INFORMATION SOURCES FOR VETERINARY TOXICOLOGY IN AUSTRALIA

Nam et ipsa scientia potestas est (Knowledge itself is power)

A little learning is a dang’rous thing;
Drink deep, or taste not the Pierian spring:
There shallow draughts intoxicate the brain,
And drinking largely sobers us again.

Alexander Pope (1688-1744) An Essay on Criticism. 1711

1: Reference Books, Software, Review Articles and Multimedia Resources - Toxicology

Outside of a dog, a book is a man's best friend.
Inside of a dog, it's too dark to read!

Key to symbols:
• ♦ indicates a recommended reference
• ♦ indicates a recommended source (criteria: authority, currency, depth, good coverage or combinations of these)
• # indicates sources with specifically Australian content
• [ ] indicates the abbreviation used in reference lists in the body of this work for a frequently-cited reference work

Compendium of Information Sources in Toxicology

Dictionaries of Toxicology & Veterinary Medicine


General Toxicology


Veterinary Toxicology


Beasley VR, Dorman DC, Fikes JD, Diana SG, Woshner V (1997) A Systems Affected Approach to Veterinary Toxicology. (Loose-leaf lecture notes) College of Veterinary Medicine, University of Illinois at Urbana-Champaign, Urbana, IL USA. lvii + xxiv + 989 pp. + index (39 pp.)

Bruère AN, Cooper BS, Dillon EA (1990) Veterinary Clinical Toxicology. Publication 127, Foundation for Continuing Education of the New Zealand Veterinary Association, Massey University, Palmerston North. vi + 233 pp. ISSN 0112 9643. Covers veterinary intoxications in New Zealand.


Oeheme FW et al. (1987) Veterinary Clinical Toxicology. Proceedings 103, Post-Graduate Foundation in Veterinary Science, University of Sydney, 630 pp. Covered major intoxications and envenomations from both an Australasian and North American perspective.


### Veterinary Medicine Texts with sections on toxicology


### Poisonous Plants and Fungi (Veterinary orientation)


# McKenzie RA, Blood DC, Larcombe MT, Brightling P (1995) *PHYTOX.* Animal Information Management Pty. Ltd., 209 Wattan Street, Werribee VIC 3030. [Minimum requirements - IBM-compatible PC, MS-DOS 3.0, 80286 processor, 512 k RAM, 8 MB hard disk space] This software was a précis of the world literature on poisoning by plants, fungi and cyanobacteria, structured to be used as diagnostic support. No longer available.


Steyn DG (1934) *The Toxicology of Plants in South Africa together with a consideration of poisonous foodstuffs and fungi.* Central News Agency Ltd., Cape Town. xii + 631 pp.


**Poisonous Plants and Fungi (Human & Alternative Medicine orientation)**


Wilson S (1997) Some Plants are Poisonous. Reed (Reed Books Australia), Kew, Victoria. xvi + 264 pp. ISBN 0 7301 0505 9. A popular account of plants actually and potentially poisonous to humans in Australia erring on the side of caution and containing a number of inaccuracies. 151 genera are included and illustrated with pencil sketches and some coloured photographs.

Poisonous Fungi


Cyanobacteria (cyanophytes, blue-green algae) & marine dinoflagellates


Chemicals and Pharmaceuticals (including Agricultural, Veterinary & Medical)


- Infopest CD-ROM. Department of Primary Industries Queensland, Animal and Plant Health Service, Brisbane. infopest@dpi.qld.gov.au [Comprehensive data on Australian registered agricultural and veterinary chemicals and their uses. Annual subscription with quarterly updates $198, single copies $99.] Also on the Web (see below).
- Infopest MSDS CD-ROM. Department of Primary Industries Queensland, Animal and Plant Health Service, Brisbane. infopest@dpi.qld.gov.au [Material Data Safety Sheets for Australian registered agricultural and veterinary chemicals. Annual subscription with quarterly updates $98, single copies $44.]

- IVS Annual (Index of Veterinary Specialties, Australian Edition), MIMS Australia, St.Leonards, NSW. ISSN 1033 2863 [Available on subscription]

# *MIMS Annual* (Monthly Index of Medical Specialties, Australian Edition), MIMS Australia, St.Leonards, NSW [Available on subscription]

# *MIMS OTC* (annual volume) MIMS Australia, St.Leonards, NSW [Available on subscription with MIMS Annual] [A guide to non-prescription “over-the-counter” drugs including herbal remedies]


**Chemical carcinogenesis**


**Envenomations & zootoxins**


# Southcott RV (1975) *Australian Venomous and Poisonous Fishes*. R.V.Southcott, Mitcham, South Australia.


Ecotoxicology (Veterinary orientation)


Miscellaneous – animal health

# Anon. (2000) Prime Notes on CD-ROM. Version 10, September 2000. Queensland Department of Primary Industries, Brisbane. ISBN 0 7345 0106 4 [$49.50 + $6 p&p] [Includes over 4500 extension articles for a wide range of subjects including animal health, plant poisonings and weed control produced by state departments of Agriculture/Primary industries and Natural Resources for Queensland, South Australia, Victoria, Western Australia, Tasmania and the Northern Territory and by industry bodies and CSIRO]


2: Serial publications (scientific journals) – the primary scientific literature

Access to the primary scientific literature is either directly through subscription or from journals in libraries or on-line (in increasing numbers), or indirectly through searches of bibliographic databases (see data under internet-based resources in this document). Some journals offer contents pages and abstracts, and in some cases e-mail contents notification, as well as searches of journal contents via the World Wide Web (see below).

Journals publishing significant amounts of material relevant to veterinary toxicology include

♦ Specialised journals devoted to toxicology.
  • Veterinary & Human Toxicology
Toxicon
- Food & Chemical Toxicology
- Toxicology and Applied Pharmacology
- Environmental Toxicology
- Natural Toxins (ceased publication)

- Journals in fields that may include toxicological subject matter
  - Journal of Veterinary Diagnostic Investigation
  - Journal of Comparative Pathology
  - Veterinary Pathology
  - Journal of Agricultural & Food Chemistry
  - Journal of Animal Science
  - Journal of Natural Products
  - Phytochemistry

- Some generalist veterinary journals that include toxicological subject matter
  - Australian Veterinary Journal
  - Australian Veterinary Practitioner
  - Journal of the American Veterinary Medical Association
  - American Journal of Veterinary Research
  - Compendium of Continuing Education for Practicing Veterinarians
  - Veterinary Clinics of North America: Food Animal Practice
  - Veterinary Clinics of North America: Small Animal Practice
  - Onderstepoort Journal of Veterinary Research
  - Journal of the South African Veterinary Association
  - The Veterinary Record
  - In Practice
  - New Zealand Veterinary Journal
  - Canadian Veterinary Journal
  - The Veterinary Journal (formerly The British Veterinary Journal)
  - Veterinary Research Communications
  - Research in Veterinary Science
  - Canadian Journal of Veterinary Research

See Wexler et al. (2000) for an extended list of journals covering toxicology as a whole.

3: Reference Books, Software and Multimedia Resources – Weed Control, Plant Identification & Use in Australia

Full many a flower is born to blush unseen,
And waste its sweetness on the desert air.


♦ indicates recommended sources

**Synoptic publications on vascular plants and fungi**
**Weed Control**


These volumes constituted a comprehensive directory of information resources and contacts for environmental and agricultural weed control in Australia and New Zealand at the time of publication.

DPI Queensland Beef Industry Institute (Tropical Beef Centre, PO Box 5545, Rockhampton Mail Centre 4702) publishes *Woody Weed Adviser for Windows*, a software package containing information on chemical and mechanical control measures and management options.


