GOVERNMENT OF WESTERN AUSTRALIA

ChemCentre
EXPERT SOLUTIONS

REPORT OF A BIOPROSPECTING WORKSHOP CONVENED BY THE CHIEF SCIENTIST OF WA

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BACKGROUND

An ethical and sustainable bioprospecting industry has the potential to diversify the WA economy, generate employment, and develop capability in high tech areas such as chemical screening and isolation bioinformatics, and drug development.

However, attempts over the last 40 years to establish on-going bioprospecting activities in WA have met with limited success.

It is arguable that WA's lack of progress in this space – despite our mega-diverse terrestrial and marine biota and our scientific excellence – is the result of systemic market failure, the lack of a cohesive collaborative approach and the absence of State legislation/regulation that gives certainty to parties engaged in bioprospecting.

The State Government has now committed to two legislative initiatives that have will remove some of the major barriers. In particular:

New legislation based on *Biodiscovery Bill 2018* already drafted that gives certainty for all parties wishing to engage in bioprospecting in WA and is consistent with the Nagoya Convention.

New legislation to enact the commitment made in the 2019-20 State budget to make substantial funding from the WA Future Fund available for investment in health and medical research and innovation via the Future Health Research and Innovation Fund.

In response the Chief Scientist of WA, Prof Peter Klinken, convened this Bioprospecting Workshop in July 2019 to explore stakeholder interest in a coordinated effort to establish an ethical and sustainable bioprospecting industry based on WA's mega-diverse terrestrial and marine biota.

WORKSHOP PROCESS AND ATTENDEES

Prior to the Workshop invitees were asked to respond in writing to two questions:

1. Are you (or your organisation) actively involved in bioprospecting of diverse flora and fauna?
2. Should the State Government invest in a coordinated effort to establish a bioprospecting industry based on WA's diverse flora and fauna?

Eight responses were received before the workshop and the key themes/insights from these responses were summarised in a PowerPoint presentation to provide a framework for the open discussion session.

The Workshop agenda, list of 22 attendees and PowerPoint presentation are attached in Appendix 1.

INTRODUCTION BY CHIEF SCIENTIST

Prof Peter Klinken opened the workshop and made the following salient points:

- The failure in the 1990's to commercialise a bioactive compound isolated from Smokebush (Genus Conosperum), traditionally used by the Noongar people, had a long lasting negative impact on the credibility of bioprospecting in WA.
- The Geological Survey for WA has operated for over 100 years and meticulously mapped the State's geological resources. As a result, the State has derived great economic and social benefit from its world-class mining, petroleum and gas resources.
- In contrast, there is no systematic process for mapping and cataloguing the State's biological resources, even though Southwest Australia has been classified as global biodiversity hotspot[1].
- The use of fundamental science to build a repository of the State's biological resources that is open for commercial exploration would allow us to put economic and environmental value on our biota and Indigenous knowledge.
- Legislation to protect the value of the States biological resources is being progressed with the Biodiscovery Bill 2018 currently undergoing a consultation phase prior to being introduced to Parliament.
- The State Government has also committed to pass legislation to establish a new Future Health Research and Innovation Fund with access to $126 million over four years for medical research and innovation.
- Two years out from a State election there is a clear opportunity to promote bioprospecting and biodiscovery to the State Government which is seeking initiatives to diversify the State's economy away from its high dependence on iron ore, oil and gas; and the GST.
- WA has high-level expertise in most of the activities required to undertake the 'traditional route of bioprospecting' – that is: collection/mapping of natural products; extraction and purification; screening for biological activities; isolation/purification; chemical modification; pre-clinical testing.
- WA also has new/maturing capabilities in genome mining and synthetic biology, where gene clusters provide a new opportunity for chemical production.
- It would be possible to make a coherent package/production line from current capabilities if we can gain meaningful engagement for the long term.

[1] From Myers *et al.* (2000). Nature, 403, 853-858. To qualify as a biodiversity hotspot, a region must contain at least 0.5% or 1,500 species of vascular plants as endemic to that area, and must have lost at least 70% of its primary vegetation.

CURRENT ACTIVITIES

The 8 written responses received, and the information shared during the Workshop discussion confirmed there are many research groups that are already active in bioprospecting or have relevant capabilities and an interest in entering the space. A summary of these activities and capabilities are provided in Appendix 2.

