Access & Benefit Sharing

## What is Access & Benefit Sharing (ABS)?

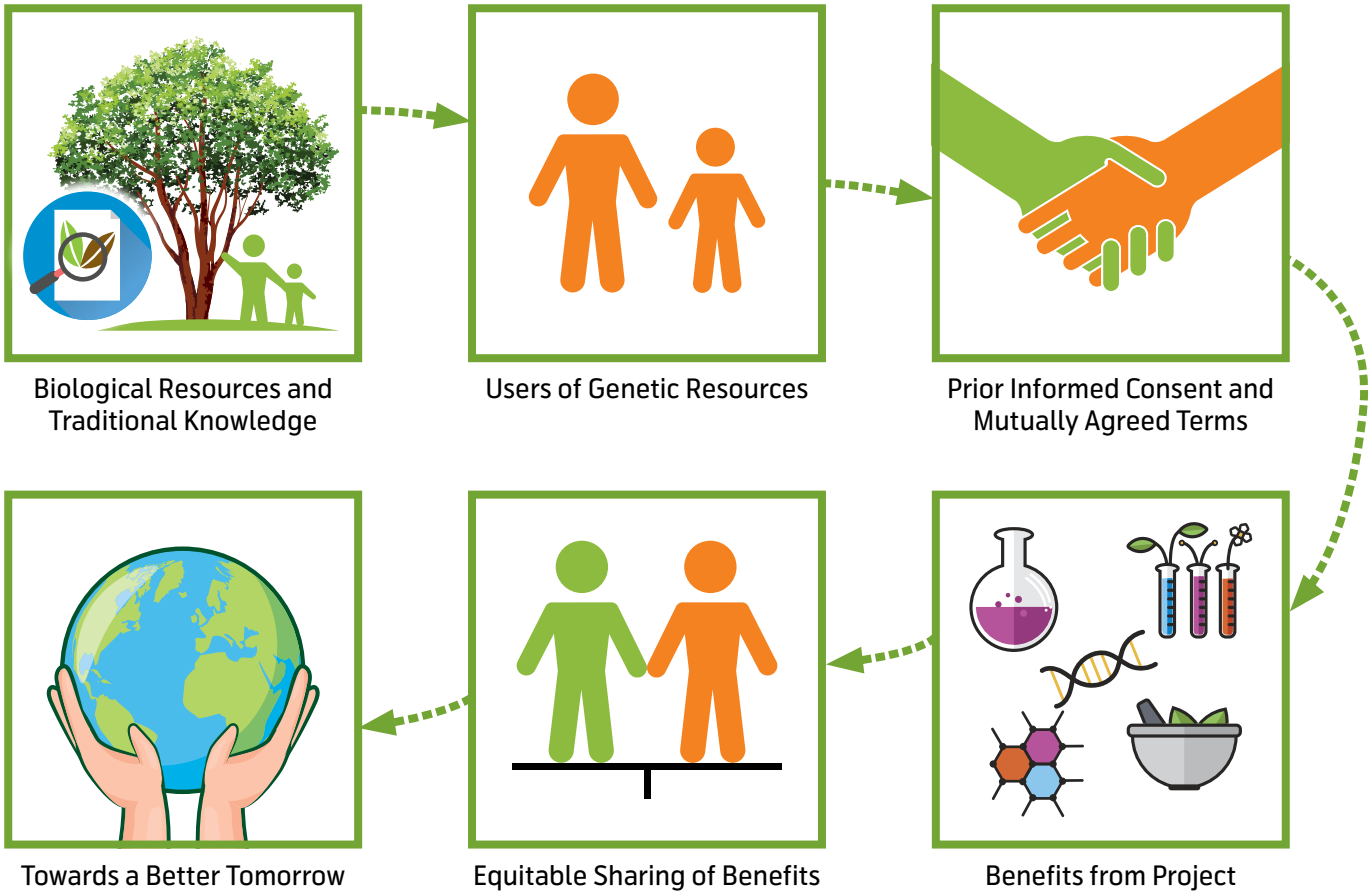
ABS refers to the way in which biological resources may be accessed and how fair and equitable sharing of benefits that result from the utilisation of biological resources between the users and provider of the resource arises.

*Showcasing of a useful plant by Iban community at Rh Bajau, Julau*

## Why is ABS Important?

Access and benefit sharing of biological resources can ensure that the method of accessing and utilization of biological resources will maximise the benefits to the users, providers and the ecology and communities where the biological resources are found.

ABS is an important issue under the Convention on Biological Diversity (CBD), where one of the three objectives of the convention on ABS which is in line with preservation of biodiversity and the sustainable use of its components. CBD recognises that biological resources are absolute rights of a country.



*LitSara® project with the Lun Bawang community at Long Telingan, Lawas*

*Collection of a useful plant by Bidayuh women folks at Kampung Semadang, Padawan*

# Core Functions

## The R&D Biodiscovery Programme – *Unlocking Biodiversity's Potential*

The Sarawak Biodiversity Centre R&D Biodiscovery Programme is an ambitious framework designed to:

1. identify, catalogue and operationalise Sarawak's vast biodiversity resources;
2. build a diverse pipeline of products of potential commercial value; and
3 advance specific lead products to proof-of-concept stage and commercialisation.

The core elements of the Programme are:

i. SBC's Natural Product Library (NPL), which includes a Traditional Knowledge Documentation Programme coordinated with Sarawak's indigenous communities;

ii. analytical chemistry, molecular biology and microbiology laboratories equipped to screen the NPL for active compounds; and

iii. product development and production scale-up facilities to enable, respectively, product optimisation and formulation, and manufacture from proof-of-concept to commercialisation scale.

The SBC R&D Biodiscovery Programme comprises of internal projects as well as a rich portfolio of collaborative engagements with national and international companies and research institutions.

As SBC enters its third decade of operation, the breadth and depth of its R&D Biodiscovery Programme continues to make the Centre a regional reference for efforts to decode biodiversity and translate the new knowledge into innovative solutions.

*Freeze drying of samples for further R&D*

# Natural Product Library
## – *Providing Access to Sarawak's Biodiversity*

The Natural Product Library (NPL) comprises a collection of assay-ready plant, and microbial extracts – obtained from over 1,000 plants, algae, fungi, actinomycetes and other microbial species – that provide a window into Sarawak's rich biological resources. SBC's NPL represents the largest such collection in Borneo representing an invaluable resource for researchers and pharmaceutical, cosmeceutical, nutraceutical or biotechnology companies around the world.


*Plant extract from NPL*

A key added value of the NPL is SBC's Traditional Knowledge Documentation Programme, which coordinates biodiversity sampling with Sarawak's indigenous communities to capture the invaluable knowledge provided by their experience with medicinal and other uses of local plants and microbes.

The NPL continues to provide the foundation for all R&D projects carried out at SBC as it has several advantages: a researcher does not need to go to the jungle and collect for extraction work, avoiding potential physical and safety hazards. A centralised library can also minimise resources necessary to travel to their interior for collection.


*Plant collection with the Bidayuh community of Kpg Semban, Padawan*

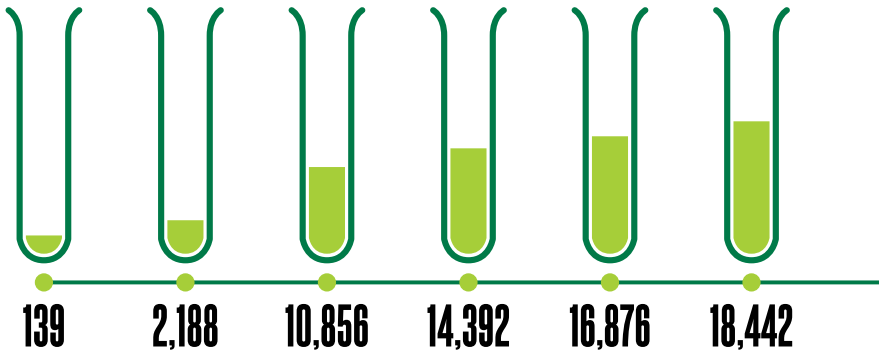

*SBC's unique library of natural products*

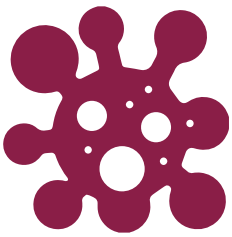
## Our Collection So Far

*(as at September 2019)*


### Plant Extracts

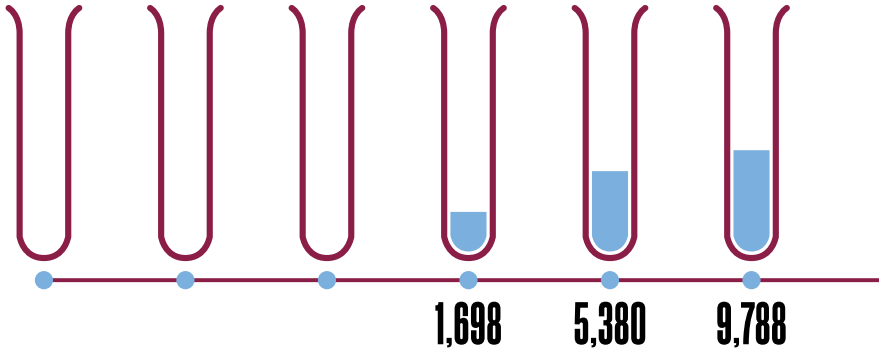
**25,612**

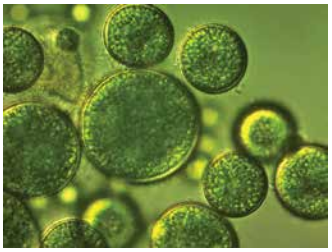


### Microbe Extracts

**29,697**



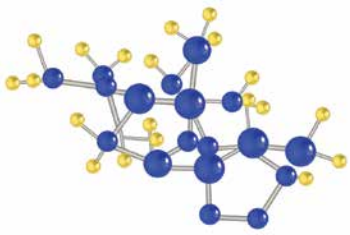



### Algae

**653** strains

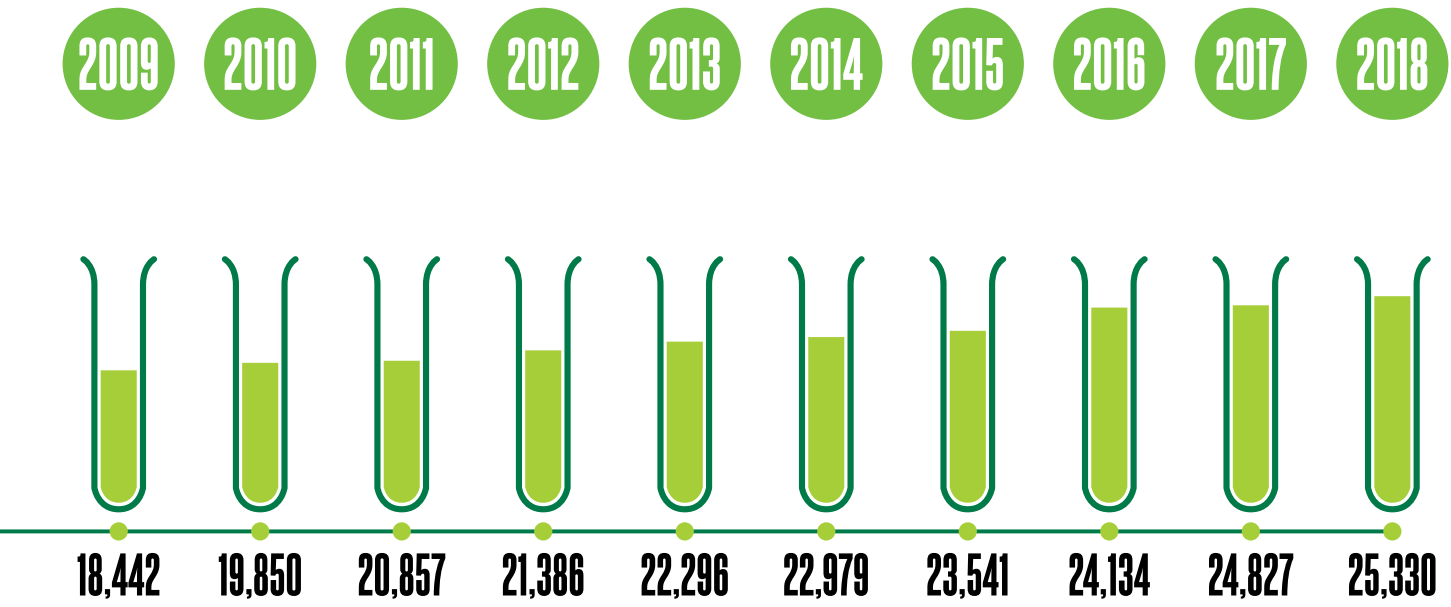
### Essential Oils

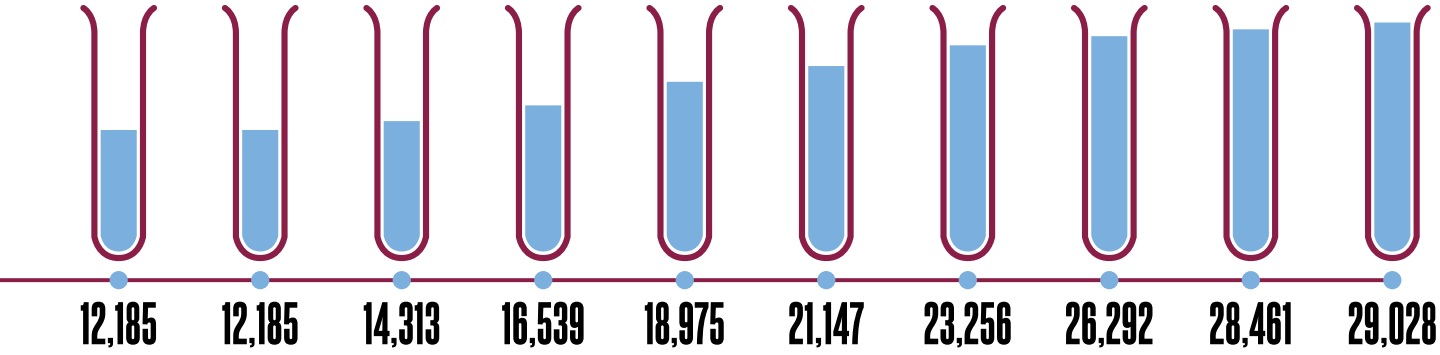
**536** types



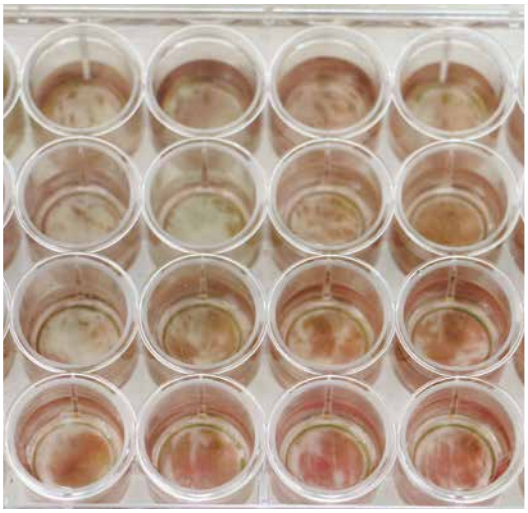
### Compounds

**15** chemically characterised compounds


2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
18,442
19,850
20,857
21,386
22,296
22,979
23,541
24,134
24,827
25,330


12,185
12,185
14,313
16,539
18,975
21,147
23,256
26,292
28,461
29,028


125 ml
PYREX



# Sample Extraction and Plant Preparation Laboratory
## ~ *Streamlining Natural Product Extraction*

The Sample Extraction and Plant Preparation Laboratory utilises state-of-the-art processes to generate plant extracts of the highest quality for internal use, or for shipping to external collaborators.