**Plant identification - general**


**Plant identification guides on CD-ROM**


**Plant identification guides – reference books**

All guides listed include data, images or both on toxic species

**Guides to identification of weeds, agricultural plants or poisonous plants**

The titles listed do not require detailed botanical knowledge for their use and are well illustrated with photographs, line drawings or both.


Floras and guides to specific plant groups in Australia

Some botanical knowledge is an advantage when using these books.

Floras


Specific Plant Groups

Ferns

Cycads

Grasses

Legumes

Eucalypts

Algae & cyanobacteria

Aquatic & Wetland Plants

Plant Censuses and Checklists
Guides to plants (native and naturalised) in Australia

The titles listed do not require detailed botanical knowledge for their use and are well illustrated with photographs, paintings, line drawings or combinations of these.

Australia as a whole

South-eastern Australia

Northern Australia

New South Wales & Southern Queensland

Queensland
♦ Anderson ER (1993) *Plants of Central Queensland, their identification and uses*. Queensland Department of Primary Industries, Brisbane. xvi + 272 pp. ISBN 0 7242 3990 1


Milson J (1995) *Plant Identification in the Arid Zone*. Information Series QI94035, Queensland Department of Primary Industries, Brisbane. viii + 104 pp. ISSN 0727 6273


**New South Wales**


**Victoria**


Tasmania

South Australia

Northern Territory

Western Australia
♦ Petheram RJ, Kok B (1983) *Plants of the Kimberley Region of Western Australia*. University of Western Australia Press, Perth, xii + 556 pp. ISBN 0 85564 215 7

Guides to macrofungi (“mushrooms”, “toadstools”) in Australia
Hay B, Young T (1988) *Poisonous Fungi of Australia*. Published by the authors, Nanango Q 4315. 73 pp. [This booklet was written to accompany a computer program for identification of poisonous species in Australia, had a limited distribution, and is no longer in print. Access may be difficult.]

Guides to ornamental garden and indoor plants, herbs and medicinal plants
The titles listed do not require detailed botanical knowledge for their use and are well illustrated with photographs, line drawings or both.

Guides to medicinal plants and herbs (culinary and medicinal)

The titles listed do not require detailed botanical knowledge for their use and are well illustrated with photographs, line drawings or both.


Australian aboriginal plant use and Australian native and naturalised food plants (bush tucker)

The titles listed do not require detailed botanical knowledge for their use and are well illustrated with photographs, line drawings or both.

An old dog for a hard road
Anonymous (Proverbial)

**Veterinary Toxicologists & Pathologists**
Prof Alan A. Seawright, University of Queensland School of Veterinary Science (retired), National Research Centre for Environmental Toxicology (associate), 39 Kessels Road, Coopers Plains [PO Box 594 Archerfield] Brisbane, Qld 4108; Phone (07) 3274-9114, Fax (07) 3274-9003, e-mail a.seawright@mailbox.uq.edu.au
Dr Jeremy G. Allen, Animal Health Laboratories, Agriculture Western Australia, 3 Baron-Hay Court, South Perth WA 6151 [Locked Bag No. 4, Bentley Delivery Centre, WA 6983] Phone (08) 9368-3466 Fax (08) 9474-1881 e-mail jgallen@agric.wa.gov.au
Dr Chris A. Bourke, NSW Agriculture (CRC for Weed Management Systems), Orange Agricultural Institute, Forest Road, Orange NSW 2800; Phone (02) 6391-3867 Fax (02) 6391-3899 e-mail chris.bourke@agric.nsw.gov.au
Dr Leigh Lehane, Office of Animal and Plant Health, Agriculture, Fisheries and Forestry – Australia, GPO Box 858, Canberra, ACT 2601; Phone (02) 6272-4697, Fax (02) 6272-4533, e-mail leigh.lehane@affa.gov.au web page: [http://www.affa.gov.au/nat-offices/ocvo/pubs](http://www.affa.gov.au/nat-offices/ocvo/pubs)
Dr Ross A. McKenzie, Yeerongpilly Veterinary Laboratory, Animal Research Institute, Queensland Department of Primary Industries, Ortive Street, Yeerongpilly [Locked Mail Bag No. 4, Moorookaa Q 4105] Phone DPI Call Centre (from Qld) 13 25 23 or (07) 3362 9432 Fax (07) 3362 9440 e-mail ross.mckenzie@dpi.qld.gov.au or yapunyah.house@bigpond.com
Dr Michael (Mike) A Pass, Faculty of Science, University of the Sunshine Coast, Locked Bag No.4, Maroochydore D.C. Q 4556; Phone (07) 5430-2840, Fax (07) 5430-2887, e-mail mpass@usc.edu.au

**Veterinary Pharmacologists & Pharmacists**
Dr Ian A Shiels, Department of Physiology & Pharmacology, University of Queensland, St.Lucia Q 4072; Phone (07) 3365 4756; Fax (07) 3365 1766, e-mail shiels@plpk.uq.edu.au
Mrs Josphiine Isaacs, Pharmacist, Companion Animal Practice, University of Queensland School of Veterinary Science, St.Lucia Q 4072; Phone (07) 3365 3093 or 3365 4851, Fax (07) 3365 1899, e-mail j.isaacs@mailbox.uq.edu.au

**Chemists & Biologists with expertise in toxins of veterinary importance**

**Mycotoxins**
Mr Barry J. Blaney, Animal Research Institute, Queensland Department of Primary Industries, Ortive Street, Yeerongpilly [Locked Mail Bag no.4, Mooroooka Q 4105] Phone DPI Call Centre (from Qld) 13 25 23 or (07) 3362 9470, Fax (07) 3362 9429, e-mail barry.blaney@dpi.qld.gov.au
Prof Wayne L. Bryden, Dept of Animal Science, Faculty of Natural Resources, Agriculture and Veterinary Science, University of Queensland, Gatton, Qld;
Plant toxins
Dr Steven M. Colegate, Plant Toxins Unit, CSIRO Division of Animal Health, Australian Animal Health Laboratory, Private Mail Bag 24, Geelong, VIC 3220; Phone (03) 5227-5739, Fax (03) 5227-5555, e-mail steven.colegate@li.csiro.au
Dr Peter R. Dorling, Division of Veterinary Biology, Murdoch University, Perth WA; e-mail dorling@numbat.murdoch.edu.au
Dr John A. Edgar, Plant Toxins Unit, CSIRO Division of Animal Health (retired), Australian Animal Health Laboratory, Private Mail Bag 24, Geelong, VIC 3220; e-mail John.Edgar@li.csiro.au
Dr. Mervyn P. Hegarty, [ex-CSIRO Division of Tropical Crops & Pastures (retired)], Plantchem Pty Ltd., Phone (07) 3378-3530, Fax (07) 3378-3530, e-mail Hegarty.Plantchem@uq.net.au

Ciguatera
Dr Richard J Lewis, Institute for Molecular Biology-Drug Design & Development/Queensland Agricultural Biotechnology Centre, Gehrmann Laboratories, University of Queensland, St.Lucia Q 4072; Phone (07) 3365 1924; e-mail r.lewis@imb.uq.edu.au

Marine microalgae (dinoflagellates)
Dr Gustaaf M. Hallegraeff, School of Plant Science, University of Tasmania, GPO Box 252C, Hobart Tasmania 7001; Phone (03) 6226 2623, Fax (03) 6226 2698; e-mail hallegraeff@utas.edu.au