RATIONALE FOR STATE GOVERNMENT INVOLVEMENT

The State Government can foster activity in the area by creating an environment where researchers, industry and stakeholders of WA biodiversity can engage with each other.

Governments have a legitimate role to play to de-risking private investment when there is clearly 'market failure' in the space that only governments can address – for example enabling legislation/regulation; demonstrating proof of concept; incentives to overcome specific issues holding back development.

This needs to be done in such a way as to provide long-term benefits/returns for the jurisdiction in which the activities are conducted.

International case studies support the notion that the development of a region's economy is often a natural progression from agriculture to mining to more high-tech pursuits that is facilitated by governments. Examples raised in the workshop included:

- Houston Texas USA developing world-class medical research capabilities after the collapse of the oil industry in the 1970s
- San Diego California USA developing significant biopharmaceutical and medical device industries.
- Silicon Valley California USA, where government investment provided the initial foundations for development of high-tech industry in the San Jose Metropolitan Area.

The written feedback on State Government involvement provided by eight participants was 'road-tested' with the group in open discussions at the Workshop. The following considerations surfaced and were broadly accepted by the participants.

Economic/Policy Considerations

- Economic and social opportunities (whilst currently hard to measure and define) are potentially significant. Provides opportunities for innovation, jobs and the overall economy, including international trade opportunities.
- Previous attempts to undertake this type of activity without Government support have been unsuccessful (eg Bioprospect Limited). Government can 'derisk' bioprospecting R&D and other activities and encourage private sector investments. Without Government investment and co-ordination there is a risk the broader benefits may not be realised.
- Creates opportunity to manage the ethical side of bioprospecting.
- Opportunity to broaden the conversation around the concept of royalties.
- Opportunities to support economic development in regional and indigenous communities typically reduce the levels of Government support required. DBCA has discussed a similar approach for agricultural and pastoral development with WABSI. Having farmers, pastoralists, revegetaters and aboriginal communities growing (potentially) high-value crops can drive economic benefit and help to justify government's investment.
- Large pharmaceutical companies prefer to deal with a single entity, rather than multiple parties. (one stop shop). In this case, the State Government could play a good role as a clearing house – perhaps via the Department of Jobs, Tourism, Science and Innovation (JTSI).

- There may be a role for a group that directs enquiries to government agencies rather than one dedicated government department having control.

Environmental/Conservation Considerations

- Western Australia has a very large and richly biodiverse natural flora and fauna, with many unique species, but an estimated 70% are undescribed.
- Opportunity to coordinate effort to catalogue and prioritise those flora and fauna (and microflora) that are endemic to WA.
- Non-vascular plants (e.g. fungi, algae), vertebrate and invertebrate terrestrial and marine fauna will also provide biomolecular and other opportunities in the medical, food, agriculture and other industries.
- WA has valuable untapped resources, this is a unique life sciences opportunity with strong environmental, social and economic benefits.
- Opportunities to leverage bioprospecting activities with, for example, mine remediation by encouraging mining companies to revegetate with plants identified by bioprospecting for their uniqueness and potential uses.

Infrastructure/Skills Considerations

- Leverage existing in-state Chemistry expertise and “small-scale” screening facilities, facilitate access to resources.
- Investment in research facilities and relevant infrastructure would significantly increase output and discovery of bioactive compounds for the benefit of the state.
- Investment in human resources bring young talented scientists who are trained (locally or abroad) to WA. Retainment of skills and knowledge in academic in bioprospecting would significantly improve our capabilities at WA to do large scale bioprospecting.
- Collaborative effort, cross-discipline, with shared resources is best coordinated by one body, a central body keeps projects on track.
- An opportunity to preserve traditional knowledge, and integrate with science.
- Bioprospecting will build a diverse range of resources and infrastructure, ranging from culture and compound collections to management structures for intellectual property. There is commercial value in the data gathered and stored and every single novel compound is an asset that needs to be documented.
- There will be significant IP management required for this exercise, and the structure put in place for this will also be an asset.

TRADITIONAL VERSUS EMERGING BIODISCOVERY MODEL

The workshop participants considered the idea that the traditional bioprospecting approach is high risk with little reward, noting many examples where traditional screening activities have been unsuccessful (e.g. AMRAD in Australia, EVOTEC in Germany). Pharmaceutical companies are also now interested in a ‘clear broth’ or single compound – not complex soup, as traditionally provided by bioprospecting activities.

