

2. Ancient but New: Developing Locally Driven Enterprises Based on Traditional Medicines in Kuuku I'yu Northern Kaanju Homelands, Cape York, Queensland, Australia

David J. Claudie, Susan J. Semple, Nicholas M. Smith and
Bradley S. Simpson

1. Introduction

Since European arrival, indigenous peoples of Australia have suffered from the effects of chronic social, political and economic disadvantage. The statistics on health outcomes and life expectancy remain tragic and unacceptable. Data published in 2008 indicates that indigenous Australians have a life expectancy some 17 years lower than the national average, are hospitalised at twice the rate of non-indigenous Australians, and are twice as likely to report high or very high levels of psychological distress.¹ The social disadvantage of indigenous peoples is reflected in low rates of literacy and school completion, and high rates of unemployment, violence, suicide, drug abuse and imprisonment.²

Disruption of traditional law and governance systems, disempowerment, denial of land rights and forced removal of people from their traditional country or homelands are recognised as important factors contributing to poor health and welfare outcomes for indigenous peoples.³ Some indigenous writers have highlighted the importance of relationships with land and its associated natural resources to indigenous health and wellbeing.⁴

Through sustainable indigenous natural resource management and development on their homelands, the Chuulangun Aboriginal Corporation, the organisation

1 B Pink and P Allbon, *The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples 2008* (Australian Bureau of Statistics, Australian Institute of Health and Welfare, 2008).

2 Ibid.

3 B Carson and T Dunbar et al (eds), *Social Determinants of Indigenous Health* (Allen & Unwin, 2007); N Watson, 'Implications of Land Rights Reform for Indigenous Health' (2007) 186 *Medical Journal of Australia* 534.

4 D Rose, *Nourishing Terrains. Australian Aboriginal Views of Landscape and Wilderness* (Australian Heritage Commission, 1996); G Phillips, *Addictions and Healing in Aboriginal Country* (Aboriginal Studies Press, 2003) <<http://search.informit.com.au/documentSummary;dn=989261116787858;res=IELHSS>>

driving the research described in this chapter, is working to improve social and economic outcomes for the Kuuku I'yu Northern Kaanju families it represents. It is also seeking to gain wider recognition by mainstream agencies of indigenous management and governance structures. Research on the medicinal and aromatic plants of the Kuuku I'yu⁵ is one aspect of the corporation's overall natural resource management plan.

In this chapter we describe our approach to medicinal plant research (incorporating both indigenous and Western scientific perspectives) and some of the issues around this field of research. We include the perspectives of particular Kuuku I'yu families living on homelands through the traditional owner and chair of the Chuulangun Aboriginal Corporation (David Claudie) and scientists in ethnobotany (Nicholas Smith) and ethnopharmacology (Susan Semple and Bradley Simpson). We envisage that culturally appropriate development of medicinal plant products will contribute to improved opportunities for Kuuku I'yu people to live and work on homelands. This will also allow younger people to engage with and learn about natural resources on their homelands, and provide an alternative to life in centralised townships. For university-based researchers, this project has provided a unique opportunity to work closely with indigenous traditional owners in the study of their medicinal plants, and to learn about the uses and stories associated with these plants, and traditional understandings of the ways these plant medicines work. Furthermore, the project has allowed Western scientific investigation of the medicinal actions and components of a number of plant species for the first time.

2. Kuuku I'yu Homelands, Traditional Governance and the Chuulangun Aboriginal Corporation

The Kuuku I'yu Northern Kaanju homelands are centred on the upper Wenlock and Pascoe Rivers in Central Cape York Peninsula, Queensland, and encompass an area of approximately 840,000 hectares (Figure 1). Kuuku I'yu people living on these homelands recognise the traditional Aboriginal law and governance system for this 'Country'. In this system the Country is divided into different clan estates (named *Ngaachi*), each tied to a particular 'bloodline' or family⁶ and to a particular traditional 'story'.⁷ For the Northern Kaanju people living

5 The term 'Kuuku I'yu' is used throughout this paper as a shortened form for 'Kuuku I'yu Northern Kaanju'.

6 B Smith and D Claudie, 'Developing a Land and Resource Management Framework for Kaanju Homelands, Central Cape York Peninsula' (Discussion Paper 256, Centre for Aboriginal Economic Policy Research, The Australian National University, 2003).

7 D Claudie, "'We're tired from talking'": The Native Title Process from the Perspective of Kaanju People Living on Homelands, Wenlock and Pascoe Rivers, Cape York Peninsula' in B Smith and F Morphy (eds), *The Social Effects of Native Title: Recognition, Translation, Coexistence. Research Monograph No. 27* (Centre for Aboriginal Economic Policy Research, The Australian National University, 2007) 91.

at Chuulangun on Kuuku I'yu Ngaachi, indigenous cosmology ties land, flora, fauna and people. The landscape was shaped by ancestral beings or 'stories' that left law (or governance) and language.

Figure 1. Kuuku I'yu (Northern Kaanju Ngaachi) homelands).



Source: Chuulangun Aboriginal Corporation.

These Ngaachi or homelands have a huge diversity of flora and fauna, including several rare, threatened and endangered species.⁸ As the traditional owners, the Kuuku I'yu people have a broad and in-depth knowledge of the ecology of these homelands and their associated natural resources. This knowledge includes information about the identification and description of species and habitats, and detailed knowledge of their uses for a variety of purposes including foods and medicines, species behaviour and distribution, seasonal variation, the effects of fire, and sacred information. Kuuku I'yu people also have their own system of natural resource management based on traditional governance systems.⁹ 'Management', to Kuuku I'yu people, means the interwoven complex of ownership, use and nurturance inherent in Aboriginal peoples' relationship to the Country.¹⁰

In 2002, the descendants of a focal¹¹ Kuuku I'yu ancestor who were living on homelands at Chuulangun formed the Chuulangun Aboriginal Corporation under the Commonwealth Aboriginal Councils and Associations Act 1976 — an Act recently superseded by the Corporations (Aboriginal and Torres Strait Islander) Act 2006 (Cwealth). The corporation can be described as a contemporary extension of traditional governance structures.¹² The 'bloodlines' that tie people to different tracts of land are the foundation of indigenous governance, knowledge, land tenure and land management. This philosophy drives the Chuulangun Aboriginal Corporation in its efforts towards sustainable land management, ecological and socio-cultural restoration, and the reaffirmation of indigenous knowledge across the Kuuku I'yu Ngaachi.