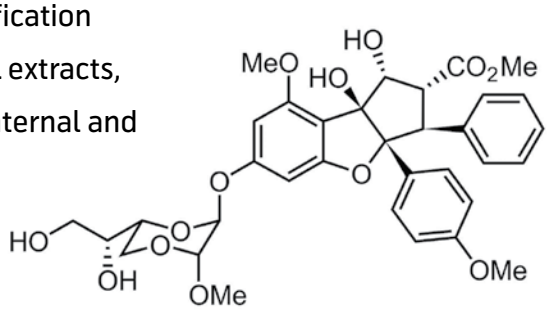
The entire sample extraction process is managed using SBC's own BioDiversity Natural Product (BioD NatPro) Information Management System to ensure extraction data are properly captured and securely kept. All extracts processed by the Sample Extraction and Plant Preparation Laboratory are deposited into the NPL.

*Well trained officers carrying out sample extraction according to standard operating procedure*

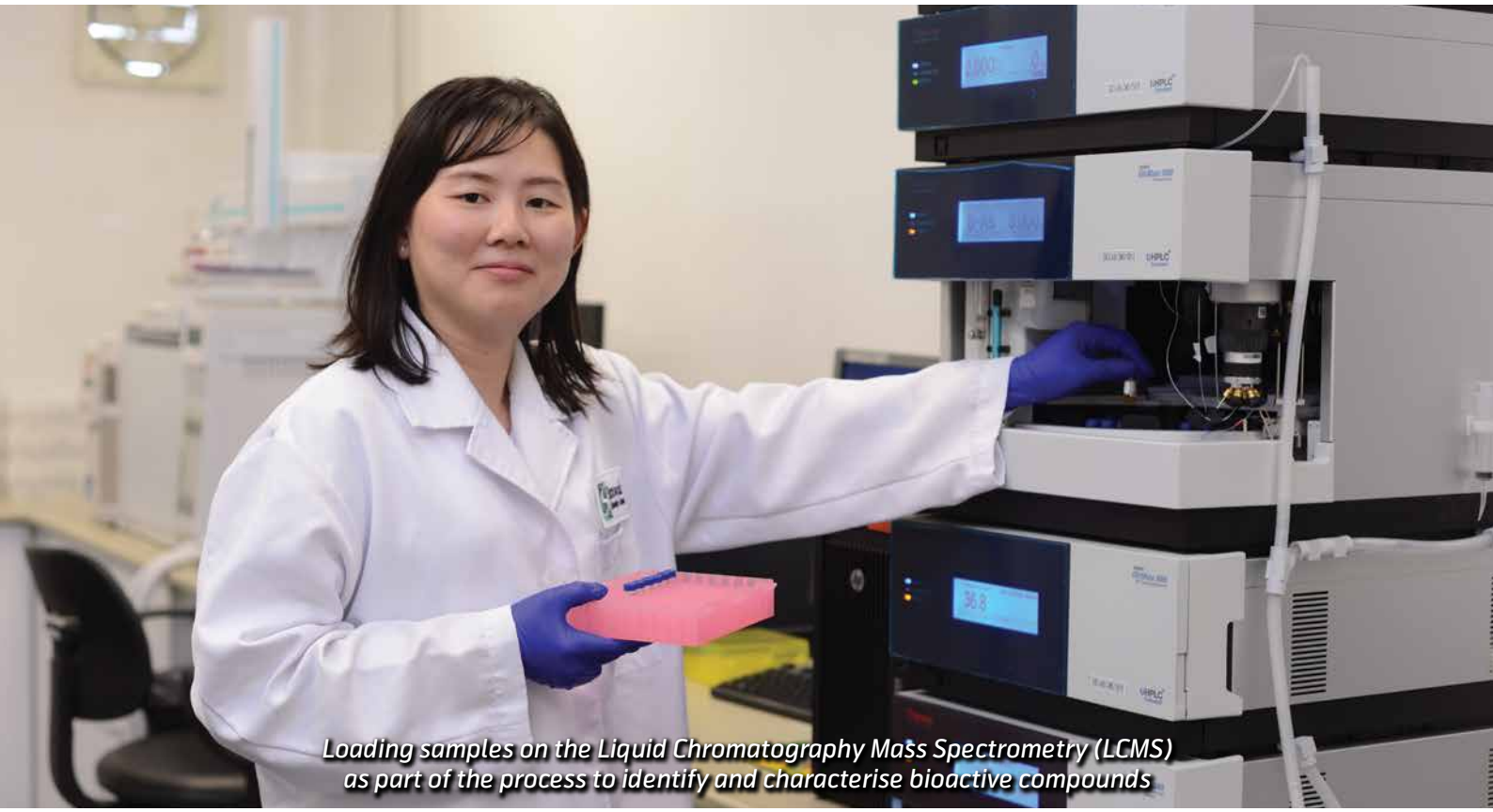
# Analytical Chemistry Laboratory

## ~ *Characterising Bioactive Compounds from Sarawak's Biodiversity*

The Analytical Chemistry Laboratory is where the identification and characterisation of bioactive compounds in the NPL extracts, as well as extraction of highly purified compounds for internal and external proof of concept testing are carried out.
The laboratory continues to provide core capabilities to support the success of the organisation's biodiversity-centred R&D mission.



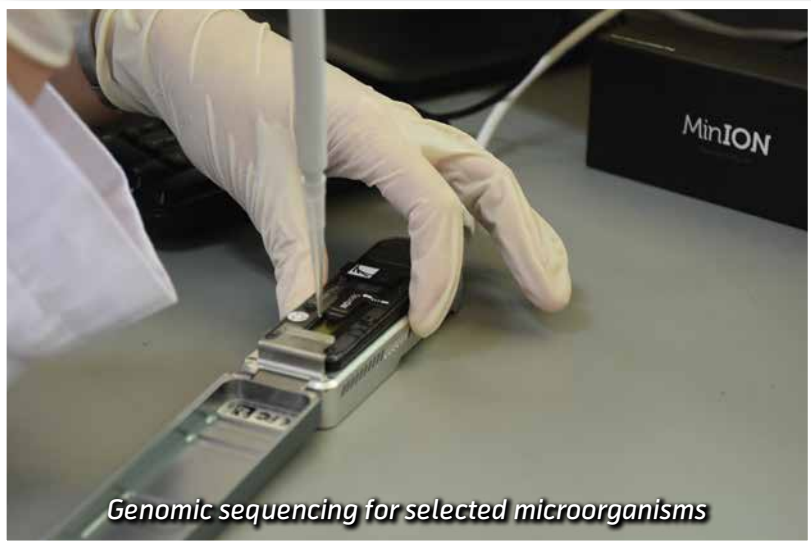

The Analytical Chemistry Laboratory has also been producing two of SBC's lead compounds, silvestrol and epi-silvestrol, at milligram scale for preclinical proof of concept studies. Silvestrol is a structurally unique compound present in *Aglaia foveolata/ stellatopilosa*, a tree belonging to the Mahogany family (Meliaceae). Silvestrol and epi-silvestrol are two highly efficient, non-toxic and specific inhibitors of the translational RNA helicase eIF4A, conferring them with anti-cancer activity. More recently, specific *in vivo* and *in vitro* inhibition of eIF4A-dependent viruses such as hepatitis E virus, Chikungunya virus, Zika virus, and Ebola virus has been documented providing more avenues for the development of silvestrol, and epi-silvestrol as therapeutic agents.



*Loading samples on the Liquid Chromatography Mass Spectrometry (LCMS) as part of the process to identify and characterise bioactive compounds*

# Microbiology Laboratory
## ~ *Unlocking Microbial Biodiversity*

The Microbiology Laboratory focuses on the isolation and identification of microorganisms from the Sarawak rainforest ecosystem, particularly actinobacteria and fungi, for their potential industrial, healthcare or agricultural application.
All extracts processed by the laboratory are deposited into the NPL.



*Genomic sequencing for selected microorganisms*

Ongoing projects at the Microbiology Laboratory include R&D of natural decomposer strains for bio-composting applications, high pigment producers for the production of natural colorants of industrial interest, and producers of bioactive compounds of potential therapeutic interest. These projects take full advantage of the laboratory's screening and bio-fermentation capabilities.

*Scale-up fermentation of microorganism in a bioreactor to produce bioactive substance for screening purposes*

# Molecular Biology Laboratory

## ~ *Identifying and Characterising Biodiversity*

The Molecular Biology laboratory is equipped with advanced technologies to identify and characterise the biological resources of Sarawak. The laboratory provides sequencing, immunoassay, cytotoxicity and other bioactivity screening platform for the Centre.

*Bioassay screening*

A key focus of the Molecular Biology Laboratory is screening the NPL for potential inhibitors or inducers of biological activities by using cell-based assays. The screens have been targeted for anti-inflammatory, anti-cancer, cytotoxicity and anti-proliferative potential. One of the assays is detection and quantification of inflammatory markers such as tumour necrosis factor-alpha (TNF-α) or interleukins (ILs) for preliminary proof of principles studies. Other projects includes transcriptomic profiling to deduce gene expression and signalling pathways, thereby providing insight into other therapeutic potential.


*Performing data acquisition and analysis via multi-mode plate reader platform*

# Plant Tissue Culture Laboratory

## *~ Propagating Sarawak's Plant Richness*

The Plant Tissue Culture Laboratory (PTC) provides a key service along the "jungle to lab to commercialisation" axis. The PTC's role is to implement protocols to facilitate plant propagation for large scale production raw materials for product development and commercialisation. The PTC is continuously evolving to meet the individual needs of each project so as to maximise yield and a plant's horticultural potential.

In addition to plant propagation using tissue culture techniques, PTC uses vegetative propagation techniques to support plant material production for research and scale up purposes. The PTC also manages an approximately one acre pilot scale planting plot at the Agriculture Research Centre (ARC) for experimental plots. Pilot scale studies are conducted to provide proof of concept that plants of interest can be cultivated in a plantation setting, to generate sufficient biomass to extract essential oils, and to collect data on parameters such as production per area size, quantity of oil per area size and quantity of resources needed.

*Checking on the plant callus produced via plant tissue culture method*

# Product Development

## ~ *Formulating Ideas from Biodiversity*

The Product Development team at SBC focuses on extraction of essential oil and formulation of personal care products. All essential oil extracts are analysed with Gas Chromatography Mass Spectrometry (GCMS) to identify their chemical composition.

Other activities by the Product Development team include product formulations of natural and herbal based products, liquid hand wash and foot spray.

One important focus of the Product Development team is the Biodiversity Makes Scents Project, an effort to reconstruct scent accords of specific flowers. Scent accords are used as ingredients for formulating a range of fragrances and other personal care products.

The goal is to create the biggest library of scent tracks in Malaysia that can be scaled up for production of Borneo-branded products.