Cyanobacteria
Prof. Ian R. Falconer, Department of Clinical and Experimental Pharmacology (& CRC for Water Quality & Treatment), Adelaide University SA 5005; Phone 02 6251 1345; e-mail ifalconer@medicine.adelaide.edu.au
Dr Gary Jones, CRC for Freshwater Ecology, Building 15, University of Canberra, ACT 2600; Phone 02 6201 5168; e-mail gjones@lake.canberra.edu.au
Dr Glen Shaw, National Research Centre for Environmental Toxicology, 39 Kessels Road, Coopers Plains, Brisbane 4108; Phone 07 3274 9120; e-mail g.shaw@mailbox.uq.edu.au
Dr Geoffrey K Eaglesham, Queensland Health Scientific Services, 39 Kessels Road, Coopers Plains, Brisbane 4108; Phone 07 3274 9085; e-mail Geoff_Eaglesham@health.qld.gov.au
Dr Michael Burch, CRC for Water Quality & Treatment, Private Mail Bag 3, Salisbury, South Australia 5108; Phone 08 8259 0352; e-mail michael.burch@sawater.sa.gov.au
Dr Andrew R. Humpage, Australian Water Quality Centre (& CRC for Water Quality & Treatment), Private Mail Bag 3, Salisbury, South Australia 5108; Phone 08 8259 0222; e-mail andrew.humpage@sawater.sa.gov.au
Dr Philip T. Orr, CSIRO Land & Water, 120 Meiers Road, Indooroopilly, Brisbane 4068; Phone 07 3214 2721; e-mail philip.orr@bne.clw.csiro.au
Dr Larelle Fabbro, Centre for Land and Water Resource Management, University of Central Queensland, Rockhampton Q 4702

5: Sources of Veterinary Toxicological and related Expertise in Australia – Scientific Institutions

Australian Research Centres with expertise pertinent to Veterinary Toxicology

Veterinary orientation
CSIRO Plant Toxins Unit, Australian Animal Health Laboratory, Private Mail Bag 24, Geelong, VIC 3213

Medical and Veterinary orientation
National Research Centre for Environmental Toxicology, 39 Kessels Road, Coopers Plains [PO Box 594 Archerfield] Brisbane, Qld 4108; Web Homepage http://www.uq.edu.au/nrcet/
Australian Venom Research Unit, Department of Pharmacology, University of Melbourne; Web pages http://www.pharmacology.unimelb.edu.au/PHARMWWW/avruweb/Page1.htm
Poisons Information Centres
These centres are human-oriented, based in the Pharmacy Departments of major metropolitan hospitals and staffed by pharmacists. They have access to large databases on pharmaceuticals, household and industrial products and plants poisonous to humans (mainly children). They may be willing to deal with veterinary enquiries and may refer veterinary callers to other local sources of expertise.

Australia-wide Phone 13 1126. You will be connected to your local state Poisons Information Centre.

State Herbariums (Plant Identification Services)
See the chapter on collection and submission of plant, fungal and cyanobacterial specimens for identification by centres of expertise

Queensland: Identification and Advisory Service, Queensland Herbarium (Environmental Protection Agency), Brisbane Botanic Gardens Mt.Coot-tha, Mt.Coot-tha Rd., Toowong Q 4066. Phone (07) 3896 9318 Fax (07) 3896 9624.

New South Wales: Botanical Enquiry Section, National Herbarium of New South Wales, Royal Botanic Gardens, Mrs Macquaries Road, Sydney, NSW 2000. Phone (02) 9231 8111. Fax (02) 9251 4403.

Victoria: National Herbarium of Victoria, Royal Botanic Gardens, Birdwood Avenue, South Yarra, Vic 3141. Phone (03) 9252 2300. Fax (03) 9252 2350.

Tasmania: The Curator, Tasmanian Herbarium, GPO Box 252c, Hobart, TAS 7001. [Tasmanian Herbarium, College Road, University of Tasmania, Sandy Bay, Hobart] Phone (03) 6226 2635. Fax (03) 6226 7865.

South Australia: State Herbarium of South Australia, The Botanic Gardens of Adelaide, North Terrace, Adelaide, SA 5000. Phone (08) 8228 2311. Fax (08) 8223 1809.

Western Australia: Western Australian Herbarium (Department of Conservation and Land Management), Locked Bag 104, Bentley Delivery Centre, WA 6983. [Western Australian Herbarium, George Street, South Perth] Phone (08) 9334 0500. Fax (08) 9334 0515.

Northern Territory: Northern Territory Herbarium, Conservation Commission of the Northern Territory, PO Box 496, Palmerston, Darwin NT. 0831. Phone (08) 8999 4516. Fax (08) 8999 4527.

Australian Capital Territory: Plant Enquiry Service, Australian National Botanic Gardens, GPO Box 1777, Canberra, ACT 2601. Phone (02) 6250 9450. Fax (02) 6250 9599.

Weed Control Research Centres
National: South Australia, Victoria, New South Wales, Western Australia
• Cooperative Research Centre for Weed Management Systems based at University of Adelaide, Waite Campus, PMB 1, Glen Osmond SA 5064 and including participants in several states. crcweeds@waite.adelaide.edu.au ; weeds@agric.nsw.gov.au

Queensland
• Department of Natural Resources (DNR) Alan Fletcher Research Station (27 Magazine St., Sherwood Q 4075) is a research centre for weed control in southern Queensland.
• DNR Charters Towers Tropical Weed Research Centre (PO Box 187, Charters Towers Q 4820) is a research centre for weed control in northern Queensland.
• Cooperative Research Centre for Tropical Pest Management Gehrmann Laboratories, University of Queensland, St.Lucia
6: Internet Resources (including resources external to Australia)

To err is human but to really foul things up requires a computer
Anonymous: Farmers’ Almanac for 1978

The World Wide Web is a growing source of information with a wide range of reliability and veracity. Sites are continually being added, modified and deleted (abandoned?) with the passing of time. Thus, the sites included in this document are not, and cannot be, an exhaustive listing. See Wexler et al. (2000) for an extended list of sites covering toxicology as a whole. Poppenga & Spoo (2002) have reviewed internet resources for veterinary toxicologists.

At present, sites with high relevance as information sources for veterinary toxicology in Australia are very few. Those available reflect the dominance of this field by professionals from North America and the emphasis placed on largely human-focused concerns such as carcinogens and environmental contamination by potential intoxicants. The lack of large volumes of easily accessible technical information may reflect the relatively early stage of development of web use by the profession and the lack of control available over intellectual property.

There are two basic avenues for current access to toxicological information through the World Wide Web –
- specific sites (some listed below) not charging fees for access, or
- access to the scientific literature through on-line bibliographic databases charging fees for access and use

It has been suggested that the refereed scientific (scholarly) literature should, can and will be made available free online through the establishment of e-print archives by scholarly institutions. See Harnad S (2001) How and why to free the give-away research literature. Freeing the scholarly and scientific research literature online through author/institution self-archiving. (Keynote Address) Information Online 2001 [text available at http://www.csu.edu.au/special/online2001/papers/keynote_harnad.htm]

World Wide Web literature search databases

PubMed (free access)
Provides access to MedLine, a bibliographic database of the medical literature (including veterinary literature) developed by the US National Centre for Biotechnology Information at the National Library of Medicine, located at the National Institutes of Health.