To facilitate this development the corporation has developed a comprehensive land and natural resource management plan in keeping with traditional responsibilities to Country.¹³ Key goals include:

- reaffirming Kuuku I'yu governance, land and resource management, and decision-making on Northern Kaanju homelands;
- protecting the indigenous and natural heritage values on Northern Kaanju homelands for the benefit of current and future generations of Kuuku I'yu people;
- supporting Kuuku I'yu people to re-occupy their homelands on a more permanent basis;

8 M Crisp, S Laffan et al, 'Endemism in the Australian Flora' (2001) 28(2) *Journal of Biogeography* 183; Smith and Claudie, above n 6.

9 Smith and Claudie, above n 6; B Smith, "'We got our own management'": Local Knowledge, Government and Development in Cape York Peninsula' (2005) 2 *Australian Aboriginal Studies* 4.

10 Chuulangun Aboriginal Corporation, 'Kaanju Homelands Wenlock and Pascoe Rivers Indigenous Protected Area Management Plan' (Chuula, Cape York Peninsula, Queensland, 2005).

11 Focal ancestor here refers to an apical ancestor, that is, an ancestor who is at the apex of a lineage and from whom the members of a descent group trace their descent.

12 Claudie, above n 7.

13 Chuulangun Aboriginal Corporation, above n 10; Chuulangun, 'Kaanju Ngaachi Wenlock and Pascoe Rivers IPA Management Plan 2011-2017' (prepared by the Chuulangun Aboriginal Corporation with the assistance of funding from the Commonwealth IPA programme, Chuulangun, Cape York Peninsula, Queensland, Australia, 2011).

- facilitating the intergenerational transfer and maintenance of traditional knowledge and Northern Kaanju language;
- developing and operating homelands-based community enterprises that incorporate sustainable land management principles;
- developing homelands-based projects, education and training that will improve the capacity and self-esteem of Kuuku I'yu people and the wider community, and lead to meaningful employment which is culturally linked;
- incorporating, where appropriate, traditional knowledge with Western scientific processes to provide beneficial outcomes for natural and cultural resource management policy and practice.

Since 2008, part of the Kuuku I'yu homelands has been recognised as an Indigenous Protected Area (IPA) under the National Reserve System.¹⁴ This was the first IPA declared in Cape York. Under this programme, the Chuulangun Aboriginal Corporation is supported by government to manage a large part of the Kuuku I'yu Northern Kaanju Ngaachi for conservation.

The Kuuku I'yu Northern Kaanju medicinal plants project described in this chapter forms just one part of the overall programme of homeland activities developed by the Chuulangun Aboriginal Corporation.¹⁵ However, this project seeks to contribute to a number of the key goals listed above. These include impacts on the development of homelands-based community enterprises, sustainable use of resources, training, improved self-determination and self-esteem for Kuuku I'yu people, the incorporation of Western scientific approaches, and the transfer and preservation of traditional knowledge. Furthermore, through this project the corporation seeks to add to discussions at the national and international level around the development of improved mechanisms to ensure the protection of the cultural and intellectual property of indigenous peoples.

To understand some of the innovation of the approach to this research, it is important to describe the context in which the majority of Western scientific research on medicinal plants used in traditional medicine is conducted.

14 Australian Government Department of Environment, Water, Heritage and the Arts, Kaanju Ngaachi Wenlock and Pascoe Rivers Indigenous Protected Area (2008) <<http://www.environment.gov.au/indigenous/ipa/declared/kaanju.html>>

15 Information on other activities can be found at the Chuulangun Aboriginal Corporation website, <<http://www.kaanjungaachi.com.au>>

3. 'Use' of Traditional Medicinal Plant Knowledge by Western Science

Traditional knowledge about medicinal plants has long been recognised as a useful guide for scientists working in the Western tradition concerned with the discovery of new medicines.¹⁶ There are many examples of Western medicines that have their origins in plants used in traditional medicine: the painkillers morphine and aspirin, the anti-malarial medicine artemisinin, the anti-cancer agent teniposide, and the cardiac medicine digoxin. In recent years there has also been a growing trend amongst the general population in Western countries, including Australia,¹⁷ towards using herbal and other 'natural' medicines (sometimes termed complementary medicines¹⁸). Many of the widely used herbal medicines have long histories of traditional use: echinacea (from Native American medicine), ginseng and ginkgo (from Asian medicine systems, including traditional Chinese medicine) and pygeum bark (used by traditional healers in Africa). Consequently, there has been, and continues to be, considerable interest in the Western scientific investigation of plants used in various systems of traditional medicine.

The fields of Western scientific research concerned with the study of traditional uses and pharmacological activities of plants include ethnobotany and ethnopharmacology. Ethnobotany involves the examination and documentation of the relationships between plants and traditional peoples,¹⁹ including the uses of plants for purposes such as medicines. Ethnopharmacology is a multidisciplinary field that has been defined as the description of plants and other natural resources used in traditional medicine, and the scientific investigation of their medicinal activities and chemical constituents.²⁰ This research has primarily been undertaken with the goal of discovering new medicines or understanding the actions and efficacy of traditional medicine through the lens of Western scientific enquiry.

In the last decade, authors in the *Journal of Ethnopharmacology* (the major international journal for the field) and other publications have examined the

16 D Fabricant and N Farnsworth, 'The Value of Plants used in Traditional Medicine for Drug Discovery' (2001) 109 *Environmental Health Perspectives* 69.

17 A H MacLennan, S P Myers et al, 'The Continuing Use of Complementary and Alternative Medicine in South Australia: Costs and Beliefs in 2004' (2006) 184(1) *Medical Journal of Australia* 27.