*Range of LitSara® products*

# Bioinformatics

## ~ *Decoding Biodiversity*

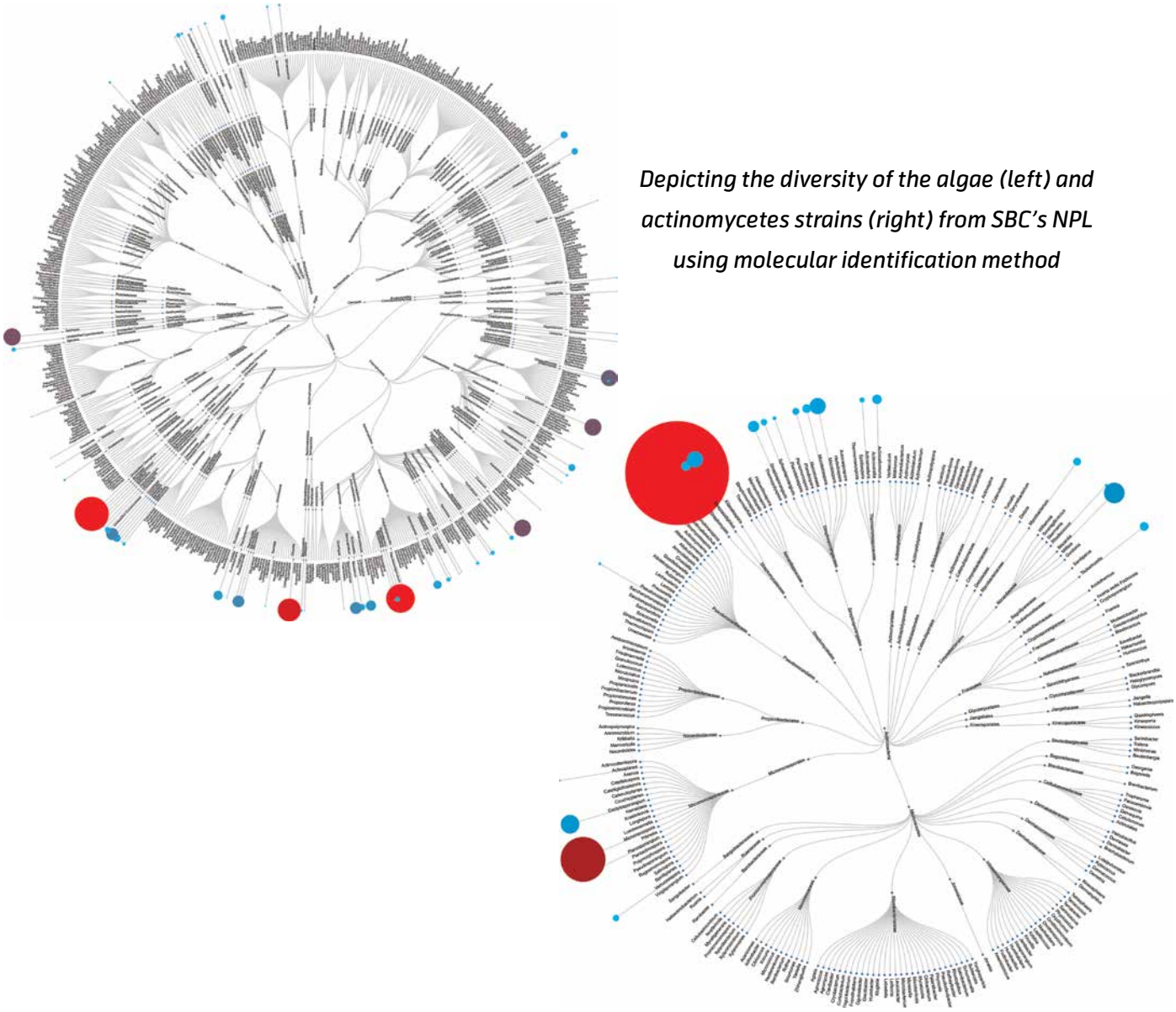
The Bioinformatics Programme was established with the aim to provide SBC with the infrastructure for bioinformatics research and to fulfil SBC's statutory function in maintaining records of and databases for biological resources found in the State.

The bioinformatics laboratory was established under the programme to:

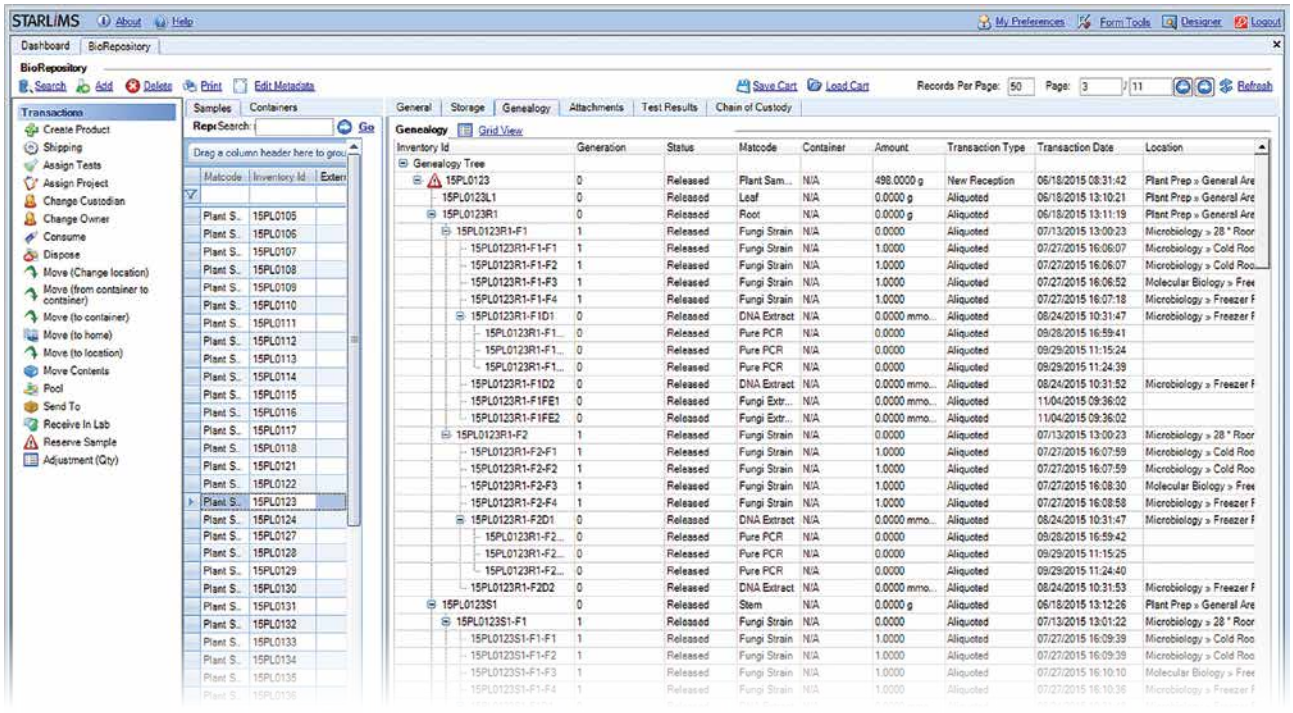
- develop database application to maintain, retrieve and analyse biological information in facilitating the SBC R&D Biodiscovery programme;
- develop database application to maintain the traditional knowledge-related data on the State's indigenous communities; and
- provide a secure, reliable and scalable management and coordinated access to biological resources and research data.

It is envisioned that the Bioinformatics programme will continue to develop in the area of computational data analytics and align organization's culture in the adoption of digital technology.

*Uploading results from the equipment to Laboratory Information Management System*



*Depicting the diversity of the algae (left) and actinomycetes strains (right) from SBC's NPL using molecular identification method*




*Screenshot from the Laboratory Information Management System (LIMS)*

# Core Functions

## Biodiversity – Biotechnology Appreciation and Awareness Programme

is aimed at creating awareness on, and appreciation for the State's rich biodiversity and biotechnology initiatives to the general public of Sarawak. Under the programme, SBC provides platforms for the general public and specific target groups (scientists, researchers, policy makers, business and industry players, investors) to share experience and ideas, and to discuss trends, directions and issues relating to biodiversity, bioprospecting and R&D. For students in particular, SBC provides opportunities to learn about the value of Traditional Knowledge of the indigenous communities, biotechnology applications in bioprospecting and career prospects in related fields.

SBC carries out the programme through various activities, such as:

- Appreciation and Awareness Visits by schools, institutions and organisations;
- Public Awareness Visits to schools;
- participation in school programmes;
- Public Awareness Workshops and Public Lectures featuring local and international experts;
- participation in exhibitions within and outside Sarawak;
- seminars, forums and dialogue sessions;
- VIP and corporate visits by government agencies and department, as well as private organisations; and
- publications and broadcasts through the media on SBC activities.

*Visit by Mr Chee Hong Tat, Minister of Trade & Industry, Singapore to SBC*

*Hands-on activity on extracting DNA from fruit*

*Delighting the olfactory sense of aromatic plants along SBC's Nature Trail*

## SBC Biodiversity Day is the Centre's annual flagship event that is held at its premises. The event is organised in conjunction with the United Nation's International Day of Biological Diversity, which is observed annually on 22 May.

The main objectives of this event are to promote awareness of, and appreciation for Sarawak's local biodiversity among all sectors of society, as well as to create awareness on SBC's function in sustainable research and development on the biodiversity found in Sarawak.

*Visit by students from primary and secondary schools to SBC during its Biodiversity Day*

## The Biodiversity Garden programme

is implemented to set up the physical structure of a nursery in SBC, identify and collect plants to be grown, assess and provide their basic physiological and environmental requirement, and to provide plants for the Laila Taib Ethnobotanic Garden.

This programme also supports SBC's Traditional Knowledge Documentation, R&D, and Awareness and Appreciation programmes. Emphasis is given on the collection, propagation and planting of Sarawak's indigenous flora, particularly useful plants that are used by the indigenous communities in the State.


*Visit by Clinical Research Malaysia on 11 July 2017*

The Laila Taib Ethnobotanic Garden – named after the late Datuk Patinggi Dr Hajjah Laila Taib – features plants that are planted according to 13 ethnic communities in Sarawak who are participating in the Traditional Knowledge Documentation Programme. They are the Bidayuh, Penan, Iban, Kelabit, Kenyah, Kayan, Lun Bawang, Punan, Bisaya, Selako, Tabun, Melanau and Malay communities.

The garden aims to create awareness on the importance of documenting and transmitting traditional knowledge of useful indigenous plants found in Sarawak. It also provides a site for off-site conservation of these plants, creating an interest on the Sarawak's plant diversity among SBC visitors.

During their visit to the garden through the Awareness and Appreciation Programme, visitors are briefed on beneficial plants used as medicines, food, crafts, rituals, building materials, and other purposes. This enables visitors to increase their understanding of the importance of documenting traditional knowledge of useful plants.

*Visit by University of Puget Sound Washington on 21 May 2018*

*Visit by the Chinese Academy of Tropical Agricultural Science on 13 September 2019*


BLOCKCHAIN GENOME
FOR BENEFIT SHARING

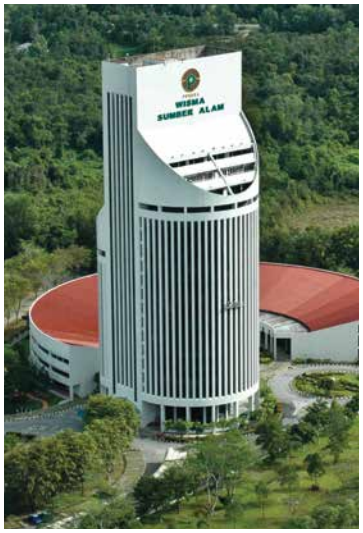
Sarawak
Biodiversity Centre

# Journey and Milestones


# Journey and Milestones

## 1997

- Government Statutory Body under the Ministry of Planning and Resource Management (MPRM) established in July 1998 after the enactment of Sarawak Biodiversity Centre Ordinance (1997)
- Began operations at Wisma Sumber Alam, Petra Jaya, Kuching in Year 1998
- Moved to its permanent premises @ KM20 Semengoh end of 1999




**Initial Functions of the Centre** *(under the SBC Ordinance 1997)*

- Regulatory Function – Regulating biodiversity related research in Sarawak
- Inventory of Biodiversity in Sarawak (Bau Limestone Biodiversity)
- Compiling a database on Biodiversity in Sarawak (Depository & Info Project)
- Conducting Biodiversity Awareness Programmes
- Networking with organisations with similar interests

## 1998

Enactment of the Sarawak Biodiversity Regulations and Establishment of the Sarawak Biodiversity Centre.

## 2000

### SBC's Inception Programme Biodiversity 2000


Objectives:

- To take stock of the status of biodiversity at the global and regional levels
- To review the progress and constraints in the implementation of the Convention on Biological Diversity
- To provide a forum to exchange views and information on matters related to biodiversity management
- To recommend workable mechanisms for equitable benefit sharing among stakeholders in R&D on biodiversity

Organised by SBC in collaboration with the Ministry of Science, Technology & Environment (MOSTE) and the Sarawak Development Institute (SDI)

Participation of 194 delegates from Australia, New Zealand, the United Kingdom, the United States, Belgium, Canada, the Philippines, Singapore, Sabah, Sarawak and Peninsular Malaysia,

## 2001

### Sarawak Bau Limestone Biodiversity

The Bau Limestone Inventory Project started in September 2001 and ended in March 2004. It covered the inventory of flora and fauna from 20 hills in the Bau Limestone Area. Findings from the field were presented at the Limestone Biodiversity Seminar that was held on 21-23 October 2003 at Universiti Malaysia Sarawak.


The project was funded by a Research Grant from the European Union Commission through the ASEAN Regional Centre for Biodiversity Conservation (ARCBC).

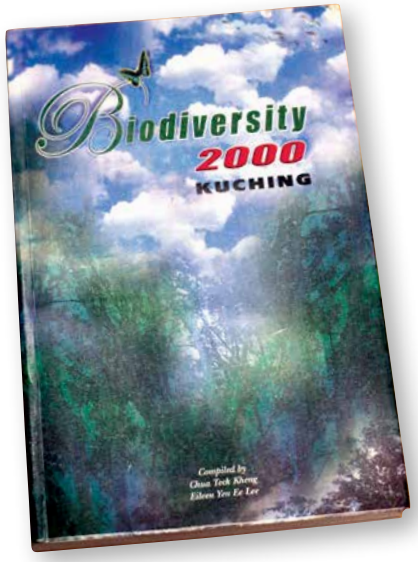
This inventory project was initiated and coordinated by the Sarawak Biodiversity Centre and was in every way a collaborative effort of many biodiversity experts and enthusiasts, research institutions and agencies.

## 2001

22 May 2001

### Launching of Biodiversity 2000 Proceedings

The proceedings of the Biodiversity 2000 Conference that was held from 1-3 November 2000 was launched on 22 May 2001 at the State Legislative Assembly building by the Chief Minister, YAB Pehin Sri Haji Dr Abdul Taib Mahmud.