TOXNET
http://toxnet.nlm.nih.gov/servlets/simple-search
Search interface providing access to the TOXNET system of databases on toxicology, hazardous chemicals, and related areas. TOXNET is sponsored by the US National Library of Medicine, through the Toxicology and Environmental Health Information Program of its Specialized Information Services Division. Toxicology Data Search - Select and search any of the following files containing factual
information related to the toxicity and other hazards of chemicals: HSDB (Hazardous Substances Data Bank), CCRIS (Chemical Carcinogenesis Research Information System) from the National Cancer Institute, and GENE-TOX (Genetic Toxicology/Mutagenicity Data Bank) and IRIS (Integrated Risk Information System) both from the Environmental Protection Agency (EPA). Toxic Releases (TRI) Search - Select and search any of the Environmental Protection Agency's (EPA) TRI series of files (beginning with TRI87) containing data on the estimated quantities of chemicals released to the environment or transferred off-site for waste treatment, as well as information related to source reduction and recycling. Toxicology Literature Search - Select and search any of the following bibliographic files, consisting of citations to the scientific literature: DART (Developmental and Reproductive Toxicology) and its backfile ETICBACK, and EMIC (Environmental Mutagenesis Information Centre) and its backfile EMICBACK.

**TOXLINE**


http://www.medscape.com

Toxline through Grateful Med and the US National Library of Medicine provides bibliographic information on biochemical, pharmacological, physiological and toxicological effects of drugs and chemicals reported in humans, domestic and laboratory animals and wildlife.

**World Wide Web free access sites**

**Poisoning Management, Clinical Toxicology Synopsis & Core Data from Toxicology for Australian Veterinarians** by R.A. McKenzie: Extracts from Veterinary Clinical Toxicology Course Notes, University of Queensland School of Veterinary Science

http://www.library.uq.edu.au/

To access the material from the above address, click on Course Materials, then Veterinary Science, then VETS4005 – Lecture Notes.

This document is Copyright (© R.A. McKenzie). It includes the basic material presented in the course. Access to the source document, Toxicology for Australian Veterinarians, is through the author. Currently, it is not commercially available.

**National Registration Authority for Agricultural and Veterinary Chemicals (Australia)**


**National Residue Survey (Australia)**


Conducted by the Commonwealth government department responsible for agricultural aspects of trade (whatever the name of the instrumentality happens to be in any given year – currently Agriculture, Forestry and Fisheries – Australia [Commonwealth Department of]).

**Infopest [database of all registered Agricultural & Veterinary Chemicals in Australia]**


Launched 2001, material available limited compared with the CD-ROM version (q.v.) but being expanded. Maintained by DPI Queensland

**ASPCA National Animal Poison Control Centre (USA)**

http://www.napcc.aspca.org/

A division of the American Society for the Prevention of Cruelty to Animals and affiliated with the University of Illinois (Urbana-Champaign) College of Veterinary Medicine

888-426-4435 Fee $US45 per case; credit cards only; no extra charge for follow-up calls (within USA only?)

**ToxicologyOnline.com (USA)**

http://www.toxicologyonline.com

Centred at the College of Veterinary Medicine of Michigan State University, USA, launched in March 2000 and under continuous development. Provides linkage to commercial services in toxicology with emphasis on environmental toxicology. Claims world-wide coverage, but currently dominated by North American material. A directory of poison control centres is included (Currently, coverage of Australia
is incomplete). The site contains links to other toxicology sites including specifically veterinary toxicology sites. Includes a bulletin board for public access to toxicological expertise.

**American Board of Veterinary Toxicology**
http://www.abvt.org/
Certifying organisation for veterinary toxicologists. The site includes toxicological profiles.

**American Academy of Clinical Toxicology**
http://www.aactox.org

**American Association of Poison Control Centres**
http://www.aapcc.org

**American Association of Veterinary Laboratory Diagnosticians**
http://www.aavld.org

**Massachusetts Poison Control Centre**
http://www.mapoison.org
Provides access to old Clinical Toxicology Reviews (brief reviews of specific toxicants)

**Food Animal Residue Avoidance Databank [FARAD] (USA)**
http://www.farad.org/
e-mail enquiries: FARAD@ncsu.edu or FARAD@ucdavis.edu
888-873-2723
Information on animal drugs and chemicals with the potential to cause food-bourn residues. Includes information on withdrawal times.

**Bad Bug Book - USFDA-CFSAN (Centre for Food Safety & Applied Nutrition)**
http://www.cfsan.fda.gov/list.html
Includes information on a number of food-bourn natural toxins

**National Pesticide Telecommunications Network (USA)**
800-858-7877
Sponsored by EPA and Oregon State University
Provides information about pesticide products and poisonings, toxicology, environmental chemistry, and other pesticide-related issues.

**EXTOXNET (Extension Toxicology Network) (USA)**
http://ace.ace.orst.edu/info/extoxnet/ghindex.html
Pesticide information profiles +
Based at the Oregon State University. Run co-operatively by University of California-Davis, Oregon State University, Michigan State University, Cornell University, and the University of Idaho.

**ToxFAQs: Agency for Toxic Substances and Disease Registry (USA)**
http://atsdr1.atsdr.cdc.gov/toxfaq.html
Hazardous substance fact sheets relating to hazardous waste sites

**Environmental Contaminants Encyclopaedia (US National Parks Service)**
http://www1.nature.nps.gov/toxic/index.html

**Material Safety Data Sheets (Where to find MSDSs on the internet)**
http://www.ilpi.com/msds/

**MSDS Search 2001**
http://www.msdssearch.com
National Toxicology Program (USA)
http://ntp-server.niehs.nih.gov/
Report on Carcinogens – lists substances recognised or reasonably suspected to be human carcinogens and to which the public may be exposed in the USA.

Environmental Protection Agency (USA) Carcinogenic Pesticides
http://www.epa.gov/pesticides/carlist/

Society of Toxicology (USA) – Sites of interest
http://www.toxicology.org/Sites/sites-body.html

Toxicology Links [University of Kentucky Library]
http://www.uky.edu/Subject/toxicology.html

The Lead Advisory Service (Australia)
http://www.lead.org.au
Based in Sydney. Freecall 1800 626 086. Provides information on effects and prevention including lead test kits.

IPCS INCHEM
http://www.inchem.org/
IPCS INCHEM is a tool for those concerned with chemical safety and the sound management of chemicals. Produced through cooperation between the International Programme on Chemical Safety (IPCS) and the Canadian Centre for Occupational Health and Safety (CCOHS). IPCS INCHEM directly responds to one of the Intergovernmental Forum on Chemical Safety (IFCS) priority actions to consolidate current, internationally peer-reviewed chemical safety-related publications and database records from international bodies, for public access.
IPCS INCHEM provides access to searchable full-text documents on chemical risks and the sound management of chemicals, helping countries fulfil their commitments under UNCED's Agenda 21, Chapter 19.
IPCS INCHEM contains the following:

• CIS Chemical Information (ILO/CIS)
• Concise International Chemical Assessment Document (CICADS)
• Environmental Health Criteria (EHC) monographs
• Health and Safety Guides (HSGs)
• International Agency for Research on Cancer (IARC) - Summaries and Evaluations
• International Chemical Safety Cards (ICSCs)
• IPCS/CEC Evaluation of Antidotes Series
• Joint Expert Committee on Food Additives (JECFA) - Monographs and evaluations
• Joint Meeting on Pesticide Residues (JMPR) - Monographs and evaluations
• Pesticide Data Sheets (PDSs)
• Poisons Information Monographs (PIMs). The Poisons Information Monographs include industrial chemicals, pharmaceuticals and natural toxins including some poisonous plants and fungi
• Screening Information Data Set (SIDS) for High Production Volume Chemicals