18 Complementary medicines include a variety of medicinal substances including plant (herbal) medicines, homeopathic medicines, aromatherapy oils, dietary supplements, and vitamins and minerals. See Expert Committee on Complementary Medicines in the Health System 'Complementary Medicines in the Australian Health System' (Report to the Parliamentary Secretary to the Minister for Health and Ageing, Canberra, Commonwealth of Australia, 2003). The word 'complementary' is used to indicate that these are medicines and practices used outside of mainstream Western medical care, but that may complement it.

19 C Cotton, *Ethnobotany. Principles and Applications* (Wiley, 1996).

20 L Rivier and J Bruhn, 'Editorial' (1979) 1 *Journal of Ethnopharmacology* 1.

definitions, roles and future of ethnopharmacology.²¹ In their critical review of the field, Etkin and Elisabetsky have highlighted that much of what is published as ethnopharmacological research focuses only on Western scientific understandings of traditional medicinal plants. They argue that research in this field often consists of published lists of traditional medicinal plants tested in a laboratory for a particular medicinal activity (such as anti-bacterial activity) and examination of the constituents of the plants with particular activities to identify the active components. While most of this is scientifically rigorous research, it fails to address the social and political implications of the findings. Very little of this research reflects an interest 'in the people whose knowledge and identity are embodied in these plants' or offers any insights into the experiences of these people 'in specific cultural and eco-political settings'.²²

When one examines the drivers of ethnopharmacological and ethnobotanical research and the authors of published papers on this research, the overwhelming majority are scientists working in universities, other scientific research institutions or pharmaceutical companies. For the most part they, along with their institutions, are also the beneficiaries of this research (in terms of grants, publications, patents or new products).²³

Over the past decade there has been increasing international recognition of the need for scientists and companies working in the field of medicinal plant research to ensure that indigenous communities benefit from the investigation and development of their traditional medicinal knowledge and to develop models for the equitable sharing of benefits of this research.²⁴

While benefit-sharing agreements are certainly a step in the right direction, we argue that there is a need to further develop models of research on medicinal plants that is locally initiated and driven by indigenous peoples as part of their

21 M Heinrich and S Gibbons, 'Ethnopharmacology in Drug Discovery: An Analysis of its Role and Potential Contribution' (2001) 53 *Journal of Pharmacy and Pharmacology* 425; N Etkin and E Elisabetsky, 'Seeking a Transdisciplinary and Culturally Germane Science: The Future of Ethnopharmacology' (2005) 100 *Journal of Ethnopharmacology* 23; A Jäger, 'Is Traditional Medicine Better Off 25 years Later?' (2005) 100 *Journal of Ethnopharmacology* 3; International Society for Ethnopharmacology, 'Editorial' (2006) 6(1) ISE Newsletter 1.

22 Etkin and Elisabetsky, above n 21.

23 D A Posey, 'Commodification of the Sacred Through Intellectual Property Rights' (2002) 83 *Journal of Ethnopharmacology* 3; D Marinova and M Raven, 'Indigenous Knowledge and Intellectual Property: A Sustainability Agenda' (2006) 20 *Journal of Economic Surveys* 587; M Kartal, 'Intellectual Property Protection in the Natural Product Drug Discovery, Traditional Herbal Medicine and Herbal Medicinal Products' (2007) 21 *Phytotherapy Research* 113.

24 S King, T Carlson et al, 'Biological Diversity, Indigenous Knowledge, Drug Discovery and Intellectual Property Rights: Creating Reciprocity and Maintaining Relationships' (1996) 51 *Journal of Ethnopharmacology* 45; Carson and Dunbar, above n 3; M Guerin-McManus, K Nnadozie et al, 'Sharing Financial Benefits: Trust Funds for Biodiversity Prospecting' in S Laird (ed), *Biodiversity and Traditional Knowledge. Equitable Partnerships in Practice* (Earthscan, 2002); D D Soejarto, C Gyllenhaal et al, 'The UIC ICBG (University of Illinois at Chicago International Cooperative Biodiversity Group) Memorandum of Agreement: A Model of Benefit-Sharing Arrangement in Natural Products Drug Discovery and Development' (2004) 67 *Journal of Natural Products* 294.

own planning for sustainable natural resources management and economic development. Furthermore, indigenous peoples need to have the rights and legal mechanisms to protect their own cultural and intellectual property.

It is now widely recognised that projects in indigenous communities that are locally run, locally owned and culturally relevant will deliver more meaningful outcomes. However, most research on traditional Australian indigenous medicinal plants has been, and continues to be, driven and published by scientists working in the Western tradition.²⁵ They may have drawn on published information about indigenous peoples' knowledge, or have used information provided by indigenous people who are otherwise bystanders in the actual research processes. We argue that those engaged in research on medicinal plants need to move beyond using indigenous peoples as 'informants'. Indigenous peoples must become researchers, and share in the benefits of research.

4. The Kuuku I'yu Northern Kaanju Medicinal Plants Project

(a) Traditional Owners 'Driving' Research

The remoteness and biodiversity and natural heritage significance of the Kuuku I'yu homelands have been the subject of considerable research interest over many years. Numerous papers, theses, books, reports and museum artefacts are devoted to aspects of the indigenous people and their homelands. More recently, however, many Kuuku I'yu traditional owners have been reluctant to participate in research. This is due largely to the past experience of Kuuku I'yu elders who took part in research activities initiated by 'outsiders', and shared their language and traditional ecological knowledge with them, but felt they received very little in return for their efforts. Today, traditional owners continue

