

Introduction, definitions and inquiry scope

High technology products and processes from natural sources

- 1.1** Advances in mechanical technology dominated the nineteenth century; the information revolution was the driver of change in the twentieth. As we start the twenty-first century, an explosion in our understanding of biological processes seems likely to underlie future industrial developments.
- 1.2** Nature is a treasury of variety and complexity. As we understand it better, we can use biological processes to provide the basis or starting point for developing new processes and products. In doing so, we avoid reinventing wheels that have already been developed in the course of evolution and fine tuned over many years.
- 1.3** Bioproducts and their means of production are also environmentally friendly. This recommends them to a world where problems caused by conventional industries are increasing. The manufacture of bioproducts involves natural processes that occur at ambient temperatures and pressures; the energy required to produce them is modest and waste is minimal and biodegradable. There are environmental as well as economic advantages to using biobased products.
- 1.4** Considerable efforts are being made by advanced countries to research biological processes and to harness this research to advances in medicine, mining, manufacturing, agriculture, and environmental management. Australia is among these countries and in competition with them to reap the benefits. There is a window of opportunity here which Australia must utilise.

- 1.5** Australia has an advantage over other countries in that it possesses a unique, very diverse biota. Our plants, animals and microorganisms represent the only resource from which certain discoveries can be made, and an additional opportunity for Australia.
- 1.6** The committee's inquiry examines the opportunities for Australia to develop high technology industries based on bioprospecting, and to investigate the factors that are inhibiting these developments. Given the committee's rural and regional focus, it is appropriate that the inquiry's terms of reference place particular emphasis on the involvement of regional Australia in bioprospecting and bioindustrial development. The inquiry was referred to the committee on 4 October 2000 by the Minister for Agriculture, Fisheries and Forestry, the Hon Warren Truss, MP.

Definitions

Bioprospecting

- 1.7** The committee's first task at the start of the inquiry was to understand the meaning of the term, 'bioprospecting'. It soon became clear that there is no standard definition and 'there are different views on how far "bioprospecting" extends down the commercialisation path'.¹
- 1.8** The term is sometimes used narrowly, for example by CSIRO and Environment Australia (EA), to cover only the initial collecting of biological material to use subsequently in biodiscovery and further development.² A more common use of the term, however, is to refer to the search for valuable chemical compounds and genetic material from plants, animals and microorganisms.³ In some cases, as in biopesticides, biomining and bioremediation, whole organisms are employed rather than the chemicals and genetic material extracted from them. The broadest meaning of the term encountered by the committee was that used by the Commonwealth Department of Agriculture, Fisheries and Forestry - Australia (AFFA). AFFA suggested that bioprospecting also involved the identification of potential food sources among Australian native plants,⁴ although the term is not usually used in this way.

1 Biotechnology Australia, Submission no. 25, p. 6.

2 CSIRO, Submission no. 14, p. 13; Environment Australia, Submission no. 29, p. 41.

3 For example, South Australian government, Submission no. 28, p. 1.

4 Department of Agriculture, Fisheries and Forestry - Australia, Submission no. 24, p. 7.

- 1.9** Notwithstanding CSIRO's preference for a narrower definition of bioprospecting than is used by most others, the committee has employed the term in its broader sense of the search for valuable chemicals and genetic material. The committee took this decision in order to reflect the way in which the term was most commonly used by those who contributed to the inquiry.

High technology

- 1.10** The bioproducts that can be developed from the discoveries from bioprospecting vary greatly in the degree of technological sophistication involved in producing them. At the most sophisticated end of the continuum, genetic material might be removed from an organism that produces a useful chemical and placed into microorganisms that can be cultured to mass produce the chemical. Alternatively, a chemical with pharmaceutical activity might be extracted and isolated, its molecular structure identified and modified for greater potency, and a means of synthesising it developed. At the other extreme, plants might be grown for their nutraceutical value, or for the essential oils that can be extracted from them.
- 1.11** The inquiry's terms of reference required the committee to consider 'high technology industries'. The committee has not confined itself in this report to the most sophisticated bioproducts. It believes that a more useful approach in examining options for regional development is to consider as wide a range of options as possible and to include some 'low technology' industries as well.

Bioindustry development

- 1.12** In its submission to the inquiry, CSIRO provided the committee with a sketch of the processes by which bioprospecting can lead to the discovery and eventual commercialisation of useful products (Figure 1.1). This sketch clarified for the committee the stages by which biological leads are researched, developed and commercialised as new bioproducts, as well as defining the meaning of the terms used in this process.
- 1.13** The meanings of many of the other specialist terms used in this report are provided in the glossary.

INSERT FIGURE 1.1 HERE
(needs to be landscape)

Conduct of the inquiry

- 1.14** The inquiry was advertised at the beginning of November 2000 in capital city newspapers and state rural magazines. In addition, information about the inquiry and requests for submissions were sent to state premiers, territory chief ministers, and Commonwealth ministers and departmental secretaries with an interest in the inquiry topic. Also approached to make submissions were universities and research groups; businesses involved in bioprospecting, bioprocessing and related biotechnologies; and organisations representing primary producers, scientists, business, and environmentalists.
- 1.15** The committee provided an issues paper to all those invited to make submissions and made it available on the internet.⁵ It was intended to assist and stimulate those interested in participating in the inquiry by outlining some of the matters that the committee anticipated the inquiry would address.
- 1.16** Thirty-nine submissions were received and eight exhibits taken; they are listed in Appendices A and B, respectively. Five public hearings were held in Canberra, one of which was carried out through an audio-visual connection with witnesses in Melbourne and Hobart. Details of these hearings are provided in Appendix C. The committee also met and held discussions with individuals and organisations involved in bioprospecting and businesses arising from it. These discussions occurred in Townsville, Lismore and Canberra. The committee was given further insights into bioprospecting during visits to CSIRO Entomology in Canberra, the Australian Institute of Marine Science (AIMS) in Townsville, and Southern Cross University (SCU) in Lismore. These events are listed in Appendix D.

Report format

- 1.17** In the next chapter, the committee outlines the potential that it sees in bioprospecting and the industries derived from it. Chapter 3 details the impediments at each stage of the chain of bioindustry development, and discusses ways of overcoming the impediments identified. In Chapter 4, the committee comments on the possibility of regional development based

⁵ *Bioprospecting and Regional Industry Development in Australia - Some Issues for the Committee's Inquiry*, Information and Research Service of the Department of the Parliamentary Library, 2000.

on bioprospecting. Chapter 5 deals with the impact of bioprospecting and related industries on the environment, and Chapter 6 covers some of the more general issues relevant to the development of biotechnology.