Annals of Clinical Biochemistry
http://www.leeds.ac.uk/aeb/annals
Extensive tabulation of therapeutic and toxic concentrations of pharmaceuticals in plasma

Toxikon Multimedia Project
http://toxikon.er.uic.edu/
Human clinical toxicology case discussions & toxidrome summary tables
Guidelines for the interpretation of analytical toxicology results and unit of measurement conversion factors

http://www.leeds.ac.uk/acb/annals/Webwise/Webwise97-1.html

RJ Flanagan (1998) Guidelines for the interpretation of analytical toxicology results and unit of measurement conversion factors. Annals of Clinical Biochemistry 35:261-7. From the Poisons Unit, Guy's and St Thomas' Hospital Trust, Avonley Road, London SE14 5ER, UK. ‘Therapeutic’ or ‘normal’ plasma/whole blood/urine concentrations for humans, as well as the concentrations associated with serious (generally acute) toxicity (if known), for some 700 analytes of toxicological interest are given together with (when possible) relative atomic or formula masses, and mass/amount and amount/mass concentration conversion factors. The paper published in the Journal gives background and supplementary information which should be borne in mind when providing interpretation or using the Web table. Copyright ©1998 Association of Clinical Biochemists.

WWW free-access sites – Poisonous Plants

N.B. Currently, there are no Australian sites useful to veterinarians

US Department of Agriculture Agricultural Research Service [USDA/ARS] Poisonous Plants Research Laboratory Poisonous Plant Reference Database: Reviews of Specific Poisonous Plants
http://www.pprl.usu.edu/newpage31.htm
PPRL Home Page: http://www.pprl.usu.edu/default.htm

U.S. Food & Drug Administration [FDA] Centre for Food Safety & Applied Nutrition Poisonous Plant Database
http://vm.cfsan.fda.gov/~dw/readme.html
The Poisonous Plant Database is a set of working files of scientific information about the animal and human toxicology of vascular plants of the world. The initial files were created in 1994, and are updated periodically. The files in this database are intended only for scientific information exchange.

USDA/ARS Phytochemical and Ethnobotanical Databases
http://www.ars-grin.gov/duke/
http://www.ars-grin.gov/duke/highchem.html
Lists plants with particular chemical constituents. Searchable by chemical name, plant common name and botanical name.

Botanical Dermatology Database [BoDD]
http://www.uwcm.ac.uk/uwcm/dm/BoDD/BoDDHomePage.html
BoDD is an electronic re-incarnation of BOTANICAL DERMATOLOGY by J Mitchell & A Rook, which was originally published in 1979 by Greengrass Ltd, Vancouver [ISBN 0-88978-047-1]. This updated on-line version is made available to you with the kind permission of the original authors.

Poisonous Plant Botanical Resources, Norton-Brown Herbarium, University of Maryland
http://www.inform.umd.edu/PBIO/FindIT/popl.html
Links to numerous web pages with poisonous plants information. Mostly North American orientation.

Atlantic Veterinary College, University of Prince Edward Island (Canada)
http://www.upei.ca/~avc/toxic/toxic.htm
The Veterinary Garden of Poisonous and Medicinal Plants was established in 1996. Displays of plants toxic to various species of animals are found in the garden and are labelled with markers. Many indoor plants also are identified by species and poisonous principle. Booklets containing pictures and information on plants currently planted in the Garden are available in the waiting areas of the Small and Large Animal Hospitals. The web site displays coloured images and very brief information on 45 plant taxa listed for searching by common name. The individual web pages carry the botanical names and plant family name,
toxin(s) contained and clinical effects produced. Images are not large enough or clear enough to be used as identification tools.

**Cornell University - Poisonous Plants**
http://ansci.cornell.edu/plants/plants.html

**University of Pennsylvania - Poisonous Plants**
http://cal.nbc.upenn.edu/poison

**Canada - Poisonous Plants**
http://sis.agr.gc.can/pls/pp/poison?p_x=px

**North Carolina - Poisonous Plants**
http://www.ces.ncsu.edu/depts/hort/consumer/poison/poison.htm

**Oklahoma State University - Poisonous Plants**

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**WWW free-access sites – venoms & envenomation**

**Ixodes holocyclus** biology and envenomation management (Australian site)

**International Venom & Toxin Database (Australian-based Site)**
http://www.kingsnake.com/toxinology/
Data on snakes, lizards, amphibians, arthropods (scorpions, spiders, paralysis ticks, ants, bees, wasps, beetles, centipedes, millipedes, insects causing allergies), coelenterates (box jellyfish, bluebottles), molluscs (blue-ringed octopi, cone shells), leeches & platypus. Australian, Asian, African and American species covered.

**Australian Venom Research Unit**
http://www.pharmacology.unimelb.edu.au/PHARMWWW/avruweb/Page1.htm

**Cone shells & conotoxins**
http://grimwade.biochem.unimelb.edu.au/cone/
http://grimwade.biochem.unimelb.edu.au/~bgl/content.htm

**Zootoxins - Oklahoma State University**
Information on poisonous plants and zootoxins. Links to other sites with zootoxin information.

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**WWW free-access sites – botanical information**

**Australia’s Virtual Herbarium**
A website organised through the Council of Heads of Australian Herbaria (CHAH) combining databases from all Australian herbariums. Contributing herbariums/organisations are Australian National Herbarium, Queensland Herbarium, National Herbarium of New South Wales, National Herbarium of Victoria, Herbarium of the Northern Territory, Western Australian Herbarium, Tasmanian Herbarium, State Herbarium of South Australia and Australian Biological Resources Study. By 2001, just over 40% of specimens housed in Australian herbariums have been databased. Queensland Herbarium is fully databased (HERBRECS). This site is under construction. Projects include
- an on-line species distribution mapper planned for 2002
- tools to collate an integrated national census and nomenclator of current and historic names by 2003
- priority plant groups databased by 2004
- incorporation of enhancements such as images, descriptions and identification tools to commence by 2005
- completion of data capture and validation of the 6 million specimens in Australian herbariums by 2006

**Australian Plant Name Index (Botanical Names)**
http://www.anbg.gov.au/cgi-bin/apni
A website maintained by the Australian National Botanic Garden, Canberra. It allows searches of botanical names and provides information on current correct names, authorities and relevant taxonomic publication details. Photographs of some taxa are available for viewing on-line.

**Common Names of Australian Plants**
A website maintained by the Australian National Botanic Garden, Canberra. It allows searches of common names of Australian plants and provides botanical names. Photographs of some plants are available for viewing on-line.

**Families of flowering plants**
http://biodiversity.uno.edu/delta/

**WWW free-access sites - weeds**

**Weeds Australia**

**CRC for Weed Management Systems (Waite Institute, SA)**
http://www.waite.adelaide.edu.au/CRCWMS/

**Weeds List (Australia & International)**

**Weedbuster Week**
http://www.weedbusterweek.info.au/

**Invasive Garden Plants**

**WWW free-access sites – water quality**

**Australian and New Zealand Guidelines for Fresh and Marine Water Quality**
WWW free-access sites - cell biology

National Centre for Biotechnology Information Digital Biomedical Library

WWW Subscription sites

Veterinary Information Network (VIN)
http://vin.com
USA-based site run by veterinarians. Subscribers (ca. SUS450 annually) have access to resources including a subscriber-searchable literature database and to consultants in a range of fields including toxicology. Toxicology consultants at time of inspection of the site [28 Aug 01] included well-respected diplomates of the American Board of Veterinary Toxicology.