Whilst acknowledging these challenges, workshop participants considered that technological advances addressed some historic challenges for identifying and isolating bioactive compounds, and that new bioprospecting models now exist. A number of ‘low hanging fruit’ were also identified that would ensure early success for a proposed bioprospecting initiative that do not rely on identifying a ‘wonder drug’.

Technological advances

- While previously bioactive compounds have been hard to identify in complex mixtures, better analytical techniques (eg High Resolution Mass Spectrometry) are now more readily available to enable the deconvolution of these complex mixtures.
- WA has strengths in new technologies including:
    - Genetic bioprospecting (based on DNA sequencing, and production of chemicals during fermentation) has the added advantage of avoiding IP problems with natural products.
    - Genome mining (using genomics, transcriptomics and comparative analysis of large datasets) to prioritise strains and biosynthetic gene discovery and employ synthetic biology tools to translate biosynthetic genes to bioactive molecules.
    - 'Synthetic biology' (the rational design and construction of nucleic acid sequences or proteins – and novel combinations thereof, using standardised genetic parts) where gene clusters provide a new opportunity for chemical production.
- Using 'big data' to determine pathways for action in the body, and then genomics to build compounds that are likely to work, although still need to be able to synthesize these compounds. The capabilities of the WA Data Science Innovation Hub and Pawsey Supercomputer should be explored and leveraged where appropriate.

Potential 'low hanging fruit'

- The 'dark matter' of DNA is marine phages and uncultivated microbes where discovery of new compounds is considered highly likely. Groups in WA are active in exploring these sources. Genomic 'low hanging fruit' could include identification of new DNA in extreme environments with big opportunities to look for novel enzymes.
- Consider production of animal products as well/instead of human products – much larger potential market for products which will be used in animals with lower costs and less rigorous requirements.
- Development of a 'chemical survey' of Western Australia, analogous to the GSWA, will help better define the value of the state's biological resources. Understanding the chemical diversity of plants is also of value – it is not just bioactive compounds.
- Determine whether traditional bioprospecting screening methods and novel methods (e.g. modelling, genetic taxonomy) are complementary.

CONSIDERATIONS FOR THE BUSINESS CASE

The business case should consider all activities and results from all stages and technologies before commercialisation. It was also recommended that case studies be identified for each stage in the bioprospecting pipeline. During the workshop, participants identified numerous examples that could be further developed when building the business case, these are summarized in Appendix 3. Case studies with both positive and negative outcomes should be explored in the business case.

Demonstrating a need for a bioprospecting industry in WA

There was a consensus that demonstrating the need for a bioprospecting industry in WA would emphasis WA's status as a biodiversity hotspot. The impetus to develop the industry 'now' could be based on a recent cultural shift where biodiversity is now considered a valuable asset, and the risk of loss of indigenous knowledge.

In preparing the Business Case it recommended that consideration is given to:

- Financial, environmental, social, and strategic value.
- Tangible and intangible benefits (intangible = knock on effects for other industries).

- Supply and value chain analysis and design.
- Stakeholder value including the end users of products.
- Internal markets and overseas markets
- Opportunities for investment, including foreign investment.
- Future workforce requirements, particularly how a bioprospecting industry fits in with current agendas to
    - increase STEM-trained people
    - enhance regional opportunities.
    - enhance indigenous peoples opportunities
- Address all issues over several time frames, e.g. 2, 5 ,10 and 15 years

COMMITMENT TO ENGAGE

In the final stage of the Workshop participants were asked if they were:

- Interested in further discussions and interactions about establishing a new bioprospecting industry in WA.
- Willing to get involved in development of business case participation in a Working Group, convened by the Chief Scientist.
- Prepared to contribute funds (~$10,000 cash and in/kind) to support the development of the business case, for which major funding will be sought from Lotterywest or another appropriate source.

There was general acceptance of all three of these criteria. ChemCentre, which is managing the process with support from WABSI, will contact the participants to firm up their commitment.

NEXT STEPS

ChemCentre, supported by WABSI, recommends that the actions listed below be carried out.

Aug 2019:

- Deliver Draft Workshop report for comment and revise as required
- Seek formal commitments to co-funding
- Form Working Group of committed parties, with appropriate support services.
- Agree Terms of Reference for Working Group
- Working Group signs off on Workshop Report
- Engage with Lotterywest grant managers
- First draft of Lotterywest proposal prepared

Sep 2019

- Working Group oversite of LotteryWest proposal development
- Submit LotteryWest proposal as approved by Working Group
- 3 month turnaround according to their website
- Develop alternate plans in case we are not successful with Lotterywest

Oct-Dec 2019

- Develop Scope and Tender Documents for the Business Case
- Working Group to progress consultations and engagements, e.g. pharmaceutical companies; academic and government stakeholders; industry participants, etc.