25 M Pennacchio, Y Syah et al, 'Cardioactive Iridoid Glycosides from *Eremophila* Species' (1997) 4 *Phytomedicine* 325; S J Semple, G D Reynolds et al, 'Screening of Australian Medicinal Plants for Antiviral Activity' (1998) 60(2) *Journal of Ethnopharmacology* 163; K Rogers, I Grice et al, 'Inhibition of Platelet Aggregation and 5-HT Release by Extracts of Australian Plants Used Traditionally as Headache Treatments' (2000) 9 *European Journal of Pharmaceutical Sciences* 355; E A Palombo and S J Semple 'Antibacterial Activity of Traditional Australian Medicinal Plants' (2001) 77(2-3) *Journal of Ethnopharmacology* 151; M Pennacchio, A Kemp et al, 'Interesting Biological Activities from Plants Traditionally Used by Native Australians' (2005) 96 *Journal of Ethnopharmacology* 597; J E Smith, D Tucker et al, 'Identification of Antibacterial Constituents from the Indigenous Australian Medicinal Plant *Eremophila duttonii* F. Muell. (Myoporaceae)' (2007) 112(2) *Journal of Ethnopharmacology* 386; A Tan and D Sze, 'Indigenous Herbs and Cancer' (2008) 7(1) *Journal of Complementary Medicine* 48. This includes some work undertaken previously by the current author, Susan J Semple, based on plants with published traditional uses.

to be concerned that some research activities (including the collection of plants and animals for study in universities and other institutions) are taking place on their homelands without their knowledge or consent.

The diverse natural resources of Kuuku I'yu homelands and the detailed traditional ecological knowledge held by its people represent a huge opportunity for the Chuulangun Aboriginal Corporation to address issues of social disadvantage, economic hardship and loss of connection amongst their people, and to sustain them into the future. To achieve this, the Corporation has taken actions to ensure that the people now initiate, manage and benefit from research on and about their homelands.

David Claudie, chair of the Chuulangun Aboriginal Corporation, has undertaken to 'research the researchers'. This has included a comprehensive literature search and review of published papers and other unpublished materials produced by 'outside' researchers about Kuuku I'yu homelands and associated resources. This has allowed traditional owners to better understand what research has already been undertaken on their land, and to direct development of further programmes of research.

The Corporation has also developed guidelines and protocols that must be observed by outsiders wanting to undertake research on Kuuku I'yu homelands and with Kuuku I'yu people. These guidelines emphasise the need for research projects to be collaborations underpinned by Memorandums of Understanding, and with the aim to protect Kuuku I'yu intellectual property (IP) rights and involve traditional owners as 'initiators and full collaborators in research'.²⁶

As part of their land and natural resource management planning,²⁷ the Corporation has developed priority areas for research which will facilitate development of Kuuku I'yu homelands, while still allowing traditional obligations to the land to be met. Some of this research is being conducted by Kuuku I'yu people themselves, whilst other research has required strategic partnerships with outside agencies such as government, universities and non-government organisations.

(b) Starting the Medicinal Plants Project

Development of a locally driven management plan for natural resources enabled relevant Kuuku I'yu traditional owners to invite Western scientific collaborators to work with them in areas they had prioritised in terms of their traditional

²⁶ Chuulangun Aboriginal Corporation, above n 13.

²⁷ Ibid.

medicines and aromatic plants. Moreover, traditional owners were able to work as collaborating researchers in the research process itself, rather than being 'stakeholders' or 'informants' and bystanders to the actual research process.

Nick Smith had been working with the corporation for two years, documenting and mapping plant species on Kuuku I'yu Northern Kaanju homelands with traditional owners. Other university-based researchers at the University of South Australia were invited to join the team, based on their experience in testing and analysing medicinal plants and medicinal product development.

(c) Project Aims

Discussions between Kuuku I'yu and university-based researchers before starting the project examined the aspirations of Kuuku I'yu people in respect of the study and development of their traditional medicinal plants. University-based researchers provided advice on the types of laboratory investigations that would be feasible and the legislative requirements for plant-based medicines to be sold as medicinal plant products. Key objectives for the research were formulated. These included:

- investigation of extracts from medicinal plant species to assist community members to determine opportunities for developing economic enterprises based on sustainable use of plant products;
- investigation of the chemical composition and toxicology of the plant extracts demonstrating the most interesting pharmacological activities as determined by the research team;
- providing opportunities for Kuuku I'yu and university-based researchers and students to visit different research sites (homelands and university);
- supporting Kuuku I'yu elders to engage with younger people on homelands, and help transfer language and medicinal plant knowledge to younger generations through the harvesting of plant material and preparation of traditional plant extracts for the project;
- dissemination of information about research processes and findings through collaborative publications between Kuuku I'yu and university-based researchers.

(d) Establishing Ways of Working — Kuuku I'yu Traditional Knowledge in the Project and How It May Be Used

Before starting the project, participants planned how they would work together. This included discussion of the key issues of how Kuuku I'yu traditional knowledge about plants should be used, and how this cultural and intellectual property should be protected.

For Kuuku I'yu people, knowledge of the ecology of their traditional homelands is based on many thousands of years of empirical observations and sustainable land and resource use and management. This knowledge has been passed down through particular Kuuku I'yu bloodlines to the current generation of traditional owners, managers and lawmakers living on homelands. Underlying this immense body of knowledge is a cosmological world view in which Kuuku I'yu people 'belong' to the land and are under the management of ancestral beings that formed the land and its associated resources. These ancestral beings are also the 'source' of particular knowledge.

There are rules for management and use of this traditional knowledge. For instance, some knowledge is freely available (public knowledge), some knowledge and information belongs to the realm of the restricted (sacred knowledge), and other knowledge and information falls into a category between public and sacred. Further, Kuuku I'yu governance and cosmology determine who can have access to knowledge. That is, only authorised persons can have access to sacred knowledge and can decide how it is used.

Only certain people have access to medicinal plant knowledge and are authorised to use such knowledge. This knowledge includes the uses of a particular plant, the location(s) where the plant should be collected, the maturity of the plant and the time of year at which it can be used, how the plant product is harvested, how the medicine is prepared, and how and to whom the medicine may be administered. Understanding who speaks for the land and who is authorised to use knowledge about the plants is critical to the working of the medicinal plants project. These authorised people decide what knowledge is appropriate to be shared in the project, how it is used, which medicines may be tested in the laboratory and what they may be tested for.