Clinical Toxicology Resources (Women’s & Children’s Hospital & University of Adelaide)
http://www.toxinology.com/
Australian-based site with the aim of world-wide coverage of envenomations and intoxications of humans. Annual subscription $A198 (including GST). Covers snakes, spiders, scorpions, marine organisms, fungi (mushrooms), poisonous plants. Coverage of plants and fungi is apparently very limited at time of inspection (September 2002).

On-line Bibliographic Databases providing access to the veterinary toxicological literature

Access for those working in scientific institutions such as universities, CSIRO and Departments of Agriculture/Primary Industries is through their in-house library services. Programs such as WINSPIRS and WEBSPIRS are used for access to some databases. The main databases with useful material include

- CAB ABS, CAB Health or combined into CAB Direct – originally the Commonwealth Agricultural Bureaux, now CAB International, publishers of Index Veterinarius and The Veterinary Bulletin; based in the UK. Electronic database back to 1973. [Note: CAB Direct annual single site subscription (up to 4 concurrent users) = £4,100.00 @ 27Nov2000]
- animalscience.com is a recent product from CABI Publishing providing access to CAB ABS databases with linkage to full-text articles plus other features and available at http://www.animalscience.com/content/html/index.htm Individual annual subscriptions = £125.00.
- AGRICOLA – based in the USA

The full text of scientific papers in an increasing number of journals are available on-line and many are linked to the database listings, providing rapid access to the primary literature through hypertext links.

Access for independent veterinarians is problematic, given the requirement to pay for access. The Post-Graduate Foundation in Veterinary Science in the University of Sydney is developing links to the databases through the University of Sydney Library that will be available to individual veterinarians.

VEIN - The University of Sydney Faculty of Veterinary Science, Post Graduate Foundation in Veterinary Science Library and the Veterinary Science Foundation will be working in partnership to develop a new service called the Veterinary Education and Information Network (VEIN). VEIN will provide information services to veterinary and animal scientists in Australasia. The service will promote information literacy and access for its client group to foster lifelong learning and professional development. Access to Research Databases and Indexes (available now), Journal indexing and abstracting services will be accessible via the VEIN website. Links to free services such as PubMed and Agricola will be provided along with passworded access to the subscription based CAB Abstracts and Medline for Post Graduate Foundation in Veterinary Science (PGFVS) Associate Members. CAB Abstracts and Medline is provided via the OVID interface, which allows the user to set up automatic current awareness profiles (AutoAlerts) to receive details of new research in their area of interest via email. To receive a password send your details via email to vein@library.usyd.edu.au
To read more information on the service access the following link:
http://www.library.usyd.edu.au/VEIN

**Internet Veterinary Toxicology Discussion List – VETTOX-L**

Access to this discussion group is only by subscription through a moderator and is open to veterinarians, chemists and others with a professional involvement in veterinary toxicology. Members are mostly North American, but include Australians, Europeans and Africans as active participants. Enquiries should be made to Prof. Merl Raisbeck, Wyoming State University raisbeck@uwyo.edu or Dr. Frank Galey, Wyoming State University FGaley@uwyo.edu.

References
Regulatory Control of Poisons: The Schedule of Drugs and Poisons

Scheduling of drugs and poisons is intended to aid the effective control of dangerous chemical substances in the community so that the benefits of their use outweigh the potential damage that their use may cause. A standard for the uniform scheduling of drugs and poisons is proposed by the National Drugs & Poisons Schedule Committee (2000) in the interests of uniform scheduling across all State and Territory jurisdictions in Australia and New Zealand. These schedules are described below. The legal power to control drugs and poisons lies with State and Territory governments. Their legislation should be consulted for details.

Drugs and poisons are grouped into schedules that each require similar regulatory controls over their availability to the public. The choice of schedule for a particular substance is based on factors including toxicity, purpose of use, potential for abuse, safety in use and the need for the substance. Nine schedules are available, eight of which are currently used.

Within each of the following groups of schedules, the higher the number of the schedule, the stricter the control. Poisons for therapeutic use (drugs) are included in Schedules 2, 3, 4 and 8. Agricultural, domestic and industrial poisons are included in Schedules 5, 6 and 7. Schedule 9 contains substances that should be available only for medical and scientific research. Appendices to the standard include a list of substances or preparations, the sale, supply or use of which should be prohibited because of their dangerous properties (Appendix C). Inclusion of a substance in the schedules does not imply current availability.

Schedule 1. This schedule is currently not in use.

Schedule 2. Pharmacy Medicine. Substances, the safe use of which may require advice from a pharmacist and which should be available from a pharmacy or, where a pharmacy service is not available, from a licensed person.

Schedule 3. Pharmacist Only Medicine. Substances, the safe use of which requires professional advice, but which should be available to the public from a pharmacist without a prescription.

Schedule 4. Prescription Only Medicine, or Prescription Animal Remedy. Substances, the use or supply of which should be by or on the order of persons permitted by State or Territory legislation to prescribe and should be available from a pharmacist on prescription.

Schedule 5. Caution. Substances with a low potential for causing harm, the extent of which can be reduced through the use of appropriate packaging with simple warnings and safety directions on the label.

Schedule 6. Poison. Substances with a moderate potential for causing harm, the extent of which can be reduced through the use of distinctive packaging with strong warnings and safety directions on the label.

Schedule 7. Dangerous Poison. Substances with a high potential for causing harm at low exposure and which require special precautions during manufacture, handling or use. These poisons should be available only to specialised or authorised users who have the skills necessary to handle them safely. Special regulations restricting their availability, possession, storage or use may apply.

Schedule 8. Controlled Drug. Substances which should be available for use but require restriction of manufacture supply distribution, possession and use to reduce abuse, misuse and physical or psychological dependence.

Schedule 9. Prohibited Substance. Substances which may be abused or misused, the manufacture, possession, sale or use of which should be prohibited by law except when required for
medical or scientific research, or for analytical, teaching or training purposes with approval of Commonwealth and/or State or Territory Health Authorities.

Reference:
National Drugs & Poisons Schedule Committee (2000) Standard for the Uniform Scheduling of Drugs and Poisons No.15. [Effective date – 1 July 2000], Commonwealth Department of Health and Aged Care, Canberra.
Collecting and handling plant, fungal and cyanobacterial specimens for identification by state herbariums and other centres of expertise

Preamble

Diagnostic investigations: If plant, fungal or cyanobacterial specimens are collected as part of an investigation of animal disease that involves sending specimens from animals to a veterinary diagnostic laboratory, include the plant, fungal or cyanobacterial specimens with these. The diagnostic laboratory will send them on to other centres of expertise for identification as needed, and the data will then be effectively integrated into the whole investigation.

Legal requirements: Collection of plant specimens from private property requires the permission of the owner. Collection of plants from public land (road or rail reserves, state forests, national parks or other nature reserves) requires the prior written permission of the responsible authority. Collection of rare or endangered plants from both private and public land requires the prior written permission of the responsible authority.

1. Conventional Technique for Vascular Plants – dried fertile specimens

This section is based on advice from the Queensland Herbarium (Anon. 2000; A Holland, personal communication 2000; MB Thomas, personal communication 2001).

1.1 What to collect

Botanists require fertile specimens if they are to make a definitive identification of a plant. Fertile specimens are those carrying flowers, fruit or both for flowering plants and the reproductive structures for non-flowering plants such as ferns and cycads.

For flowering plants in general, a specimen should comprise a small branch or part of the stem about 20-30 cm long with leaves plus flowers, fruits or both, all still attached. It is difficult and sometimes impossible to identify plants from leaves alone.