Jan 2020

- Advertise, assess and award Tender for Business Case

Appendix 1: Workshop Documentation

Attendees

Dr	Simon	Carroll	WA Museum
Dr	Gavin	Flemattti	The University of Western Australia
Mr	Colin	Priddis	ChemCentre
Professor	Kevin	Pfleger	Harry Perkins (MTP Connect)
Professor	Peter	Klinken	Department of Jobs, Tourism, Science and Innovation
Professor	Peter	Davies	Murdoch University
Mr	Matt	Judkins	Deloitte Financial Advisory Pty Ltd
Ms	Sarah	James	Deloitte Financial Advisory Pty Ltd
Dr	Luke	Twomey	Western Australian Marine Science Institution (WAMSI)
Adjunct Professor	Paul	Watt	Telethon Kids Institute
Dr	Yit Heng	Chooi	The University of Western Australia
Ms	Denise	True	WABSI
Professor	Mick	Poole	WABSI
Mr	Peter	Zurzolo	WABSI
Dr	Alan	Payne	Curtin University
Dr	Andy	Patterson	Consultant (ex DPIRD)
Dr	Kathryn	Linge	ChemCentre
Dr	Stephen	Van Leeuwen	DBCA
Dr	Martine	Keenan	EpiChem
Dr	Sam	Abraham	Murdoch
Mr	Chris	Gentle	WABSI
Ms	Preeti	Castle	WABSI

GOVERNMENT OF WESTERN AUSTRALIA

The Western Australian Biodiversity Science Institute ChemCentre

BIOPROSPECTING WORKSHOP Agenda

DATE:	Monday 22nd July, 2019
TIME:	2 pm – 4pm
LOCATION:	WABSI, WA Trustees Building, Level 2/133 St Georges Terrace, Perth

ATTENDEES:

APOLOGIES:

Discussion Items

Item	Topic	Lead	Time
1.	Welcome Acknowledgement of Country	PZ	5 min
2.	Setting the scene	PK	15 min
3.	Who is in the room?	KL	25 min
4.	Questionnaire – Summary of Feedback • Snapshot of current state R&D capability • Current interest in developing a business case of bioprospecting.	KL	45 min
5.	Discussion • Why do we need to develop a bioprospecting industry? • What programs/activities would be undertaken?	KL	20 min
6.	Summary of meeting outcomes, way forward	KL	10 min

Appendix 2: Current Activities and Capabilities

The following snapshots provide a brief summary of the current bioprospecting activities and capabilities of workshop Participants.

Curtin University (Alan Payne)
Research interest in this area is the identification of WA plants (native or introduced) with abundant complex molecules which could be used as building blocks for the chemical and pharmaceutical industries. The initial screen of compounds is based on chemical structure and abundance rather than bioactivity. The resinous coatings of plants have proved to be a surprisingly clean and abundant source of compounds which may be viable for farming in the future. These natural products are then converted to a range of compounds for medicinal chemistry programs.

Deloitte (Matt Judkins; Sarah James)
Deloitte are not actively involved in bioprospecting however they have recently flagged bioprospecting as a significant opportunity for WA. They are interested in using their firm's resources (in addition to their 'New Way' platform) to support the development of the opportunity for WA. This could include work to undertake an economic analysis of the opportunity or support in the development of appropriate commercial arrangements to ensure the State receive appropriate benefits from the initiative.

Murdoch University (Peter Davies)
The new Harry Butler Institute (HBI) provides a focus for bioprospecting activities and with the new Australian National Phenome Centre also based at Murdoch, there is considerable analytical capability. The ANPC has committed to investing an additional $30m in its 'kit'. Murdoch is in the early stages of developing a CRC bid (led by Murdoch) on the area of bioprospecting combining the expertise and analytical capability of the HBI and the ANPC (with links to Murdoch's Kulbardi Aboriginal centre).

UWA (Yit Heng Chooi)
This group is focused on leveraging advances in genomics and synthetic biology to accelerate the discovery of bioactive small molecules in diverse microorganisms (fungi and bacteria) and plants (in collaboration with UWA colleagues Josh Mylne and Mark Waters). They specialise in genome mining (using genomics, transcriptomics and comparative analysis of large datasets) to prioritise strains and biosynthetic gene discovery and employ synthetic biology tools to translate biosynthetic genes to bioactive molecules. Participants in a CRC-P for bioprospecting funded from Oct 2018, 'BioAustralis Towards the Future'.

UWA (Gavin Flematti)
Natural products research group in Chemistry is actively isolating and identifying natural compounds from various WA plants and marine sponges and screening these for biological activity. They collaborate with many biological scientists in this regard making use of various cell based assays to aid in isolating bioactive compounds. These include anticancer (Prof George Yeoh, Prof Pilar Blancafort, Perkins, UWA) and antibacterial assays (Dr Katherine Hammer, UWA), plus more specific assays such as anti-methanogenic assays (Prof Phil Vercoe, UWA) that are relevant to agriculture.

WA Biodiversity Science Institute (Denise True)
WABSI as a transdisciplinary science institute can provide opportunities for the development of opportunities for science research to advance bioprospecting in a coordinated and collaborative environment. WABSI's remit is to help the state invest in better decisions. With the expert programs of biodiversity knowledge and information management, WABSI can play a key role in the recognition of terrestrial bioresources and development of a systematic approach to the storage and protection of the data necessary for the development of a bioprospecting industry.

WA Museum (Simon Carroll)
The WA Museum being a central repository of terrestrial and aquatic faunal collections is

interested and willing to be part of a well-defined bioprospecting capability in the State. The WA Museum maintains the emerging WA Marine Bioresources Library (WAMBL) which, in recent times, has been demonstrated by collaborators to contain bioactive molecules that influence triple negative breast cancer cells. This should signify future opportunities.

ChemCentre (Colin Priddis)
ChemCentre is undertaking significant research activities for WA mono-floral honey, in collaboration with CRC for Honey Bee Products, including provenance and adulteration tests. ChemCentre also has significant analytical capability relevant to bioprospecting, including proteomics.

EpiChem (Martine Keenan)
Epichem is an Australian company formed in 2003 to provide services in synthetic and medicinal chemistry to the drug discovery and pharmaceutical industries.

Harry Perkins Institute/MTP Connect (Kevin Pfleger)
The Harry Perkins Institute of Medical Research is a leading medical research facility with the only early phase clinical trials facility in Western Australia.

Murdoch University (Sam Abraham)
Undertakes mass screening for antimicrobial susceptibility testing using invitro tests, preclinical trials.

Telethon Kids Institute (Paul Watt)
TKI has secured funding from Peron Foundation for the only long-range sequencing instrument in WA, which will significantly increase their metagenomics capability. They are also is developing standards for working with indigenous people informed by learnings from the experiences of ANU. These are currently in draft form but would be available to share when finalised.

DBCA (Stephen Van Leeuwen)
The Western Australian Herbarium is responsible for the description and documentation of Western Australia's exceptional botanical species diversity. Kings Park (now managed through DBCA) is still undertaking traditional plant breeding activities

WAMSI (Luke Twoomey)
WAMSI has previously facilitated research in marine biodiscovery, which led to development of the Western Australia Marine Bioresources Library.

Appendix 3: Case Studies

The Workshop identified examples that could be further developed when building the Business Case for Investment in bioprospecting and biodiscovery. Case studies with both positive or negative outcomes should be explored in the business case.

Case Study	Notes
Tropical Indigenous Ethnobotany Centre	The TIEC was developed in partnership between the Australian Tropical Herbarium, Traditional Owners, the Department of Science, Information Technology, Innovation and the Arts (DSITIA), CSIRO and the Cairns Institute. The TIEC aims to empower Indigenous people to renew and strengthen their cultural knowledge and practices about plants. The TIEC supports Traditional Owner information sharing, practice and collaboration, and also keeps plant collections and data for Traditional Owners through shared protocols and agreements. https://www.jcu.edu.au/australian-tropical-herbarium/research-and-programs/tropical-indigenous-ethnobotany-centre-tiec
Northern Australia Aboriginal Kakadu Plum Alliance	The Northern Australia Aboriginal Kakadu Plum Alliance (NAAKPA) is a consortium of Aboriginal enterprises ethically harvesting and processing Kakadu Plum across Northern Australia. NAAKPA was established to protect the interests of Aboriginal enterprises and communities in the Kakadu Plum industry. It aims to encourage ethical sourcing of native fruit while protecting the interests of Aboriginal communities and their traditional knowledge.
Improving water repellent soils	CSIRO Floreat with Nufarm as a collaborator have been investigating herbicides vs biocides, and identified a natural soil wetter – different types of bacteria that help break down the wax barriers that prevent soils absorbing water https://www.csiro.au/en/Research/AF/Areas/Sustainable-farming-systems/Soil-water-landscape/Water-repellent-soils
Evolva	Use genetically modified yeasts to make ‘natural’ food products – e.g. STEVIA and artificial vanilla https://www.evolva.com/yeast/
UWA Sandalwood Project	Improving productivity of sandalwood productivity by identifying the genes that control heartwood production. Biosynthesis of sandalwood oil using terpene synthase genes http://www.ioa.uwa.edu.au/__data/assets/pdf_file/0010/1147528/Chris_Jones.pdf http://www.news.uwa.edu.au/200908061507/media-statements/research-isolates-sandalwood-oil-gene

Smokebush Plant Patent	Smokebush is a plant that grows in the coastal areas of Western Australia and has been traditionally used by Indigenous people in those areas for its healing properties. After being granted a licence by the WA Government to collect plants for screening purposes in the 1960s, the US National Cancer Council discovered in the late 1980s that Smokebush had the potential to be developed into an anti-HIV drug. The 'discovery' of Conocurovone in Smokebush was patented by the National Cancer Council, who then granted Amrad, a Victorian biotechnology company, the right to develop the patent. In the 1990s, Amrad paid $1.5 million to the Western Australian Government to secure exclusive access to Smokebush and related species. However, Indigenous people received no acknowledgement for their role in having first discovered the healing properties of Smokebush. These events have been described as biopiracy, and highlight the lack of legal remedy available to Indigenous people under the patent system in respect of unauthorised use of their Indigenous Knowledge.
Apollo Therapeutics Fund	An example of a collaborative model in which AstraZeneca and GlaxoSmithKline of the UK, and Johnson & Johnson of the US, will contribute financing and expertise to a collaboration with Cambridge University, Imperial College London and University College London. Each of the three pharmaceutical companies will contribute £10m to Apollo over six years while the three universities will each put in £3.3m via their technology transfer offices. All six parties will have a seat on the Committee that picks early-stage projects to invest in. The three pharmaceutical companies will have first option to take assets backed by the fund into clinical development, with a bidding process among the trio to decide which gets the licence. Half the royalty income from any successful drugs will go to Apollo with the rest paid to the university where the product originated. https://www.ft.com/content/7cb34d18-c0fe-11e5-9fdb-87b8d15baec2
Natural Product Discovery Unit, Griffith University	A partnership between Griffith University (Qld), and the pharmaceutical company AstraZeneca involved the screening of extracts of flora and fauna by Griffith University's Eskitis Institute to identify bioactive molecules as potential leads for pharmaceutical discovery and development of novel pharmaceuticals. More than 45,000 samples of regional biota, both marine and terrestrial, have been collected since the start of the partnership. Collections have derived from several jurisdictions within Australia, including plants from Queensland's rainforest and sponges of the Great Barrier Reef - as well as from Papua New Guinea, China and India. Notably, the partnership spanned a critical time in the development of policy guiding access to "genetic resources" and sharing of benefits from their use. Major benefits to Queensland from this partnership have been development of skills and infrastructure, rather than chemical discovery.

	https://www.cbd.int/doc/meetings/abs/abswg-06/other/abswg-06-cs-all-en.pdf https://www.environment.gov.au/biodiversity/publications/queensland-biodiscovery-collaboration-griffith-university-astrazeneca-partnership-natural.
Collection of Western Australian biological material by Danish researchers	The collection of plant materials was based on traditional knowledge. While the (pharmaceutical company) involved has required some percentage of money to be returned to indigenous community in WA, they chose a community in the Kimberley, whereas the plant and traditional knowledge were from (the south west?) Two chemicals with potential biological activity have been identified to-date.
CRC-P: BioAustralis Towards the Future	This project exploits their library of talented Australian microbes, harnessed to state-of-the-art metabolomic and genomic technologies, to deliver a unique platform of 5,000 microbial metabolites, expanding BioAustralis' global niche market, catalysing the discovery of next-generation antibiotics and provide a ready-to-use natural product metabolite library to stimulate Australian research. http://www.microbialscreening.com/; http://www.bioaustralis.com/index.htm