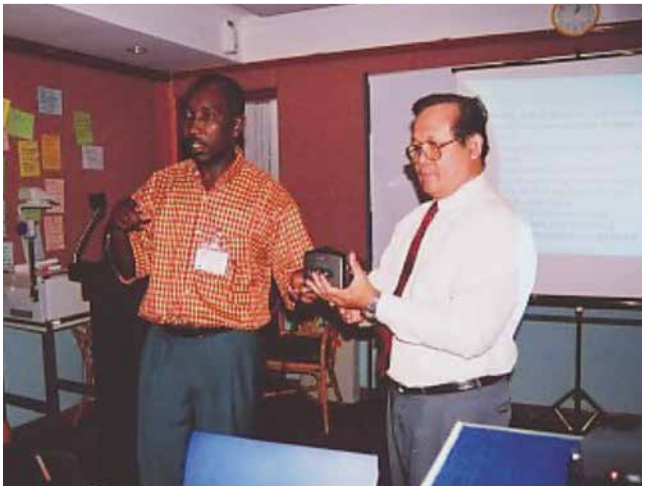

The 234 page compilation comprises working papers and views expressed during the international level conference and was compiled by the Sarawak Biodiversity.

# 2001

20 - 21 November 2001

## 1st Workshop on Traditional Knowledge Documentation at Penrissen Inn, Kuching






# 2002

## Silvestrol:

## An emerging compound for cancer therapy

- Patented under Therapeutic Compounds & Methods (Patent number US 6,710,075 B2)

28 April 2002

## Demonstration on Nyok by the Bidayuh Community of Kampung Kiding and Kampung Annah Rais, Padawan


9 - 11 December 2002

## Capacity Building Workshop on TK Documentation Project with the Bidayuh Community of Kampung Semadang

## 2002

11 - 13 December 2002

### Consultative Meeting & Drafting of Vision-Mission with Penan Communities of Batu Bungan & Long Iman

## 2003

The State Legislative Assembly passed the Sarawak Biodiversity Centre (Amendment) Ordinance, 2003 and the following year, the Sarawak Biodiversity Regulations, 2004.

## 2003

22 September 2003

### Dedication of *Begonia lailana* to YAB Datuk Amar Puan Sri Hajjah Laila Taib

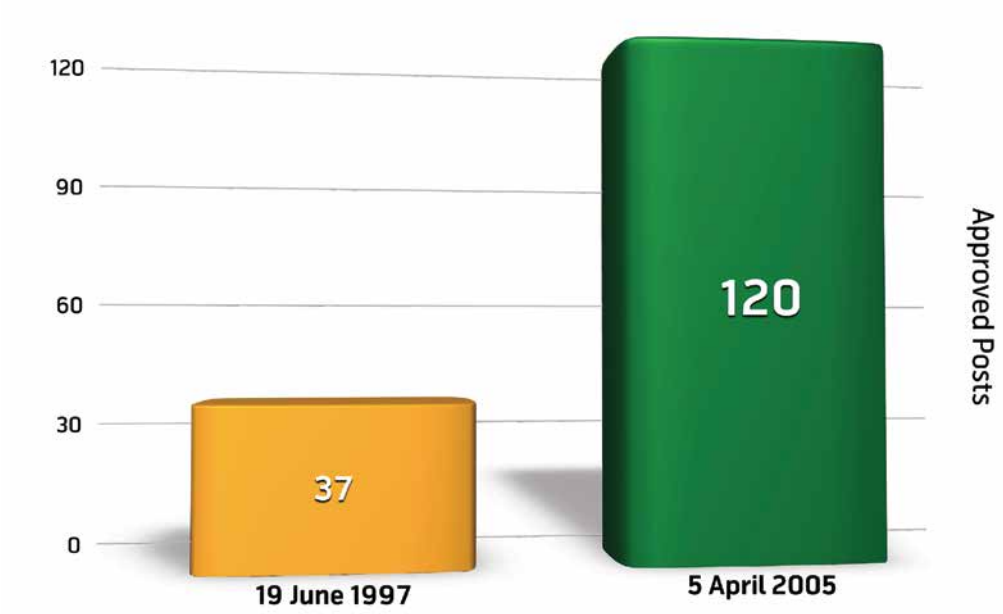

# 2004

24 - 31 October 2004

**SBC-GEF/SGP-IPGRI Regional Workshop on Traditional Knowledge Rumah Lulut, Kapit**

# 2005

**Organisational Restructuring and MMKN Approved Posts for SBC**



## SBC Biodiversity and Biotechnology Symposium 2008

## 2009

8 - 14 October 2009

**Regional Workshop on Good Practices Related to Traditional Knowledge Documentation, Community Biodiversity Register and Farmer's Descriptors**

## 2010

- **SBC Administration Building officiated by Pehin Sri Haji Abdul Taib Mahmud**
- **1st SBC Open Day 2010**


## 2011

### LitSara® was registered as a trademark

Geographical Indication-Sarawak Litsea (GI2011-00001), registered under class 3


Perbadanan Harta Intelek Malaysia
Intellectual Property Corporation of Malaysia

CERTIFICATE OF REGISTRATION

LITSARA

### Collaboration with PepsiCo

A two-year service agreement was signed between SBC and PepsiCo in October 2011 for screening of sweeteners and taste modifiers from Sarawak plants. The contract was renewed for another two years in September 2013

## 2012

### Collaboration with pharmaceutical company Novartis

Collaboration in scientific trainings and rare actinomycetes research.

## 2012

### Signed a collaboration and license agreement with the Ohio State University

To carry out further research on the silvestrol compound isolated from the fruits and twigs of *Aglaia stellatopilosa*.

## SBC Bio Borneo 2012


## 2014

### Sarawak Biodiversity Centre (Amendment) Ordinance, 2014

- Sarawak Biodiversity Centre (Amendment) Ordinance includes provisions for Access and Benefit Sharing (ABS) and acquisition of Prior Informed Consent (PIC) from indigenous communities when accessing their biological resources and traditional knowledge.


## 2014

### Launching of Headhouse and Propagation Building

## 2015

### AdenoSara® was registered as a trademark

- Geographical Indication - Sarawak Adenosma (GI2015-00018)
- Registered under class 3, 5, 16 and 35.

## 2015

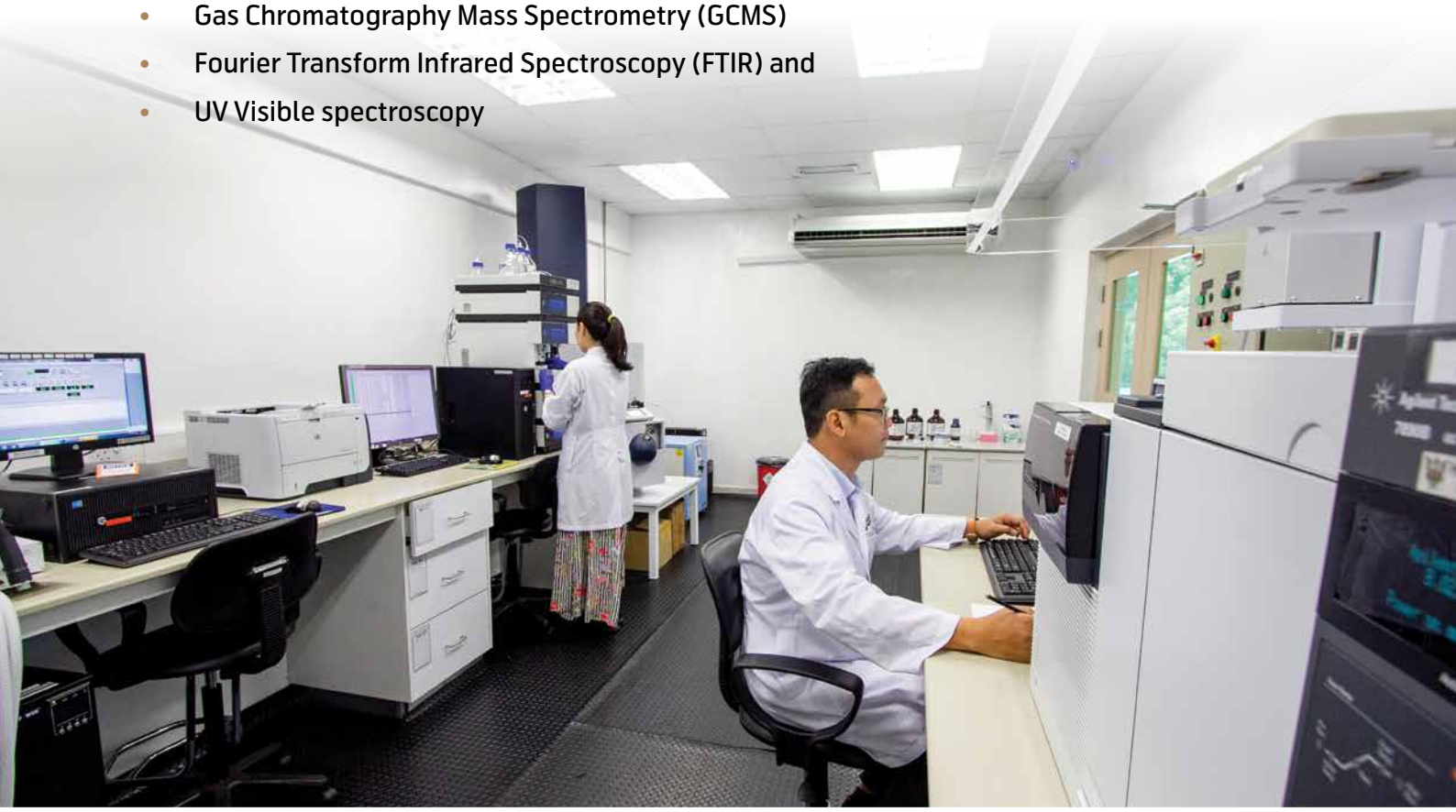
### Deployment of STARLIMS

A Laboratory Information Management System – Unify informatics between all laboratories and traditional knowledge.

## 2015

### High End Equipment at Analytical Chemistry Laboratory in IBRB Building

- High Performance Liquid Chromatography (HPLC)
- Liquid Chromatography Mass Spectrometry (LCMS)
- Gas Chromatography Mass Spectrometry (GCMS)
- Fourier Transform Infrared Spectroscopy (FTIR) and
- UV Visible spectroscopy



# 2016

22 January 2016

## SBC Integrity and Motivation Day 2016

Eighty-five Sarawak Biodiversity Centre (SBC) staff did their bit for the environment by planting 500 mangrove trees at Kuching Wetlands National Park (KWNP). The activity was held in conjunction with SBC's annual Integrity and Motivation Day. It signified SBC staff's commitment to ensuring a healthy environment and sustainable biodiversity management.


# 2016

## Sarawak Biodiversity Regulations, 2016

- The Sarawak Biodiversity Regulations, 2004 is replaced with the Sarawak Biodiversity Regulations, 2016 which comes into force on 28 January 2016. The new regulations include the process of obtaining **Prior Informed Consent (PIC)** and provisions of the **Benefit Sharing Agreement**.

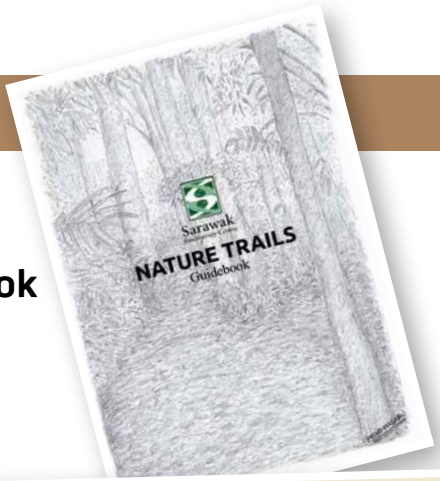

THE
SARAWAK GOVERNMENT GAZETTE
PART II
Published by Authority
30th December, 2016
Vol. LXXI
No. 74
Swk. L.N. 312
SARAWAK BIODIVERSITY CENTRE ORDINANCE, 1997
SARAWAK BIODIVERSITY REGULATIONS, 2016
ARRANGEMENT OF REGULATIONS
PART I
GENERAL

13 July 2016

## Launch of Integrated Biodiversity Research Building (IBRB) and LitSara® by the late Pehin Sri Datuk Patinggi Tan Sri (Dr) Haji Adenan bin Satem

5 April 2017

## SBC Nature Trails and Scent Trekking Guidebook and Exchange of Collaboration Agreement between Mitsubishi Corporation and the Sarawak Biodiversity Council




# 2017

19 April 2017

## First corporate partnership with French-based International Pullman Hotel brand for LitSara® project


## 2017

14 - 16 July 2017

### RWMF 2017 – SBC's 1st participation


## 2017

### NatureSara® trademark granted

The State's patented compounds, silvestrol and episilvestrol, were retailed on

**www.naturesara.com**

6 November 2017

## Visit by HRH Prince Charles, Prince of Wales

# 2019

20 March 2019

## Sarawak Biodiversity Centre seals country's first Benefit Sharing Agreement (BSA) with five indigenous communities

SBC became the first in the country to implement the Nagoya Protocol on Access and Benefit Sharing, with five indigenous communities. This is a major landmark for governance of genetic resources and traditional knowledge (TK) with benefit-sharing for its indigenous communities through the sustainable use of their biodiversity.

*Signing of the 1st Benefit Sharing Agreement at the 53rd Council Meeting*

# 2019

27 August 2019

## Algae Cultivation Facility launching by YAB Chief Minister

Officiated by the Chief Minister of Sarawak, The Right Honourable Datuk Patinggi (Dr) Abang Haji Abdul Rahman Zohari. The outdoor facility which is part of the Phase 3 milestone for the collaboration between Sarawak Biodiversity Centre and Mitsubishi Corporation is 1,000m$^2$ and is the biggest outdoor installation for algae cultivation in South East Asia.

Sarawak
Biodiversity Centre

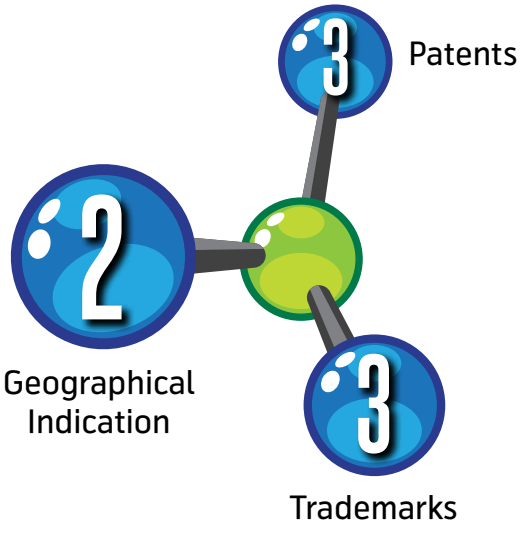
# Achievements and Role at Global Level

# SBC's Achievements

## Intellectual Property Rights

Over the past 20 years, SBC has developed and now owns two patents, two trademarks and two Geographical Indications.

| Year | Type | Title |
|---|---|---|
| 2018 | Patent | LitSara® related - oral care (Patent Number WO2012173464A1) |
| 2017 | Trademark | NatureSara® registered under class 1, 3, 4, 5, 10, 22, 27, 29, 35 and 44 |
| 2015 | Geographical Indication | Sarawak Adenosma (GI2015-00018), registered under class 3 |
| 2015 | Trademark | AdenoSara® registered under class 3, 5, 16 and 35 |
| 2011 | Geographical Indication | Sarawak Litsea (GI2011-00001), registered under class 3 |
| 2011 | Trademark | LitSara® registered under Class 3, 5, 16 and 21 |
| 2010 | Patent | Method for Identification of *Aglaia stellatopilosa* (Patent Number WO2012030206A1) |
| 2002 | Patent | Therapeutic Compounds & Methods (Patent number US 6,710,075 B2) |

Perbadanan Harta Intelek Malaysia
Intellectual Property Corporation of Malaysia

TRADE MARKS ACT 1976
TRADE MARKS REGULATIONS 1997

CERTIFICATE OF REGISTRATION
(Regulation 56)

LITSARA

Trade mark no : 2011001881

To : The Government of the State of Sarawak, Malaysia

I HEREBY CERTIFY THAT under the provisions of the Trade Marks Act 1976 and the Trade Marks Regulations 1997, the above-numbered trade mark has been registered in your name as proprietor of the said trade mark in the Register for a period of ten (10) years from 28/01/2011 to 28/01/2021 in Class 3 in respect of the following goods:

(LIST OF GOODS : AS-ATTACHED)

(ABDUL AZIZ B. ISMAIL)
for REGISTRAR OF TRADE MARKS
MALAYSIA

DATE ISSUE: 29/06/2012

Perbadanan Harta Intelek Malaysia
Intellectual Property Corporation of Malaysia

GEOGRAPHICAL INDICATIONS ACT 2000
GEOGRAPHICAL INDICATIONS REGULATIONS 2001

CERTIFICATE OF REGISTRATION
[Subregulation 29(3)]

SARAWAK LITSEA

Geographical Indications No. : GI2011-00001
Class : 3
Name of Registered Proprietor : The Government of the State of Sarawak, Malaysia
Registered From : 28th day of January 2011
Expiry Date : 28th day of January 2021
Goods : In respect of the following goods

Sarawak Litsea In Any Form (Whole, Ground, Any Other Related Forms)
And All Sarawak Litsea Products And Litsea-Based Products

Quality, Reputation or Other Characteristic

-As appended in APPENDIX I-

(SITI EAISAH MOHAMAD)
For Registrar of Geographical Indications
MALAYSIA

Date: 7 October 2011

# LitSara®


On 13th July 2016, SBC launched the LitSara® brand products.

The LitSara® trademark comes from a combination of Litsea and Sarawak. The essential oil of LitSara® comes from Sarawak Litsea (*Litsea cubeba*), a plant well known to the Bidayuh, Kelabit and Lun Bawang Communities for its culinary and healing properties.

Known to the Bidayuh as "Pahkak" and to the Kelabit and Lun Bawang as "Tenem", the tree produces a scintillating scented essential oil that invigorates, rejuvenates and inspires.

The production of LitSara® essential oil from the Sarawak Litsea tree is a pilot project that involves ABS and the acquisition of Prior Informed Consent (PIC) from participating communities who are actively involved in the development of the essential oil. On 20th March 2019, five participating communities officially signed the Benefit Sharing Agreements (BSA) with the Sarawak Biodiversity Council. The five communities are the Bidayuhs of Kampung Kiding, Padawan; the Lun Bawangs of Long Telingan and Long Kerebangan, Lawas; and the Kelabits of Pa'Ukat and Pa'Lungan. Today, seven villages are involved in sustainably producing the Litsea essential oil, with a production target of 100 litres a year.

The essential oil's journey from jungle to market has been remarkable. So far, a range of LitSara® products such as soaps, body wash, shampoo, hand wash, aromatherapy oil, sniff jar and air freshener is available online through the LitSara® website. SBC is working on producing a wider range of products to compete with the global market.


Body Oil


Natural
Body Wash


Natural
Shampoo


LIQUID HAND WASH
Crisp. Citrusy. Calm
NATURAL
MOISTURIZING
HAND WASH
250ml


Sarawak Litsea
100% Pure Essential Oil
Net .51 floz (15mL)


Sarawak Litsea
100% Pure Essential Oil
Net .51 floz (15mL)


Natural
Body
Wash


Natural
Shampoo


Invigorates. Rejuvenates. Inspires.
Natural
Soap
Made in Sarawak
90g


Air
Freshener

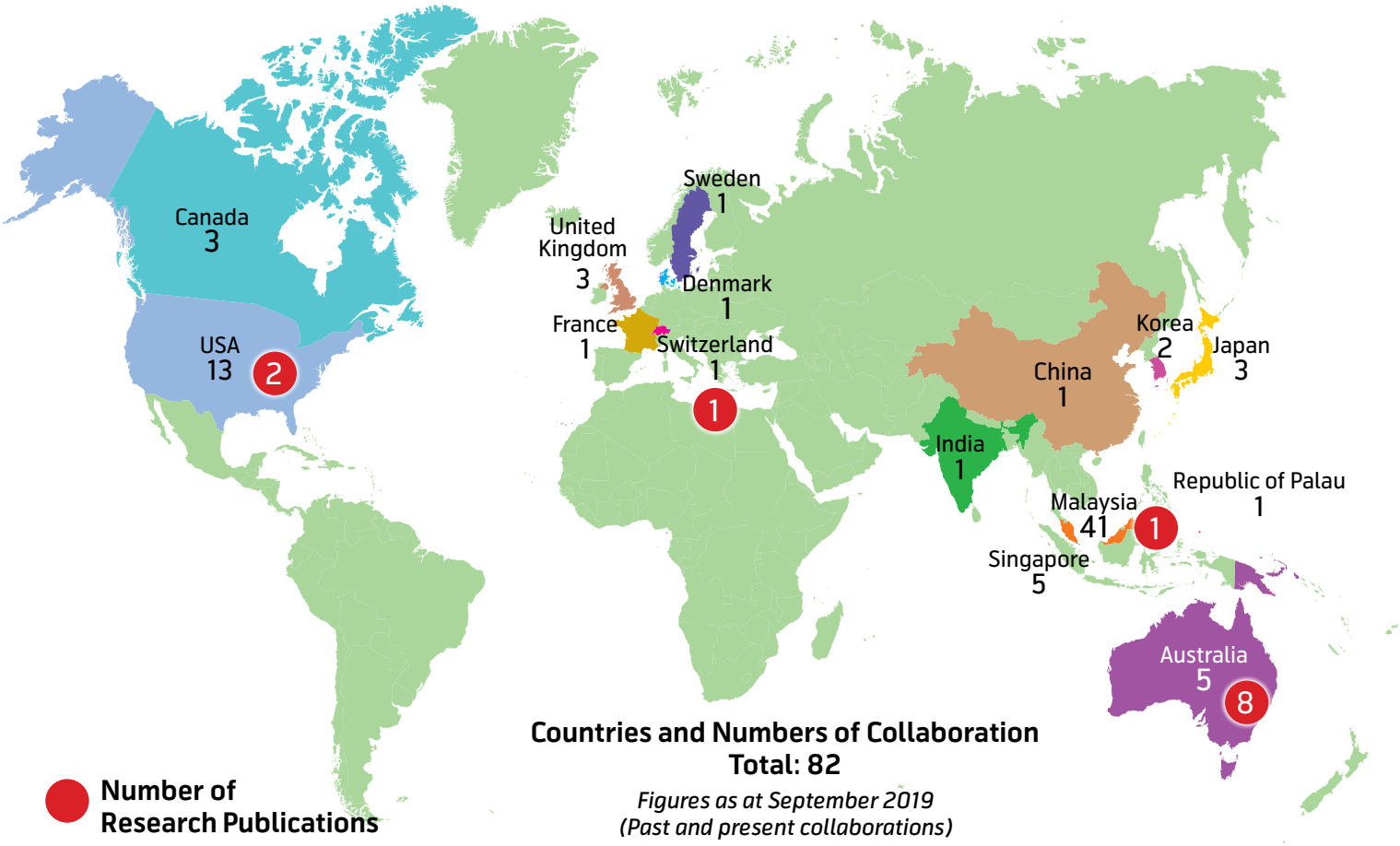

Sniff Jar

# SBC's Role at Global Level

Over the past 20 years, SBC has established research collaborations with corporate organisations and research organisations around the world to maximise its effort in adding value to biodiversity, and to enhance research excellence. As at September 2019, a total of 82 research collaborations have been established: 41 are national while the rest are international.

The agreements signed are categorised into:

- Agreement (AG);
- Materials Transfer Agreement (MTA);
- Non-Disclosure Agreement (NDA);
- Confidentiality and Non-Disclosure Agreement (CNDA); and
- Memorandum of Understanding (MOU). Some research collaborators have more than one project with SBC.



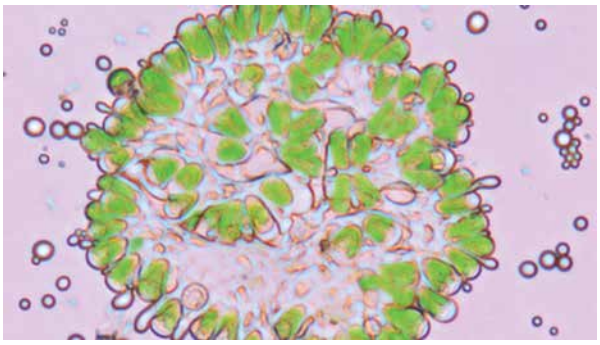

**Countries and Numbers of Collaboration**
**Total: 82**

*Figures as at September 2019*
*(Past and present collaborations)*

## The following are among local and international organisations and institutions that have collaborated with SBC

| | | | |
|---|---|---|---|
| Monash University, Australia | Swinburne University of Technology, Australia | University of Queensland, Australia | Mitsubishi Corporation, Japan |
| Nimura Genetic Solutions, Japan | ATL Cosmetics Sdn Bhd, Malaysia | Cancer Research Initiatives Foundation, Malaysia | Monash University, Malaysia |
| Universiti Sains Malaysia, Malaysia | Tidy Non-Woven Sdn Bhd, Malaysia | Universiti Malaysia Sarawak (UNIMAS), Malaysia | Universiti Malaya, Malaysia |
| Universiti Teknologi Petronas, Malaysia | University of Strathclyde, Scotland | National University of Singapore, Singapore | Singapore Immunity Network (SIgN), Singapore |
| AT Lab, South Korea | Novartis AG, Switzerland | Glucan Biorenewables LLC, United States | Pepsi Co, United States |
| Sloan Kettering Institute, United States | Texas A&M University, United States | Yale University, United States | GS Caltex Corporation, Korea |
| Interhill Group of Companies, Malaysia | Pullman Kuching and Pullman Miri Waterfront | Satoyama Farm Sdn. Bhd., Malaysia | Gretals Australia Pty. Ltd., Australia |

# The Collaborative Research: Microalgae Project



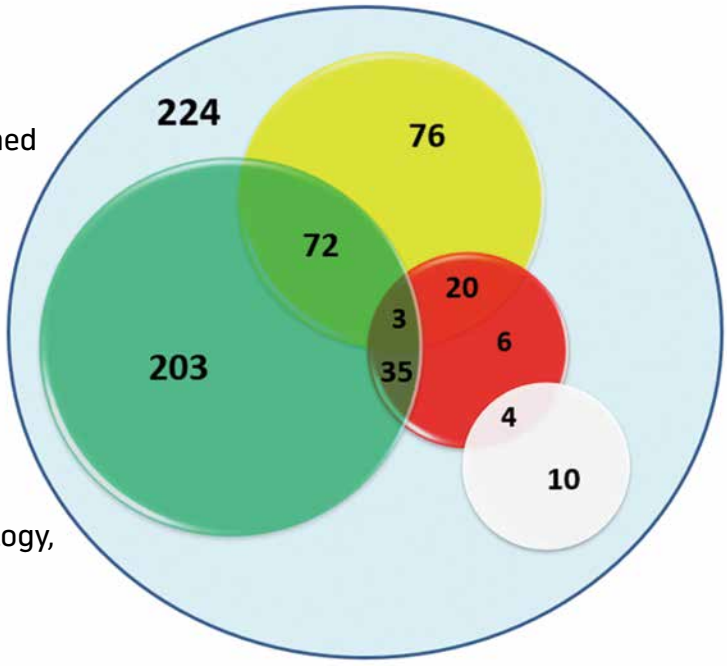
## Introduction

Sarawak is well-endowed with a diverse wealth of biological resources that potentially have unique applications in various industries. SBC's R&D Programme focuses on making discoveries in biological resources that would lead to the development of high-end products with broad industrial applications.

Microalgae are the focus of worldwide market now due to its extensive industrial application and promising return. Sarawak Biodiversity Centre and Mitsubishi Corporation have worked closely since October 2012 to endeavour and explore microalgae in Sarawak.

## SBC Microalgae Library

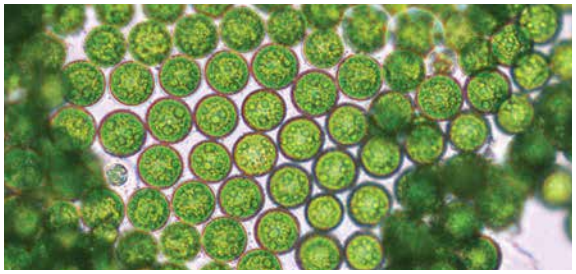
A Microalgae library was successfully established with a total of 653 strains collected from various unique habitats located in Sarawak.



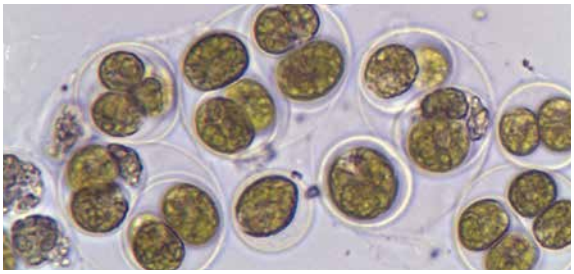

Biotechnology application classification (for graphic labelling):

- Agriculture, environmental biotechnology, biofuels, bio-fertilizer, bioremediation
- Food and nutrition
- Health, medicine and diagnostic
- Bio-Industry
- Undiscovered potential

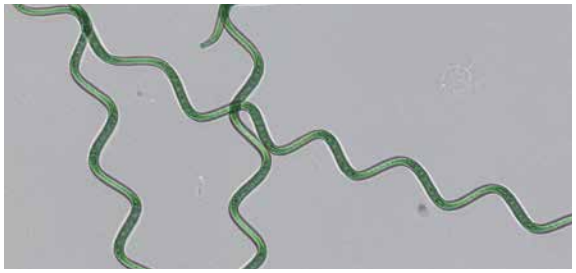
# Prospective Microalgae



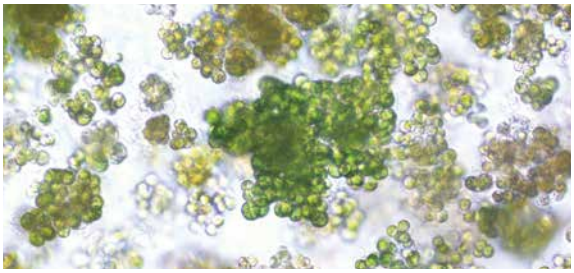
*Haematoccocus* sp.



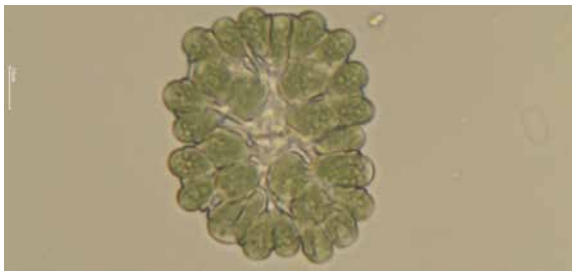
Chlamydomonas



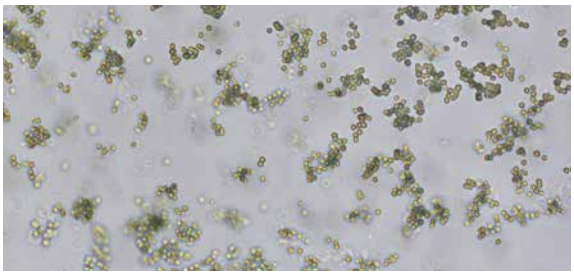
*Arthrospira platensis*
*(commonly known as Spirulina)*



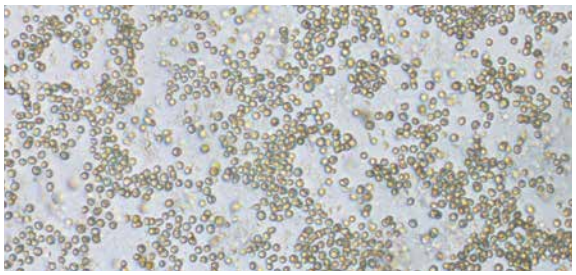
*Chlorella* sp.



*Botryococcus* sp.

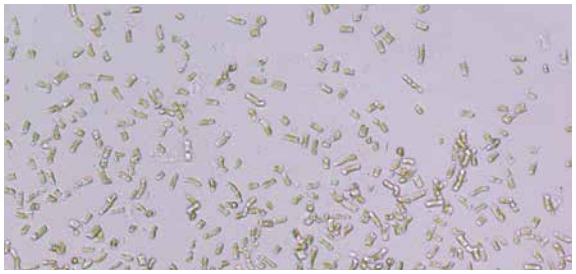


*Nanochloropsis* sp.

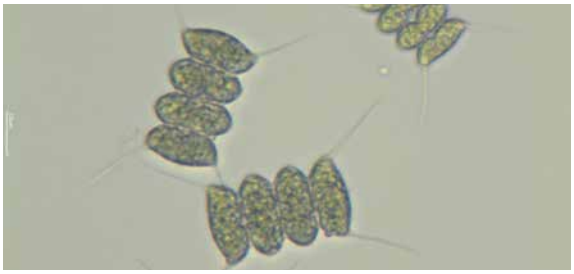


*Isochrysis* sp.

*Marine Spirulina*



*Chaetoceros* sp.



*Scenedesmus* sp.

# Sarawak Biodiversity Centre (SBC) - Mitsubishi Corporation (MC) Microalgae Project

SBC and MC began collaborating in 2012 to identify potential indigenous microalgae strains with diverse applications in biofuel, food supplement and biomass feedstock production under the consultative support from Chitose Laboratory.

Through intensive sampling and isolation processes, more than 75 genera of microalgae strains have been successfully isolated at SBC. In Year 2014, the collaboration had extended to Phase II to evaluate isolated strains for outdoor cultivation at an economic cost. A 81m$^2$ pilot study plant was set up to study the growth rate and productivity. As a result, one of the strains was identified as the most robust strain when cultivated at outdoor.

The in-house analysis found that some strains were exhibiting high lipid production as well as carotenoid pigment. Due to the encouraging result from Phase II evaluation, the collaboration continued to Phase III in Year 2017 to expand the outdoor facility from 81m$^2$ to 1,000m$^2$ algae cultivation facility.


Algae Cultivation Facility at Sa
iversity Centre
Waste Pond
PBR Plot 1
Pilot Scale Experimental Plot (81m²)
MSB & Genset House
Pump House
Fact Sheet
Sarawak


THE FUTURE OF ALGAE BIO INDUSTRY
ANIMAL FEED
ANIMAL FEED ALTERNATIVE
Agriculture Farm

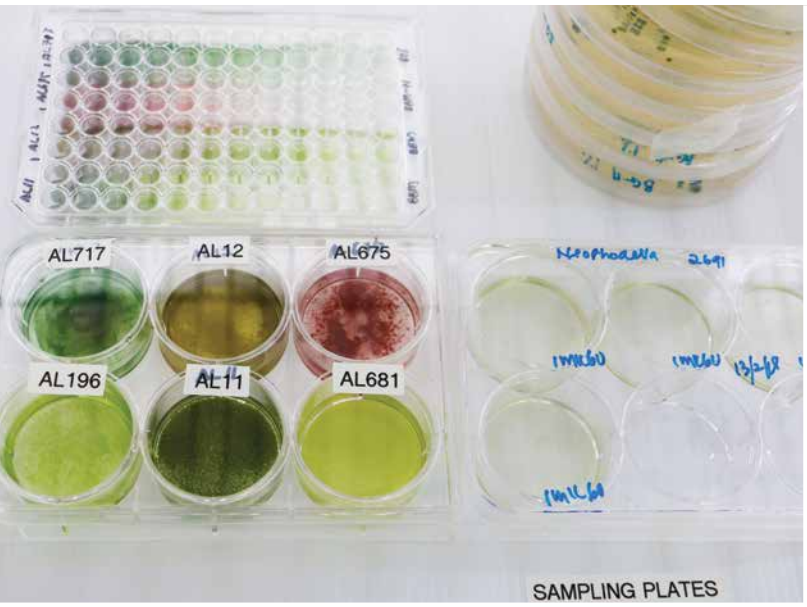
The 1000m$^2$ Algae Cultivation Facility is a physical setup which resulted from the collaboration work between SBC and MC over the past 7 years. It comprises of 60 units of 24 meter long flat panel photo-bioreactor (PBR). The facility is designed with high surface area to volume ratio using vertical PBR system for maximum photosynthetic light absorption, therefore promoting higher area productivity. As it is an outdoor facility, it has a sustainable supply of natural sunlight that can help in reducing the operation cost.

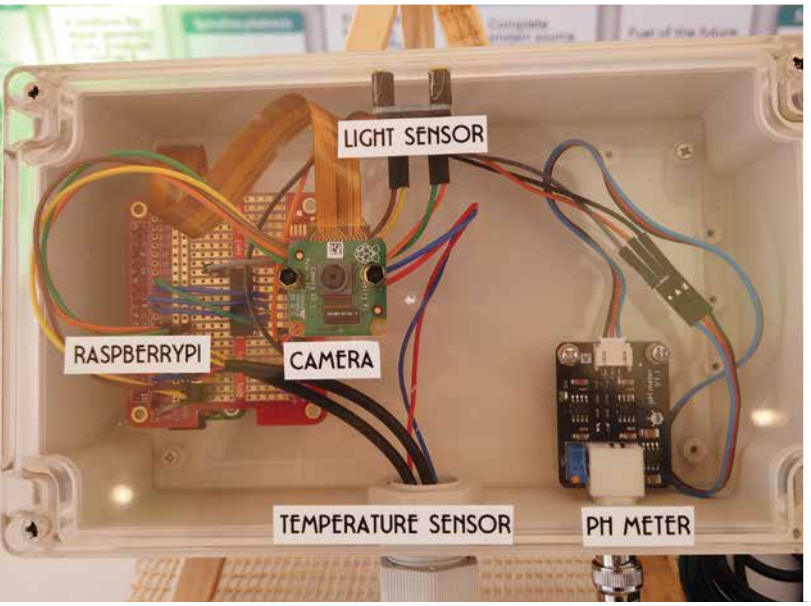
In line with SBC's development path towards digital transformation, the facility is integrated with smart monitoring system, embracing the Internet of Things (IoT) technology to provide real-time monitoring of growth conditions such as pH, temperature, and light intensity as well as regulate the variables through automatic

operations such as temperature cooling. The smart device is also equipped with Artificial Intelligence (AI) which is developed in collaboration between SBC and University Malaysia Sarawak (UNIMAS) to monitor the health conditions of the algae culture.

The facility is expected to yield up to 6 tonnes of dried algae biomass per year on an area of 1000m$^2$. SBC aims to move beyond algae research to commercialization by actively engaging with local and international collaborators or partners in harnessing the benefits of algae, which will contribute to the economic viability and environmental sustainability in Sarawak.

The facility serves as a model for efficient production of algae based high value products, This facility also serves to model the next scale up phase to reach the production levels needed to meet the global demand for algae biomass, creates more job opportunities and spur the development of a new bioindustry in Sarawak. Through this, SBC hopes to be one of the key players in the global algae industry.



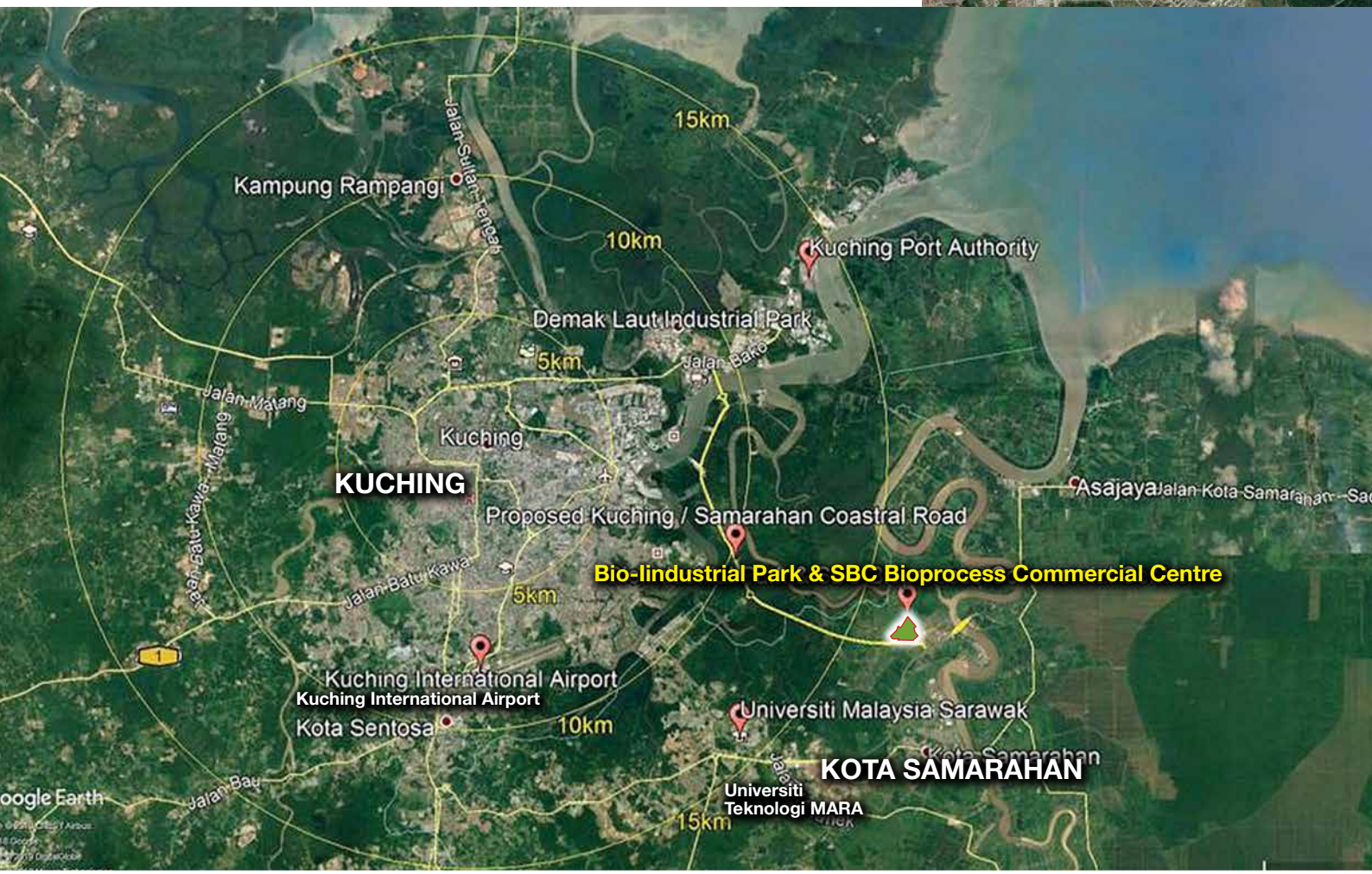

Sarawak
Biodiversity Centre

# Biodiversity for a Better Tomorrow

# Bio-Industrial Park

SBC's Bio-Industrial Park is expected to be developed not far from the collection centre of agro products in Kota Samarahan Industrial Estate. The park will consist of industries based on agriculture and biodiversity resources.

Upon completion, the park will support the agricultural supply chain in Kota Samarahan, which will be vital in the development of downstream industries based on agriculture and natural resources in the state, and the transformation of the rural population there.

# Bio-Industrial Park &
# SBC Bioprocess Commercial Centre


# Developing Young Talents

SBC's internship and industrial training programmes provide opportunities for undergraduate and graduate students to engage in the workings of an actual research organisation, to build research connections, and to hone their laboratory skills.

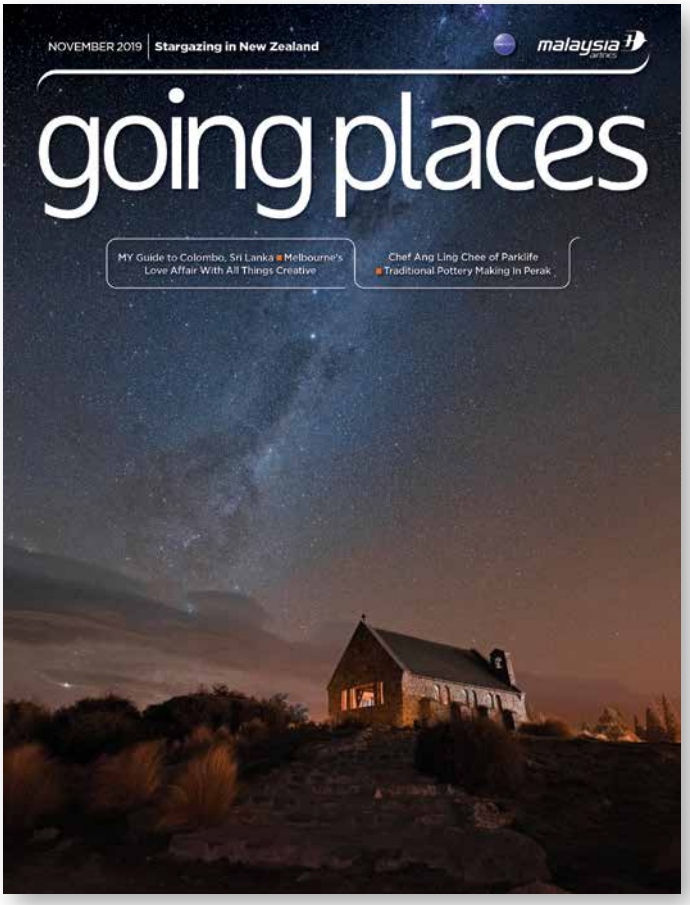
The trainees and interns are also provided opportunities to participate in SBC's various outreach programmes. Those from overseas get to immerse themselves in Sarawak's local cultures and delicacies.

Undergraduates typically carry out their training at SBC between eight to twelve weeks in SBC's laboratories, and work on mini projects. Graduate students spend between one to ten months interning at SBC, focusing on their respective research projects.

The industrial training and internship programmes at SBC are also targeted at developing Sarawak's very own talent pool of young scientists, as well as establishing and maintaining research networks with local and foreign universities.

Since the programme was initiated in 2001, SBC has hosted a total of 197 interns and industrial trainees from universities based locally and internationally.

# Magazine Features on SBC – Going Places *(November 2019)*




EXPLORE | Sarawak Litsea

## Scents of the Rainforest

**Commercialising essential oils harvested from the Sarawak rainforest to empower indigenous communities.**

Words **Carolyn Hong** | Photography courtesy of **Sarawak Biodiversity Centre**

**The sun was low in the sky** and the rainforest was growing dark as Margarita Naming and her team from the Sarawak Biodiversity Centre (SBC) trudged back to the village. Suddenly, a zesty scent filled the air.

To many Malaysians, a sudden sultry scent in the jungle is a signal to hurry away without looking back. But to Margarita's team, it was cause to stop to take a closer look – their exhaustion immediately forgotten, their senses awakened and their curiosity piqued.

The invigorating scent, reminiscent of citronella or lemongrass, was emanating from tiny berry-like fruits being picked by their forest guide and local medicinal plant expert, the late Taie Puyet, from a small tree. According to Taie, several ethnic groups in Sarawak such as the Lun Bawang and Bidayuh have, for generations, used these berries as a spicy condiment to eat with rice as well as a natural remedy to ease stomach and back aches. Taie was from the Lun Bawang community.

Excited, the team took several cuttings from the tree, known as *tenem* to the Lun Bawang and *pohkok* to the Bidayuh, and brought them back to SBC's headquarters in Kuching, the capital of Sarawak, for further analysis.

This scent-filled jungle walk had taken place in 2005 as part of SBC's effort to document the use of the indigenous plant with a scientific name of *Litsea cubeba* by the different ethnic groups in Sarawak and to preserve this traditional knowledge.

Margarita's team had visited the mountains of east Sarawak to document the traditional plant use of the Lun Bawang community, a small ethnic group of Sarawak. The Lun Bawang are mountain-dwellers with deep knowledge of the highland rainforests where they have lived for generations.

On that trek guided by Taie and his son Ukong Taie, the team mapped out the indigenous plants commonly used in the villages of Long Telingan and Long Kevebangan, both located over three hours' away by road from the nearest town. Margarita remembered clambering up and down muddy slopes, walking for hours to search for plants used locally as medicines, food and other purposes. "We kept asking 'are we there yet?'," she recalled, laughing.

Back in their labs in Kuching, the team set out to analyse the chemistry of the *Litsea cubeba* berries and other cuttings. To their excitement, they found its oil composition to be markedly different from similar *Litsea* plants found in the highlands of China and Taiwan, where they are also used for medicinal purposes. This allowed SBC to register the local tree, Sarawak Litsea, as unique to Sarawak for Intellectual Property protection.

The team also found the Sarawak Litsea oil to have anti-microbial properties as effective as tea tree oil, while emitting a revitalising, fresh and vibrant scent. These discoveries started them off on a long journey of research and development, which took over 10 years until the Sarawak Litsea oil was turned into delightfully-scented personal care products.

Marketed under the brand-name LitSara®, a combination of Litsea and Sarawak, the range includes soaps, body wash, shampoo, handwash, aromatherapy oil, sniff jar and air freshener. Litsea oil is also available as pure essential oils for diffusers, and soon, Litsara-based insect repellent sprays and biodegradable wipes will also be on the shelves.

This essential oil's journey from jungle to market has been remarkable because SBC strove to ensure that all benefits are shared equitably with the local communities. This is in keeping with the global standards set by the 1992 Rio de Janeiro Convention on Biological Diversity and the 2010 Nagoya Protocol, an addendum to the Convention, which recognises the right of indigenous communities to manage the biological resources in their area, and to benefit from its commercialisation.

"We wanted to ensure that there is community engagement right from the start, to make the local community a part of the decision-making and development process," said Dr Yeo Tiong Chia, Chief Executive Officer of SBC, adding that the communities receive a share of the benefits, in both monetary and non-monetary terms.

In non-monetary terms, the documentation of the local traditional knowledge with full acknowledgement of its ownership is of great value to the community. Subsequently, any new insights derived from their traditional knowledge are also shared with the community.



1



2



3

1 & 5. The LitSara products range from soaps to air fresheners, and soon insect repellent sprays and biodegradable wipes

2–4 Local villagers picking the Litsea berries and posing with their harvest; the tiny fruits



4



5

> "According to Taie, several ethnic groups in Sarawak such as the Lun Bawang and Bidayuh have, for generations, used these berries as a spicy condiment to eat with rice as well as a natural remedy to ease stomach and back aches."

In the case of the Litsea essential oils, SBC holds regular workshops to share new information on cultivating and nurturing the Litsea trees. It also holds classes on extracting essential oils from the fruits and leaves, and soap-making sessions to enable the locals to make their own products from the oils.

Monetary benefits come into play once the products are commercialised. For the Litsea products, the SBC buys the essential oils produced by the locals at a fair price, and subsequently returns a percentage of the product sales to the community.

Today, seven villages are involved in sustainably producing the Litsea essential oil, with a production target of 100 litres a year. Besides the original Lun Bawang villages, the SBC has started working with the Kelabit, Iban and Bidayuh communities once it was established that they also use the plant.

The unassuming *Litsea cubeba* tree – and its heavenly-scented tiny fruits – has earned a place of pride in the ranks of essential oils, having come a long way from that first whiff of its zesty scent in a dank rainforest. ●

# Magazine Features on SBC – Borneo Talk *(October – December 2015)*



# LitSara®

## *An Essential Oil from Sarawak*

Amidst the hilly forests of Sarawak grows the Sarawak Litsea, a plant long utilised by the indigenous communities as a source for flavour and healing.

*Traditional harvesting of the Sarawak Litsea fruits and leaves in Kampung Kiding is carried out in a safe and sustainable manner*

Thriving along ascending clearings of up to 2,300 metres above sea level, this small tree bears fruits and leaves that emit a crisp and invigorating scent.

Its fruits, small, delicate and often mistaken as peppercorn, are a popular culinary condiment and to treat stomachache among the communities of the highlands – the Kelabit in Bario, Lun Bawang in the Long Semadoh area of Lawas and the Bidayuh in Kiding, a village nestled in the Padawan range near Kuching.

*The fruits of the Sarawak Litsea*

Its leaves too are used as a traditional relief for backaches. It is from these very fruits and leaves that LitSara®, an essential oil is obtained by steam distillation. LitSara® exemplifies the powerful realm of useful essential oils. It has shown, through laboratory testing, both anti-microbial and repellency properties, besides having a pleasantly revitalising scent.

*Distillation of the LitSara® oil for research and development is also carried out by the communities involved in the project*

Above all, it is traditionally used, thus making LitSara® a suitable ingredient for personal care products such as natural handmade soaps, scented multipurpose spray and even in wet wipes for the adventurous explorers of the rainforests to repel insects.

Because the tree, also known as *Litsea cubeba*, produces a unique oil composition which differs from the same species found in other countries and locations, the Sarawak Litsea is registered as a Geographical Indicator, while the essential oil LitSara® is trademarked.

The Sarawak Biodiversity Centre (SBC) works closely with the indigenous communities of Sarawak, whose traditional knowledge on the plant led its team of researchers to the discovery of the essential oil. The communities are actively involved with the Centre in the collection and extraction of LitSara® for research and development.


*Examples of personal care products that incorporate the LitSara® essential oil*

Their effort in documenting the uses of the tree, sustainable harvesting of the fruits and leaves while conserving the trees, and extraction of the oil does not go unrecognised.

To acknowledge the importance of traditional knowledge of indigenous communities in providing leads to discoveries and new applications from the biodiversity that they utilise, the Sarawak government has incorporated provisions for Access and Benefit Sharing in the Sarawak Biodiversity Centre Ordinance.

*A member of the community in Bario funnels out LitSara® oil to be sent to SBC*

This is to ensure that the indigenous communities play a pivotal role in adding value to their traditional knowledge and local biodiversity, and are also duly acknowledged through recognition and equitable sharing of benefits arising from product commercialisation.

Interested in using personal care products containing LitSara®, in SBC's work with the indigenous communities and its R&D programmes?

Surf for more information on SBC's website, **www.sbc.org.my** or call the Centre's corporate communications team at **+6082 610610** (ask for Asha or Constance) or feel free to leave a message via Facebook on *www.facebook.com/sarawak.biodiversity.centre*

# Magazine Features on SBC – Borneo Talk *(July - September 2017)*

Tourism

## Making scents of Borneo's biodiversity

Borneo is a hotbed of tropical plants with various genetic makeups, often producing a rich fragrance through their flowers, latex, bark, leaves or roots. Trekking through the jungles of Borneo, one will experience wafts of alluring and sometimes, what seem to be repelling smells.


The Bellina or Normah Orchid

For example, the *Phalaenopsis bellina* or Normah Orchid, the official State flower of Sarawak is known for its sweet, vanilla and jasmine like scent when in full bloom. The *Coelogyne asperata* meanwhile produces a sweet smelling note that ends with a hint of liquorice. On the other hand, there are orchids that may not seem as appealing in terms of how they smell, for example, the *Bulbophyllum becarii* which is said to smell like rotting meat!

The forests of Sarawak also boasts a number of trees that produce beautiful scents from their latex and barks, for example, the "Selukai" or *Goniothalamus macrophyllus* which aromatic bark is used by the local communities to repel insects. Another example of a tree widely found in our forests is "Medang Tija" or *Cinnamomum javanicum* which is commonly known as cinnamon or "kulit kayu manis" used widely in cooking.


Looks like the Durian skin has no smell!

This leads us to the question, wouldn't it be wonderful to trek through the forest with our nose for a change?

# A scented trail

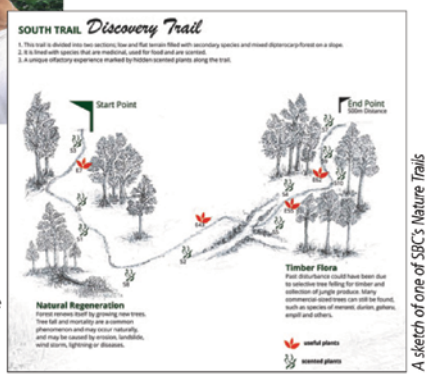
A delight for your olfactory senses

## A scented trail

The Sarawak Biodiversity Centre recently opened up two nature trails at its premises in Semenggoh as part of its on-going efforts to reach out to the public, particularly the younger generation, on the need to appreciate, the importance to conserve, and sustainably explore biodiversity.


Delighting the olfactory senses!

The highlight of the two trails, known as the Ecology and Discovery trails is, the opportunity to sniff out and identify plants that produce different types of scents - some growing naturally, and others, planted along the way.



A sketch of one of SBC's Nature Trails

The Ecology trail passes through two distinct ecosystems in the alluvial forest and old lowland secondary forest, while the Discovery Trail passes through a lowland rainforest of Semenggoh. These ecosystems exhibit a variety of plant species found in Sarawak.

The idea of including an olfactory or scented experience along SBC's Nature Trails was inspired by an article written by SBC's Research Officer Elaine Remi and published in the Malaysian Naturalist in 2013 (a copy of the article can be viewed at *http://www.sbc.org.my/media-centre/downloads/publication/181-making-scents-of-biodiversity-a-perfumed-garden-in-paya-maga-sarawak*).

Other than the olfactory experience, trekkers will be also "discover" useful and important plants which are found along both trails. These plants have long been used by the indigenous communities in Sarawak for various applications such as medicinal, culinary and in rituals.

Guided walks along the trails are available to groups of 10 persons through appointments made with SBC. Participants have the opportunity to engage in an "olfactory hunt" where they have to "sniff out" the fragrant plants along the trail. Those who "sniff out" all fragrant plants listed will walk away with a "Wilderness Explorer" medal from the Centre.

For more information on outreach activities carried out by the Sarawak Biodiversity Centre, head on to ***www.sbc.org.my*** or contact the centre via email at ***biosar@sbc.org.my***.

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# Magazine Features on SBC – Naturalist *(September 2013)*

# Making Scents of Biodiversity

## A perfumed garden in Paya Maga, Sarawak

TEXT BY ELAINE REMI

When I joined the Sarawak Biodiversity Centre (SBC) in 2011, I was given the opportunity to work on a project exploring natural scents with the tagline: "Biodiversity Makes Scents".

The project focuses on analysing and developing natural scents from Sarawak's biodiversity with the idea to create original biodiversity-inspired fragrances to be incorporated into consumer products that define the magnificent rainforests.

Being very enthusiastic about new things, I gladly took up the project not realising that the job would require me to 'hunt and trap' scents. I always thought that 'hunting and trapping' was the job of a zoologist!

The work on reconstituting scents from nature based on headspace technology is a technique pioneered by a fragrance chemist, Roman Kaiser at Givaudan, a Swiss fragrance and flavour company. Inspired by his work, SBC has been searching for opportunities to work on scented plants in Sarawak for the past five years or so.

When I joined SBC in 2011, I attended a talk by Ch'ien C. Lee who presented his research on pitcher plants. Ch'ien C. Lee is a professional photographer and botanist, specialising in carnivorous plants of the genus *Nepenthes*. During his talk, I was particularly attracted to the story he told of a scented pitcher plant he came across, called *Nepenthes chaniana*.

As he told us of the adventures he'd had and the story about the strong scent he experienced from a pitcher plant, I was convinced that the species *chaniana* was my ultimate target.


*Nepenthes chaniana*

*N. chaniana* is endemic to Northern Borneo and can be found at Paya Maga, Lawas. I had a vague idea of where Paya Maga is in Borneo and ever since that talk I had been hopeful that one day I would personally experience the scent of *N. chaniana* in the wild at Paya Maga.

Paya Maga, a highland plateau in the northern part of Sarawak is covered by pristine highland forest. It remained largely unexplored by outsiders until the Scientific Expedition to Paya Maga in 2010.

The biodiversity at Paya Maga has been reported to be very rich and numerous species of flora and fauna have been recorded and described during the scientific expedition. One such unique species is a primitive plant *Thismia goodii*, also known as the "blue cap lantern plant".

Apart from the flora and fauna, the ecosystem of Paya Maga itself is also exceptional. It is probably the only highland area in Sarawak that is covered with peat forest. There are also many picturesque waterfalls and streams.








The SBC team - (L-R) Elaine Remi, Arlene Alicia, Tora Ranggan, Holed Jubai, Dawut Barok, Mohd. Nasar and Jafari Selutan.

It was almost two years after I first heard of *N. chaniana* that SBC organised an expedition to Paya Maga in June 2013 with a dedicated purpose – to track down and trap the scent of *N. chaniana*.

The team comprised three research officers: Arlene Alicia, a budding botanist who works closely with the indigenous communities; Holed Juboi, a microbiologist who has a keen eye for rare microbes; our dedicated support staff, Mohamad Nasar and Tora Ranggon who are veterans of many field trips; and me, a scent enthusiast.

We arrived at a stopover town called Lawas on 6 June and proceeded directly to Kampung Long Tuyo where we spent a night before journeying up to Paya Maga the next day.

Our journey started early in the morning in a four wheel-drive vehicle headed to the drop-off point at Sungai Retingu, 20 minutes from Kampung Long Tuyo.

We were joined by Pelidah Panus Taie from the District Forest Office of Lawas and two villagers, Dawat Barok and Jafari Selutan, our knowledgeable guides. Without them our mission to locate the scented *Nepenthes* would not have been successful.


*Thismia goodie.*


"Friends" encountered along the way.





We were joined by Pelidah Panus Taie from the District Forest Office of Lawas and two villagers, Dawat Barok and Jafari Selutan, our knowledgeable guides. Without them our mission to locate the scented Nepenthes would not have been successful.

Our journey began on foot on the stretch of logging trail with a steep incline past Gunung Do'a to a shortcut trail. We hiked through the shortcut for about four hours before reaching the Paya Maga plateau (5235 ft.) at 6 pm, where we set up camp on the very same ground as the scientific expedition in 2010. I was relieved that we could retrace the route taken previously.

As we journeyed on foot up the trail following the steep gradients up to our destination the landscape transformed gradually from secondary forests along the old logging trail to mixed dipterocarp and lower montane forest at higher elevations. The Paya Maga plateau is majestically mostly covered with montane heath forest.

After breakfast the next day, our group went further up the plateau to locate *N. chaniana*. Our experienced guide led us towards a place they call the "Secret Pitcher Plant Garden" - home to an abundance of different species of pitcher plants.

We hiked uphill towards Gunung Matalan following the existing dirt road. We had to be careful and sure-footed as any mistake could cause us to fall into a small waterway covered by undergrowth. Despite being cautious, a few of us did fall in and got pretty wet and mud-spattered.

After walking for about 40 minutes, we turned off onto a trail to our right and crossed a small stream, before we finally reached the "Secret Pitcher Plant Garden". The garden was roughly an hour's walk from the camp site and as we entered the area we could see an amazing variety of pitcher plants growing along the logging trail.

The area is covered by *kerangas* forest with exposed sandstone. I switched on the GPS device and dutifully logged the exact spot where *N. chaniana* specimens were collected during the scientific expedition in 2010.

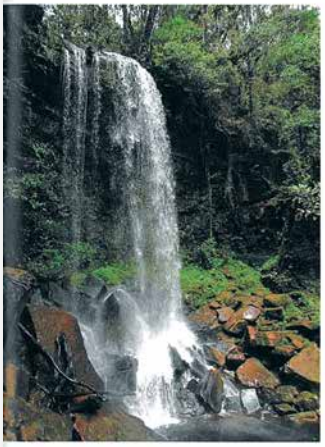

*Nepenthens stenophylla.*


Trapping the *Nepenthes chaniana*'s scent.









Interestingly, we observed that there were a few different types of *Nepenthes* species growing closely to each other. We identified *N. chaniana* after matching its physical characteristic to the record book and did the first sniff evaluation on its pitcher!

The whiff of the scent was as refreshing as the fresh air from the rainforests. The pitchers of *N. chaniana* indeed emit a pleasant fragrance which could be described as fresh, clean and relaxing. The sheer anticipation to take a whiff of the pitcher and the fragrance immediately lightened my mood.

We were thrilled to set up traps for the scent which will be a new addition to the SBC Scent Library. We collected the air around the pitcher for seven hours. At the same time, the group collected samples for the herbarium and fluids from the pitcher plant for analysis. We also collected soil samples for microbe isolation.

As we explored the area, we noticed that there were only a few *N. chaniana* growing compared to another species of *Nepenthes* that Arlene and I suspected to be *N. stenophylla*, which was also scented! We decided to get some specimens back for identification and herbarium collection.

On the way back to the camp site, we made a quick stop at a waterfall – one of the most scenic and natural sights I have ever seen. Everyone of us took a moment to soak up the peace and enjoy the surroundings. A beautiful rainbow arch greeted us at the foot of the waterfall, creating colours dancing across the spray of falling water against the afternoon sun. Here, I marvelled at the wondrous gifts of Mother Nature. We reached the camp site after sunset and made our way back to Long Tuyo the next morning.

Back in the laboratory at SBC, I kept my fingers crossed that the chemical analysis of scent collected from *N. chaniana* would reveal some interesting compounds that could be made into a fragrance for a perfume.

Until I arrived at Paya Maga, the *N. chaniana* scent was only something of an imagination. Being able to see it in its natural habitat and enjoying its scent will always be a special moment for me and be forever embedded in my memory. The experience at Paya Maga has served to reaffirm my calling; to help conserve the biodiversity for our future generations.

**Note:*

*In Sarawak, all Nepenthes species are listed as "Protected Plants" under the Wildlife Protection Ordinance, 1998. Therefore, any person who collects, cultivates, cuts, trims, removes, burns, poisons, in any way injures, sells, offers for sale, imports, exports or is in possession of, any protected plant or any recognisable part or derivative thereof, except under and in accordance with the terms and conditions of a licence issued under the Ordinance, shall be guilty of an offence. The penalty is imprisonment for one year and a fine of ten thousand ringgit (RM10,000).*

For more information on the Sarawak Biodiversity Centre please check out *www.sbc.gov.my* or email *biosar@sbc.gov.my*.

# Magazine Features on SBC – Naturalist *(December 2013)*

# EXPLORING LOAGAN BUNUT

TEXT AND IMAGES BY KHO CHIK WEI AND HOLED JUBOI

In May 2013, the Sarawak Biodiversity Centre (SBC) organised a trip to Loagan Bunut National Park with a special purpose – to collect plant, soil and water samples unique to peat swamp environments for research.

The team's goal was to study Loagan Bunut's microbial genetic diversity, with special attention towards actinomycetes and fungi, using metagenomic and transcriptomic studies concomitantly with standard microbial culture methods.

In addition, the team is interested in the unique environment of natural lake water that may nurture interesting algae species for SBC's microbial library.

Loagan Bunut is the only natural lake in Sarawak, fed by the Tinjar and Baram rivers. It is unique as despite being filled for most of the year, the water level fluctuates.

During the dry season (between February and August), Loagan Bunut transforms into a huge expanse of dry, cracked mud.

Peat, a type of soil high in organic content from the decomposing plant litter of a transitioning forest, has developed on top of the alluvium sediment deposited by the floodwaters.

A *Nepenthes* plant, popularly known as tropical pitcher plants, seen in the peat swamp forests of Loagan Bunut.







During heavy rain, water is absorbed by the peat and is slowly released during the dry periods, sustaining a constant supply of water. This extraordinary environment supports an ecosystem teeming with limited yet a niche biodiversity. This was evident from the colourful array of birds and insects observed during our journey through the peat swamp forests and across the waters of the lake.

The Hydrology Trail is one of the tracks that passes through the peat swamp forest. It took a 20-minute boat ride from the national park headquarters across the lake to get to the starting point of the trail.

Due to the relatively low water levels, our boat had to stop about 10 meters from dry land. We then had to walk through knee-deep water to reach the forest. The forest floor consists of a network of roots covered in thick organic material. It was definitely a challenge because our legs could easily have slipped between the gaps in the roots. Despite the difficulty, the two-kilometre trail provided a close-up view of the unique ecosystem.

Despite the limited diversity of plants that swamp forests support, the species found are adapted to the ecosystem, and provided valuable additions to our herbarium. The observation of such unique flora and fauna could mean that the microbial diversity would be as interesting.

With our fingers crossed, and a robust isolation process in the lab, we imagine that such a special ecosystem will offer microbes that could potentially produce novel powerful antibiotics.

Trekking through the forest is challenging with knee-deep waters and an uneven terrain because of the expansive root systems of the trees.

Note: Kho Chik Wei and Holed Juboi are Research Officers under SBC's Microbiology Programme. For more information on the Sarawak Biodiversity Centre's roles and activities, please check out SBC's website, www.sbc.org.my or send an email to biosar@sbc.org.my

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