Specimens from certain types of plants need to have particular material in them and information with them to allow accurate identification:

- From Eucalyptus spp., collect specimens bearing flower buds, seed capsules, adult leaves (and juvenile leaves if available). Information about the bark type at the base of the tree and its extent and the bark type on the upper branches is very necessary.

- From Solanum spp., collect specimens bearing fruits as well as flowers.

- From Xanthorrhoea spp. (grass trees), collect a whole leaf showing the shape of the leaf base and a portion of the flower spike including the base and attachment onto the stem (scape), measure the lengths of both the flowering spike and non-flowering scape (the ratio of scape to flowering spike length is an important identification character), measure the height of the trunk if present, describe the leaf colour (e.g. blue-green, greyish, green).

- For small plants, grasses and sedges, collect the whole plant including underground roots, runners, stems, bulbs or tubers. Both flower heads and the base of the plant are needed.

- For grasses, the base of the plant and the flower or seed head are essential for identification.

- For ferns (other than tree ferns), collect the fertile (spore-bearing) fronds with a sample of the rhizome (root-like structure) attached together. The scales or hairs at the base of tree-fern frond stalks are essential for identification. These can be collected by slicing off a sliver of the outer stem (with scales attached) with a knife.
• For large leaves (e.g. palms or cycads) or flower heads, collect the uppermost (apical) and lowermost (basal) portions of the leaves or heads, measure the overall dimensions and report this with the specimens.

Enough material should be collected to make at least 2 sets of specimens with the duplicates numbered identically and numbers attached to the specimens. Send one set to the veterinary laboratory or the herbarium (depending on the type of investigation being done) and keep one for your future reference so that you can match the name provided by the herbarium to the appropriate plant. Thoroughly dry the specimens that you keep and take precautions to prevent insect damage to them. Eventually, specimens unprotected from insect attack will be destroyed by such insects as booklice and tobacco beetles.

1.2 Data to be recorded at the time of collection and sent with specimens
• Date of collection
• Details of the locality. The latitude and longitude are the ultimate locality record (GPS), but acceptable alternatives are the distance and direction from the nearest township or road junction (e.g. 15 km west of Roma on the Warrego Highway). The data should be detailed enough to allow another person to return to the same locality to find the plant.
• Data that are not visible from the specimen or that cannot be deduced reasonably from it. Coloured photographs may be useful for some of these purposes, but are not always an adequate substitute for careful written descriptions. These data include the
  ◆ type and growth habit of the plant (e.g. upright, drooping, spreading, multi-stemmed)
  ◆ height
  ◆ flower colour
  ◆ bark type
  ◆ situation (e.g. in pasture, on a stream bank, in open forest)
  ◆ surrounding vegetation
  ◆ soil type

1.3 Drying
All specimens must be dried to preserve the plant tissues, help keep their colour and prevent them becoming mouldy.

Drying can be done by placing the plant specimen between several sheets of newspaper and replacing the sheets daily for about a week until drying is completed. The specimens must be kept flat during drying so that they will not shrink and become distorted. A flat piece of plywood, chipboard or Masonite can be placed over the paper and weighed down with a heavy object such as a large book or a brick.

Delicate plant parts, such as petals, may stick to the paper used for drying and accidentally become detached or torn when drying paper is changed. To prevent this, it is acceptable to place such parts between sheets of facial tissue (e.g. Kleenex®) and leave the tissue adherent to the plant part when transferring the specimen to fresh paper during drying.

The plant parts of some species may fall off the main specimen while drying. Keep these in an envelope and send them with the main specimen, also clearly marked with the specimen’s number.

Fleshy specimens such as large fruits do not dry easily and are distorted if pressed flat. These should be preserved in alcohol such as methylated spirits or photographed in colour.

Succulent plants are difficult to dry successfully. Try crushing them to break the cuticles. Some species, such as Bryophyllum spp., will continue leaf and plantlet growth while in a plant press. Stopping this requires killing the tissues by some suitable means (boiling water, microwave oven).

Plants, particularly flowers, often change colour during drying. This is natural and cannot be prevented. Note the original colour of leaves, flowers and fruit and send this information to the herbarium with the specimens.
1.4 Labelling
Number the sets of specimens clearly, the duplicate specimens from each plant carrying the same number. Small blank price tags attached to a thread which may be tied to the specimen are useful for this task. Alternatively, tape the numbered tag to the base of the stem of the specimen. The number will be quoted in the report on the specimens from the herbarium.

1.5 Packing
Do not send fresh plants to herbariums in plastic bags. They allow condensation and promote mould and bacterial growth on specimens, rendering them rotten and unidentifiable. Dry the specimens, or (if urgent) pack the specimens well with newspaper before sending them (This is not recommended for very moist specimens).

Pack dried specimens flat in newspaper between sheets of cardboard to prevent crushing and breakage during transport. Do not use sticky tape to secure the specimens to the paper because you may cover and obscure some essential feature needed for identification.

Include a cover note with your name and address, the information requested from the herbarium and the extra data recorded about the plants as described above.

2. Rapid Technique for Vascular Plants – electronic data transfer
This section is based on advice from Ailsa Holland, Queensland Herbarium (A Holland, personal communication, 2000).

Note well! This method is not a substitute for a definitive identification based on a conventional pressed dried specimen submitted as above. If you use this method, subsequently press and dry the specimen as above and submit it for confirmation of the rapid identification.

2.1 Applications
When a rapid identification is required, an image of the plant in question can be generated and transmitted to a herbarium for a rapid tentative identification. This approach depends on the availability to the submitter of either a photocopier and a facsimile machine or a flat-bed scanner and computer with an e-mail connection and the willingness of the herbarium to provide an identification from this material. Check with your local herbarium before using this method.

2.2 Specimen and data collection
Follow the protocol set out under sections 1.1 and 1.2 above

2.3 Method
Photocopy or scan the plant specimen carefully, ensuring that any reproductive structures are not obscured by leaves. Then either fax or e-mail the image to the herbarium with the data collected on it, requesting an identification (if possible).

When using a colour flat-bed scanner, a blue background (a sheet of blue paper or card placed over the specimen on the scanner glass) may give best results. Pay attention to the size of the electronic file generated, as these are likely to be very large. Saving such files in JPEG format will tend to reduce their size without undue loss of resolution.

3. Fungi (macrofungi = “mushrooms”, “toadstools”)
Data in this section are based on Hay & Young (1988) and Bougher & Syme (1998) with further input from Megan Thomas, Queensland Herbarium (MB Thomas, personal communication (2001).

CAUTION: Not all herbariums provide an identification service for fungi. It is wise to contact your local herbarium for advice before submitting specimens.

3.1 What to collect
Collect the whole fruiting body intact (do not cut the stalks) and place it in a paper bag or twist of paper to protect it. If specimens of differing ages of the same species are available, collect a range of them. Collection may involve digging the structure from the soil or cutting out a section of the wood or
other substrate supporting it. If more than one species is collected at the same time, it is vital to keep them separately wrapped to prevent cross-contamination of spores. If the only specimen available has been partly eaten by the patient, collect that – it may retain sufficient structure for identification. Because dried specimens of fungi do not retain the shape or colour of the material at the time of collection, coloured photographs or sketches of the specimen can be a useful aid to identification. Ideally, these should show young, mature and old specimens, some in longitudinal section, and should contain a scale graduated in millimetres or a standard object (e.g. small coin) to indicate the size of the fungus. Some species of fungi disintegrate rapidly and do not dry well. For identification of these, photographs or sketches with notes on the colour or colours of the various parts of the specimen are essential.