(e) Collaborative Research Agreement

It was central to our research that a clearly negotiated collaborative research agreement must be in place before commencement of the project. This agreement had to ensure the protection of indigenous IP, confidentiality, and a mechanism for benefit sharing if any commercialisation results from the jointly generated project IP. The agreement had to allow Kuuku I'yu law and custom to dictate how traditional knowledge would be used in the course of the project, and for traditional owners to maintain control over any decisions to proceed with commercialisation of IP.

The Chuulangun Aboriginal Corporation and university-based researchers worked together to produce a research collaboration and IP agreement. The agreement incorporated relevant aspects of standard agreements between the University of South Australia and industry partners, but required special

recognition and protection of the cultural and intellectual property of Kuuku I'yu participants and culturally appropriate ways of working. Drafts of the IP agreement were shared, with each party making comments and contributions to define their understanding of each of the following project areas:

- work and funding commitments;
- protection of indigenous cultural and IP rights;
- confidentiality;
- publication of research findings;
- ownership and utilisation of IP generated through the project.

The final agreement was reviewed and approved by the Human Research Ethics Committee of the University of South Australia.

Relevant documents such as the National Health and Medical Research Council (NHMRC) 'Values and Ethics: Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research'²⁸ and general guidelines for responsible research practice²⁹ were considered by the research team in the drafting of the agreement. However, the emphasis was on recognising members of the Chuulangun Aboriginal Corporation as drivers of the research process and as researchers in their own right. This meant that while it was necessary to comply with national research guidelines, local indigenous lore also dictated how the project would be conducted. The NHMRC Guidelines are based on six key values which the team agrees are crucial to the conduct of collaborative research between universities and Aboriginal peoples — namely 'Spirit and Integrity; Reciprocity; Respect; Equality; Survival and Protection; Responsibility'.³⁰ However, the guidelines talk about 'researchers' or the 'research community' on one hand and 'Aboriginal and Torres Strait peoples' on the other. For our team, the Aboriginal people represented by the Chuulangun Aboriginal Corporation are also the researchers.

A summary of the some key aspects of this negotiated collaborative agreement is given in Box 1.

28 National Health and Medical Research Council, 'Values and Ethics: Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research' (Commonwealth of Australia, Canberra, 2003).

29 National Health and Medical Research Council and Australian Vice Chancellors' Committee, 'Joint NHMRC/AVCC Statement and Guidelines on Research Practice' (Australian Government, Canberra, 1997).

30 Above n 28.

Box 1. Key Aspects of the Collaborative Project Agreement

- Recognition of the values of traditional knowledge is central to the research project.
- Kuuku I'yu people's participation will bring to the project valuable IP in the form of traditional knowledge about plants of cultural significance. This background IP remains in the ownership of traditional owners and is fully acknowledged in the allocation of any new IP generated through the project.
- Cultural and intellectual property of traditional owners is treated as confidential information that will not be disclosed to any third party.
- Indigenous law and custom govern how background IP will be used during the course of the project.
- Traditional owners will undertake plant collections for the project in accordance with the rights of certain people to prepare medicines under customary law.
- New IP developed through the project (such as findings of laboratory-based testing and chemical analysis) is jointly and equally owned by Chuulangun Aboriginal Corporation and the University of SA.
- Decisions to commercialise any aspects of project IP will require the consent of both parties. Both parties will work together in making decisions about the processes of any commercialisation.
- There will be an emphasis on joint publication of research findings by both university-based and Kuuku I'yu researchers contributing to relevant aspects of the work.

(f) Approaches to Activities Undertaken in the Project**(i) Collection of plant materials**

Collection and preparation of plant materials to be laboratory tested in the project took place during collaborative field work involving both university-based researchers and Kuuku I'yu researchers. Only traditional owners with authorisation could prepare traditional medicines, lead the field work to collect the plant materials, or instruct other researchers on what and where to collect it. Inappropriate collection by the wrong person, collecting the wrong plant or entering the wrong part of the Country to collect it would be seen by traditional owners to make the medicine either not work or to do harm. Traditional owners say that the medicinal plant needs to 'pass through our hands' to work in the correct manner. In the past, this has been a source of concern for traditional owners when 'outsiders' have collected plants from homelands for testing in laboratories without their knowledge or consent.

Western scientific disciplines such as ethnobotany and ethnopharmacology require the use of voucher specimens of plants. Voucher specimens are reference specimens for a particular plant collection that are usually archived in a nationally recognised institution such as a state herbarium. This ensures the specimen is available to other members of the scientific community, and that the specimen is maintained and curated appropriately. Publication of the results of Western scientific research on medicinal plants in reputable peer-reviewed journals requires that a voucher specimen has been lodged and that the unique voucher number is published. In our project we have lodged voucher specimens for all the collections with herbaria. However, the public availability of these voucher specimens does present some issues for traditional custodians of the plants. When lodging the specimen for our study, some information about the plant was restricted and no information about traditional uses was recorded on the specimen. Specimens were linked to the particular clan estates on which they were collected, and the rightful traditional custodian of the plant was recorded as the plant collector. However, once specimens have been lodged in a herbarium, it is currently difficult for traditional owners to maintain control over what happens to them. Our research team is concerned that most herbaria can split up voucher specimens, make duplicates and then exchange or swap these with overseas institutions. While material transfer agreements may be signed, these do not seem to consider the issues of concern to indigenous people. Once the specimens have been sent overseas, they become the property of the overseas institution and it has control over them, and third parties may be able to access the genetic resources of these samples. It seems specimens lodged in most Australian herbaria can also be sampled (for example, for bar-coding of genetic information) as long as the process is not 'destructive' (that is, so long as the specimen is not destroyed or parts of the specimens such as flowers go missing).

(ii) Preparation of plant materials

Kuuku I'yu people working in the project have emphasised that preparation of a traditional medicine is something that takes time and care to do properly. If one takes pride in the work and the appearance of the final medicine, this shows respect to the plant and to the ancestors who passed knowledge about it to the current generations. The way the plant material is harvested and prepared for extraction, and the actual water used to prepare the extract, are seen by Kuuku I'yu researchers as essential in ensuring the medicine has the desired effect when tested in the project (Figure 2).

Figure 2. Preparation of a plant for the study according to traditional methods.



Photo: S. Semple.

Where possible, traditional medicinal preparations have been prepared by traditional owners as part of the project for testing in the laboratory. In most cases these are prepared by boiling or soaking the plant material in water. This ensures that the components of the plant tested in the laboratory are those that would be present in the actual traditional medicine.

In some cases, the method of traditional use presents a challenge for laboratory testing. Some of the plants used in Kuuku I'yu traditional medicine are not prepared as water extracts; rather, the plant part is crushed and administered directly to the affected part of the body. For example, one plant researched in the study is used as a pain-relieving and anti-inflammatory medication for the mouth, with the plant material chewed and inserted directly onto an inflamed or infected tooth. Another small herb is used as a wound treatment by dabbing the juice from the stem or fleshy roots directly onto the affected area of the skin. In these cases, laboratory testing (which requires some kind of extract of the plant to put into the testing models) cannot directly mimic the traditional use. Discussions among the researchers concluded that the best approach to testing these types of plants was to transport the plant material to the laboratory, and

to use laboratory solvents (such as alcohols) which will extract such a broad range of components from the plant that they should include those components released with the direct application.

Another aspect of the project has been an examination of essential oils from some of the aromatic plants that grow on Kuuku I'yu homelands. Essential oils are the volatile components of plants. These are often complex mixtures of components that contribute to a plant's characteristic smell and taste. In a Western scientific approach, essential oils are usually produced through steam distillation of plant material to produce a concentrated oil extract.

Obviously, distillation of essential oils is not among the traditional plant extraction methods. However, Kuuku I'yu people have traditionally recognised the value of the volatile components of some of their plants. For example, vapours inhaled from crushed leaves have been used for the relief of common cold symptoms, and particular scented plants have been used as 'love potions' to attract members of the opposite sex. Kuuku I'yu people also have knowledge of the content of the aromatic oils in different plants in different locations of their homelands, as well as the optimal time or season to harvest plant materials. The Chuulangun Aboriginal Corporation sees distillation of essential oils on homelands as a feasible means of generating income and local jobs. Essential oils and products made from them (such as soaps and skin lotions) may form the basis of small-scale businesses.

The distillation of essential oils has been undertaken on the homelands as part of the project. This has allowed Kuuku I'yu and university-based researchers to work together in examining yields of oils from different plant materials, the characteristics of the extracted oils, and the feasibility of the oil-distillation process on homelands (Figures 3a and 3b).

Figure 3a. Plant collection for essential oils distillation on Northern Kaanju homelands.



Photo: N. Smith.

Figure 3b. Plant testing for essential oils distillation on Northern Kaanju homelands.



Photo: N. Smith.

(iii) Laboratory investigations of plant extracts

The focus of laboratory testing has been to examine activities suggested by the traditional uses of the plant. For example, plants that have uses for treating infected skin sores have been tested in the laboratory for activity against common bacteria that cause skin infections, and plants used to treat skin irritation or mouth afflictions have been tested for effects against inflammation. However,

it is important to emphasise that Kuuku I'yu people involved in the project do not see indigenous knowledge as something that is static or 'stuck in the past'. Rather, they say that the 'old people' would have needed to adapt their knowledge to new challenges that confronted them, including new diseases. For this reason, relevant Kuuku I'yu traditional owners in the project feel it is appropriate for university-based researchers to test the traditional medicinal plants against a range of illnesses that confront indigenous and other Australians in modern society, such as diabetes, viral infections, cancer and antibiotic-resistant bacteria, as well as conditions that reflect the more traditional uses. They want broader recognition of the value of their medicines and the role they can play in maintaining health among both indigenous and non-indigenous people.

To date, the laboratory testing has been focused around three main areas. First, plant extracts including essential oils have been tested for activity against micro-organisms (including bacteria, yeasts and viruses) that cause human diseases such as skin, oral, respiratory and gastrointestinal infections. This testing has also included examination of activities against bacteria resistant to many of the modern antibiotics used in Western medicine. Some extracts have been tested in a model of skin inflammation. Discovery of extracts that can modulate inflammatory processes could play a role in management of a number of medical conditions for which inflammation is an important component, such as eczema, rheumatoid arthritis, cardiovascular disease, inflammatory bowel disease and some kinds of cancer. Anti-cancer testing, using cancer cells from a variety of cancer types such as skin, breast, lung and gastrointestinal cancers, has also been conducted on plant extracts. In the future it is planned to expand the testing to other areas of interest such as mental illness, diabetes, insect repellency and parasitic diseases.

Visits to the university-based laboratories by Chuulangun Aboriginal Corporation chair David Claudie were used to assist traditional custodians of the plants in understanding what was actually being done with the plant extracts in the laboratory (Figure 4). However, the distance between Adelaide in South Australia and central Cape York (and the expense of travel) has presented challenges in getting more Kuuku I'yu people to experience laboratory work first hand. In the future we hope to establish a small homelands-based laboratory and extraction facility that will allow some more of the Western scientific research and extraction processes to be conducted on the actual homelands, with university-based and Kuuku I'yu researchers working together.

Figure 4. Chuulangun Aboriginal Corporation Chair David Claudie with Susan Semple at UniSA laboratories in Adelaide.



Photo: S. Semple.

Various extracts that have demonstrated the most promising activity in the laboratory-based testing have been subjected to chemical analysis techniques to work out what active components are present in them.

(g) Project Findings and Moving Towards Plant-based Enterprises

This project has had the important aim of identifying plant species with potential for development as plant-based products that can support homelands-based development. A number of the plant species chosen for laboratory testing by the research team have demonstrated activities which reflect traditional understandings of these plants. These serve as examples of the way in which Western science and Australian indigenous science and culture may come to the same finding. Our experience so far with one of these plant species is described below.

5. Uncha (*Dodonaea polyandra*): An Example Case Heading Towards Commercialisation — And an Ongoing Learning Experience

(a) Traditional Use and Western Scientific Investigation

Uncha (*Dodonaea polyandra*, Sapindaceae) is a plant species used for medicinal purposes by particular Kuuku I'yu traditional owners (Figure 5). Knowledge about the plant is passed through the patrilineal bloodline. The plant is used traditionally to decrease pain and discomfort in the mouth from toothache and infection.

Figure 5. Uncha (*Dodonaea polyandra*).



Photo: N. Smith.

The plant was first collected for our project as part of field work on Chuulangun homelands in 2006. Based on traditional uses, the team decided to undertake laboratory-based tests for anti-inflammatory, antibacterial and cell-toxicity effects. Traditionally the plant material (the join of leaf and stem) is applied directly to the mouth. For testing in laboratory models, the team made ethanolic (alcohol) extracts of leaf and stem to extract a range of the plant's chemical constituents that would otherwise be released directly if the plant was chewed or crushed. Both leaf and stem extracts showed significant activity in a model of skin inflammation (conducted by Dr Jiping Wang at the University of South

Australia). The comparable effects in this model were with the known anti-inflammatory medicine hydrocortisone (available in over-the-counter anti-inflammatory skin creams).

Further chemical analysis of the extracts has been undertaken as part of a PhD project by Bradley Simpson. This part of the study has led to the isolation of several compounds which are responsible for the anti-inflammatory effects of the extract in the laboratory model. Some of the purified compounds performed similarly to a potent (prescription) anti-inflammatory drug called betamethasone in the testing model. These components isolated from the plant are 'new' to Western science but related to other compounds known to exist in other species in the genus *Dodonaea*. The most active compounds are from a class called furanoclerodane diterpenoids. The actions of the components of *Dodonaea polyandra* are of course not 'new' to the particular Kuuku I'yu traditional owners who have used this plant medicinally for generations.

(b) That's All Very Interesting — But Now What?

While compound isolation and identification from plants is no trivial task, in some ways the research to this point was the easy part, in that there were (and are) clear guidelines and methods for the conduct of such research. The next steps were (and continue to be) in some ways the most challenging. We now need to negotiate the pathway to getting a potential commercial outcome that can create enterprises on Kuuku I'yu homelands and bring benefits back to the Chuulangun Aboriginal Corporation.

(i) Commercial partners and patenting

To develop medicinal plant products that can be sold widely (and that make therapeutic claims) it is necessary to meet the requirements of the Therapeutic Goods Act 1989 and regulations, and to seek approval from the Therapeutic Goods Administration in Australia (and similar agencies in other countries). The levels of evidence for the safety and efficacy of any new product entering the market require a great deal of research and hence financial support. Therefore, to progress to a commercial product it is almost inevitable that a commercial partner will have to be involved. University researchers are also under considerable pressure to publish the findings of the research to meet the needs of PhD candidature, to develop track records for further funding applications to support the work, and to demonstrate external review of the research which is important in satisfying the requirements of potential funders of commercialisation.

In 2009 the research partners decided to proceed with patenting the project IP related to their findings on the Uncha plant, and in November 2009 two

provisional patent applications were filed. The first of these covered an extract and extraction process for the Uncha plant. The second covered the compounds themselves and likely derivatives for anti-inflammatory applications. These two applications were considered appropriate to allow different streams of product development, including herbal extract products or products containing the isolated components. The Chuulangun Aboriginal Corporation and the University of South Australia are joint applicants (owners) of the patent applications, and in November 2010 the applications moved to the Patent Cooperation Treaty (PCT) phase. All patent costs so far have been borne by the university's commercialisation company, ITEK (a wholly University of South Australia-owned company).

The team is also exploring the use of trade marks to identify extracts as belonging to the Chuulangun Aboriginal Corporation and sourced appropriately from the Kuuku I'yu Northern Kaanju homelands.

A number of common medical conditions involve inflammation. Anti-inflammatory applications therefore have potential in a variety of areas, including cosmetic uses, over-the-counter herbal complementary medicine products and conventional pharmaceuticals (isolated compounds or derivatives), and some potential commercial partners have already been identified. Cosmetic applications are likely to be the first commercial uses for the extracts.

Our wish is to maximise IP in the project by conducting as much research as possible in the university and on the homelands before linking with a commercial partner. The decision to file the patent applications was not taken lightly but was considered as our best option at the time. The patent process as it stands is far from ideal for this type of work. Filing of the applications allows the research to be published, but now sets a tight timeline (18 months) before the patents move to the 'national phase' of the application, where costs escalate rapidly. At the national stage we may need to have a third party on board to help pay for the upcoming patent costs, because the university commercialisation arm may not be able to support this specification in the absence of external funding and significant progression of the technology into a market-ready product. As a team we may need a long-term perspective on this. For our first products, we may need to take partners on earlier, with a view to eventually creating our own spin-out company with a pipeline of products. In the future we may be able to maintain more of the research in-house and maintain patents on other extracts to a later development stage.

(ii) Issues around patenting and IP protection for the Chuulangun Aboriginal Corporation

This patenting process has raised other issues besides those of costs and timelines. Patents do not allow 'ancestors' or whole clan groups to be named — only 'inventors' according to a narrow definition. While the Chuulangun Aboriginal Corporation can be an owner on the patent, their ancestors or clan group as a whole cannot be named as the inventors. Traditional owner preference would also be to patent plants from the particular area. While it may be possible to genetically map plants to particular areas and patent extracts from them, a pharmaceutical commercial partner buying the right to use the IP covered by the patent may want to ensure it is covered for extracts from the species generally so no one else can produce what it perceives as the 'same' product. Additionally, patenting allows protection of IP only for a defined period of time.

Article 31 of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) states the right of indigenous peoples to 'maintain, control, develop and protect' their sciences, including medicines and botanical resources.³¹ While still an aspirational document, rather than a treaty or law, the UNDRIP highlights the rights of indigenous peoples to maintain their own institutions, traditions and cultures, and the right to develop their economic and social needs and aspirations as a group. The Convention on Biological Diversity (CBD) is the major international convention that recognises the ownership of traditional knowledge by indigenous communities and therefore the right to protect this cultural and intellectual property. The CBD also highlights the need to preserve the knowledge of indigenous communities that can contribute to the conservation and sustainable use of biodiversity. However, a number of limitations of the CBD for indigenous peoples have been discussed, particularly the authority given to nation states to make agreements in relation to access to natural resources and benefit-sharing agreements. These may undermine the rights of indigenous peoples.³²

In our experience, the current patent system places too much emphasis on the value of the novel and inventive steps from a Western scientific perspective. Indeed, inventors are defined from this perspective. The limited timeframe of protection is also problematic for traditional custodians who have held their knowledge over generations. If indigenous peoples are to protect their sciences, including medicines, as stated in the DRIP, new legal mechanisms need to be developed to allow them to do this 'from their side'. The Chuulangun Aboriginal Corporation is currently exploring options for legal changes in Australia that

31 United Nations Declaration on the Rights of Indigenous Peoples, (UNDRIP).

32 D Harry and L Kanehe, 'The BS in Access and Benefit Sharing (ABS): Critical Questions for Indigenous Peoples' in B Burrows (ed), *The Catch: Perspectives on Benefit Sharing* (Edmonds Institute, 2005) <http://www.ipcb.org/publications/other_art/bsinabs.html>

may be required to ensure that medicinal plant knowledge can be protected and to formalise their traditional knowledge of plant properties as the IP of the Kuuku I'yu Northern Kaanju people. While some aspects of 'cultural knowledge' are hard to define to outsiders, the knowledge of a plant species or population, the properties it affords and the preparation required are fairly concrete, and the Corporation believes such knowledge could and should be legally protected.

Australia's Native Title Act 1993³³ establishes a framework for the protection and recognition of native title over land and waters. In the native title case of *Western Australia v Ward*,³⁴ the High Court found that native title law did not extend to protecting cultural knowledge from misuse. To do so would extend it beyond the control of access to land to the control of access to cultural knowledge, in what the court considered to be a 'new species of intellectual property'. However, this is what the Chuulangun Aboriginal Corporation believes its people need if they are to ensure that their knowledge can be used for the benefit of the world of medicine and for their own economic benefit, and on their terms. From the Corporation's reading of it, the Act should afford these protections. The Corporation is currently seeking advice on whether reforms to Australia's Native Title Act may help in achieving protections, or whether legal reforms to IP laws are needed instead.

At a local level, the Chuulangun Aboriginal Corporation is planning to form a body representing the IP of the Kuuku I'yu people to arrange and distribute commercial benefits, decide on commercial use, investigate misuse and oversee research collaborations.

(c) Supply and Sustainability Considerations in Product Development

Central to the vision of the medicinal plants project is the development of plant-based products to foster development on Kuuku I'yu Northern Kaanju homelands. This in turn would offer opportunities for employment, financial independence and increased self-esteem, particularly for younger Kuuku I'yu Northern Kaanju people. If sustainable plant-based products are to be developed, the sustainable harvest or production of plant materials on the homelands will be crucial.

In discussions with potential commercial partners, issues surrounding the supply of plant extracts and compounds have been raised as matters of high priority. A suggestion by some commercial operators that cultivation and harvesting of plant material in some kind of established horticultural facility

³³ *Native Title Act 1993* (Cth).

³⁴ *Western Australia v Ward* (2002) 191 ALR 1.

away from the homelands could overcome supply issues is not acceptable to our research team. The holder of the plant knowledge is attached to the plant by a 'story'. These holders of knowledge are individuals within clan groups. Under traditional law, growing the plant elsewhere for the natural resource that is known to Kuuku I'yu is not an option. It would cause problems for both the grower and the holder of the 'story'. We need to make sure that traditional governance systems are respected and that issues of plant supply can be met in a culturally appropriate manner. The timelines of the patenting process and need to have a commercial partner in place put considerable pressure on the team to ensure these issues are addressed quickly. As the research and commercial development moves into its next stage, there will be a need for on-ground research, led by relevant traditional owners on their homelands, to examine a range of sustainability issues. For each of the plant species that has commercial potential, including the Uncha plant, a variety of questions arise. These include questions such as:

- What quantities of plant materials can reasonably be harvested from plants growing naturally on Kuuku I'yu homelands?
- What impact would harvesting have on the number of these plants, and on other species (such as insects, birds, mammals) that depend on them?
- How quickly would the plants re-grow and when could they be re-harvested?
- Would it be feasible to cultivate the plant on homelands?
- Would plant materials obtained from cultivated plants have the same medicinal properties and components as those that are wild-harvested?
- What infrastructure and management structures need to be in place to allow a successful plant-harvesting and extraction enterprise to be developed on the homelands?
- How will issues of remoteness be overcome?

6. Conclusions

Our medicinal plants research project and journey towards development of locally driven enterprises based on traditional medicines in Kuuku I'yu homelands has raised, and continues to raise, a number of important issues. We believe that research of this type must be driven by indigenous traditional owners, and incorporate their own views of how their medicinal products should be researched and developed. Importantly, the project highlights inadequacies in current legal systems to support IP protection in work of this kind. There is a need for other mechanisms of indigenous cultural and IP protection which will be recognised and respected by potential commercial partners — not just an emphasis on the Western scientific aspects and their protection through patents.

A future in which Australian indigenous peoples' IP rights are recognised by the legal system is essential to traditional owners represented by the Chuulangun Aboriginal Corporation. With this in place, not only the Kuuku I'yu people but all Australians and people worldwide could benefit from 'new' medicines. Without it, Kuuku I'yu people's knowledge of medicines will be guarded closely to prevent IP 'theft' by unscrupulous companies.

Acknowledgement

This project has been supported with funding from an Australian Research Council (ARC) Linkage Grant (LP0667713) and a National Health and Medical Research Council (NHMRC) Development Grant (APP1017556).