CAUTION: Always wash your hands thoroughly after handling fungi.

### 3.2 Data to be recorded at the time of collection and sent with specimens

See 1.2 above

A checklist of data useful to the mycologist for identification of “mushroom”-type fungi follows: It can be adapted for use with other types of fungi.

- Date of collection
- Location
- Habitat (under eucalypts, in pasture, in garden, etc.)
- Surrounding vegetation (common plants nearby)
- Substrate (wood, soil, leaf litter, etc.)
- Occurrence (single, in clusters or groups?)
- Shape of cap (conical, convex etc.)
- Colour of cap
- Scales present on cap?
- Cap slimy?
- Does fungus change colour if cut? If so, what is the new colour?
- Colour of gills?
- Stem ring present?
- Cup present on the stem base?
- Stem slimy?
- Colour of stem
- Describe odour
- Describe taste if known [Caution: Persons liable to asthma or allergy may have these ailments triggered by tasting fungi. Taste may be assessed by placing a very small portion on the tongue and spitting it out after tasting. Do not swallow any.]
- Any changes in colour following handling?
- Any other observations
- Sketch of fruiting body (including cross-section if possible)

### 3.3 Handling, Spore-printing & Drying

CAUTION: Always wash your hands thoroughly after handling fungi.

Clean off excess soil and debris, being careful not to remove any delicate structures such as veils or any attached mycelium at the base. Avoid freezing, bruising, breaking or squashing specimens. Collect the specimens into paper bags. Do not use plastic bags or containers. Keep specimens cool, but do not refrigerate them if a spore print is to be made. If the specimen can be transported to a herbarium swiftly, do this. If there will, or could be, a delay in submitting the specimen to a herbarium, make a spore print (if applicable to the type of fungus collected) and dry the specimen before transporting it.

Spore printing: Make a spore print of all mushroom, bracket, coral and club fungi to determine the colour of spores and to provide a sample for microscopic examination. Place a mature cap, spore-bearing structures (gills, pores) down, onto white paper. Cover the preparation to prevent desiccation and air movement. Spore deposition may take from 1 hour to overnight. Record the colour of the spore print as soon as possible as it may change on drying and after storage. Dry the paper carrying the spore
print, then fold it in half with the spore deposit facing inwards. Store in an envelope (or zip-lock plastic bag, but only if thoroughly dry).

**Drying:** Before drying, cut one or two fruiting bodies of mushroom-like fungi in half longitudinally; cut all truffle-like fungi in half. Air-drying is preferable to freeze-drying and significantly superior to preservation in liquid fixatives. Placing a specimen in good air circulation in the sun for about 2 days in warm, low-humidity weather or in the airflow from an electric hair dryer are two methods suggested by some mycologists. Heating overnight at 45-50°C in a drying cabinet is ideal. Drying can also be achieved by placing specimens on a wire mesh over a radiator or fan heater.

3.4 Labelling
See 1.4 above. Label the specimen & spore print of each fungus with the same number.

3.5 Packing
Dried fungi should be placed in crush-resistant containers to protect them from vibration and impact so that they will retain their shape in transit to the herbarium. Include the spore print. Add a small amount of naphthalene or some other insecticidal material to protect the specimen from attack by such insects as booklice. Do not use plastic bags because they trap moisture and lead to the rapid decomposition of the specimens.

Include a cover note with your name and address, the information requested from the herbarium and the extra data recorded about the fungus as described above.

Undried specimens should be delivered to the herbarium as soon as possible after collection.

4. **Cyanobacteria (cyanoprokaryotes, cyanophytes, blue-green algae)**
CAUTION: Ensure that minimal skin contact is made with bloom material. Always wear rubber / latex gloves and adopt normal hygiene precautions such as washing off any splashes and washing the hands immediately after the procedure.

Samples of cyanobacteria from suspected poisoning incidents should be submitted to laboratories equipped for toxicity testing. These are usually the regional veterinary laboratories maintained by or on behalf of state departments of agriculture/primary industries or laboratories within universities. Some herbariums provide an identification service for these organisms, but none do toxicity testing.

For identification and toxicity testing, collect the surface scum of the organisms, if present. If there is discoloration of the water (green or red-brown) but no surface scum, collect samples from the worst-affected areas. Two samples are required:

- For identification, preserve a separate 20 ml representative bloom sample by adding 1 ml of 10% formaldehyde solution and submit that with the chilled sample.
- For toxicity testing, fill a 1 litre container with a representative sample of the most concentrated part of the bloom, leaving at least a 25 mm air gap on the top of the container. Submit the sample on ice (not frozen) in an insulated container to arrive at the testing laboratory within 24 hours of sampling.

5. **The fate of specimens**
Do not expect herbariums to return specimens to you. They do not have the time or the funds for this. Most specimens sent to herbariums are discarded a short time after they have been examined and a report provided to the sender. Only those specimens of special interest to the herbarium staff may be retained in the permanent herbarium collection. If you are undertaking research with the plants that may lead to scientific publication, it is essential that you request that the specimens be retained in the herbarium as a voucher and the acquisition number be reported to you for citation in any resulting published papers. McKenzie (1993) discusses the reasons for establishing vouchers.

References
Hay B, Young T (1988) Poisonous Fungi of Australia. Published by the authors, Nanango Q 4315. pp.36 & 36-1

Building the Australian Veterinary Toxicology Knowledge Base

Where do’st thou careless lie,
Buried in ease and sloth?
Knowledge, that sleeps, doth die;
And this Securitie,
It is the common Moath,
That eats on wits, and Arts, and [oft] destroys them both.

Ben Jonson (?1573-1637): First stanza from An Ode to Himselfe

Recording poisoning cases: This means you!
Why should you publish your interesting and unusual cases? Cogent reasons are

- Professional obligation to communicate with colleagues and contribute to our knowledge base. As a veterinarian, you use the knowledge base every day. You have an obligation to contribute to it whenever you can. Case reports compiled from practice records and published in the scientific literature are vital for furthering our knowledge and understanding of poisonings.
- Personal satisfaction from the creative process
- Building communication skills
- Building your curriculum vitae for future job & promotion applications

Vehicles for published case reports include the refereed journals (for example Australian Veterinary Journal, Australian Veterinary Practitioner), AVA Special Interest Group newsletters or periodicals (for example Australian Equine Veterinarian, Australian Cattle Veterinarian), The Veterinary Pathology Report (newsletter of the Australian Society for Veterinary Pathology), and the University of Sydney Post-Graduate Foundation in Veterinary Science Control & Therapy series. The refereed journals provide support for the inexperienced author – try them first and ask their editors for help with your paper.

Basic needs for a meaningful scientific paper:
- Literature search to ensure that your data will make an original contribution to knowledge
- Plant identification supported by a herbarium voucher. Accurate botanical identification of the plants, fungi or cyanobacteria involved is essential. Use the services of your state herbarium (q.v.); tell them that you intend publishing the case; request that they retain the specimen as a voucher for future reference and ask them for the acquisition number to quote in your paper. I have discussed the reasons for voucher specimens in McKenzie (1993).
- Data to rule out differential diagnoses
- Authorship list inclusive of all who made substantial intellectual contributions; acknowledgments section inclusive of all other contributors

Above all, get the data on paper first, then polish it!

Declining institutional research input
Decreasing research on plant (in particular) and other poisonings of animals in Australia carried out by universities, government departments and CSIRO has essentially resulted from contracting resources of finance and staff and an increased concern for the welfare of experimental animals (Baker 2000). This places a greater reliance on accurate field observations to advance knowledge in the absence of experimental investigations.

References: