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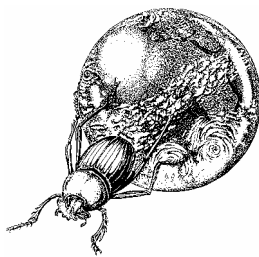
BRITISH & IRISH ASSOCIATION
OF ZOOS & AQUARIUMS

Management Guidelines for the Welfare of Zoo
Animals

**Poisonous or Venomous Reptiles, Amphibians, Fish and
Invertebrates in Captivity**

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Bristol Zoo Gardens

Adopted from “Codes of Practice for the Care of Invertebrates in Captivity: Hazardous Invertebrates”
written by the Terrestrial Invertebrate TAG



Terrestrial Invertebrate Taxon Advisory Group

Mission Statement:

BIAZA is a professional organisation which represents its members and promotes the values of good zoos and aquariums. It leads and supports its members:

- To inspire people to help conserve the natural world
- To participate in effective co-operative conservation programmes
- To deliver the highest quality environmental education, training and research
- To achieve the highest standards of animal care and welfare in zoos, aquariums and in the wild

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Foreword

It is designed to assist those concerned with the care and management of poisonous or venomous reptiles, amphibians, fish and invertebrates (RAFI) in captivity, especially, but not exclusively, in zoos.

This document is based on the *Codes of Practice for the Care of Invertebrates in Captivity; Hazardous Invertebrates* (1993) compiled by D. G. Hughes on behalf of the Zoo Federation. It has been reviewed and recompiled to include reptiles, amphibians, fish and aquatic invertebrates under the auspices of the Terrestrial Invertebrate Taxon Advisory Group (TITAG), the Herpetology Taxon Advisory Group and the Fish and Aquatic Invertebrate Taxon Advisory Group (FAITAG) of BIAZA. BIAZA holds the copyright, but permission will be granted to reproduce in part or whole if a written request is received and a full acknowledgment of the source(s) is given.

As with previous editions, this publication will be up-dated regularly, in order for new information to be added as soon as is possible. Constructive criticism on this publication is always welcome and should be addressed to BIAZA Regent's Park, London, NW1 4RY, or email admin@biaza.org.uk .

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- Richard Gibson of The Zoological Society of London
- Heather Koldewey of The Zoological Society of London
- Warren Spencer of Bristol Zoo Gardens
- Olivia Walter of BIAZA

Disclaimer

Although this publication should be used to advise on the management of venomous and poisonous reptiles, amphibians, fish and invertebrates, no responsibility can be accepted by BIAZA for any liability whatsoever arising from such use.

Introduction

This publication suggests guidelines for collections on the day-to-day care and management of poisonous or venomous reptiles, amphibians, fish and invertebrates (RAFI) species and action in case of bite; it also includes an Incident Emergency Card (see Appendix III).

For the collection considering maintaining these poisonous or venomous species it is hoped that this will provide a basic resource in the establishment of workable procedures and culminate eventually in safe and exciting educational displays. Collections that currently maintain such animals should conduct a review of their practices and develop or fine-tune their working procedures regularly.

These guidelines should also be read by those collections that may never intend to keep such species, but may receive them from the public or other sources from time to time and require some helpful advice.

As a cautionary note, many animals produce poison or venom and individual victims may react in many different ways to an envenomation incident. Even if the person is bitten or stung by a supposedly harmless species, they should be carefully monitored and medical advice sought if required.

Many taxa previously considered unusual are now found in zoos and aquaria and we should be constantly vigilant as to whether they may pose a potential threat. They come from terrestrial, freshwater and marine ecosystems and the variation is certainly considerable, including such species as Gaboon vipers, lion fish, wild-caught poison dart frogs, black widow spiders, fat-tailed scorpions, assassin bugs, cone-shell molluscs, blue-ringed octopus, jellyfish and corals. It is also worth noting that different species have different poison or venom delivery systems e.g. injected delivery, both front-fanged (vipers) and rear-fanged (boomslang) and venom spitting (some cobras).

RAFI taxa offer other dangerous forms of defence other than venom or poison and although not covered in this document, should be recognised and management practices adjusted accordingly. Other forms of defence should be considered are bites or impact injuries resulting from crocodylian restraint techniques, electric shock from electric eels, Theraphosid spiders flick urticating hairs which can be harmful both on direct contact with the skin or through inhalation. Some assassin bugs spray dangerous fluids in to the eyes and can cause both temporary and permanent damage. Caution should also be observed with millipedes, which can both spray and ooze potentially harmful substances. Some crustaceans such as mantis shrimps can inflict a serious wound by beating or hammering with the club-like appendages and crush injuries as may occur with large crabs/lobsters.

What is classified as a 'dangerous' RAFI taxa?

Poisonous or venomous RAFI taxa are included in the classification of dangerous animals in the Zoo Licensing Act 1981 The Secretary of State's Standards of Modern Zoo Practice – Appendix 12, Dangerous Animal Categorisation.

Appendix 12 gives three categories in which species are allocated with regard to the risk they place

- Category '1' (Greater Risk) 1.1-1.4.
- Category '2' (Less Risk) 2.1-2.4.
- Category '3' (Least Risk) 3.1-3.2.

Assistance in interpreting the dangerous animal categories can be found in addition to the above in notes 1 –13 and a basic taxonomic list follows with the allocated category and special risk information.

For example, mangrove snakes *Boiga dendrophilia* has been put in to "Category 1; Special Venom Risk".

Policy

The zoo should have a policy on keeping poisonous or venomous species and it should be clearly visible and include:

- The zoo undertakes to ensure that suitable and sufficient procedures are in place in the event of a poisonous bite or sting through an emergency procedure (see section on emergency procedures) and has the equivalent of the Emergency Incident Card (see Appendix III), both clearly visible and accessible.
- A list of species held that will require hospital treatment in the event of a bite or sting incident clearly visible and accessible.
- It is the responsibility of the zoo that all relevant staff to be aware of and comply with the management procedure (see sections on husbandry, management and keeper safety) and the emergency procedure. It is recommended that the emergency procedure is practiced at the very least once a year.
- Regular risk assessments are carried out. Contact the BIAZA Office for more info.

Records

- It is crucial that up-to-date **animal records** on all RAFI taxa are kept. These records should include accurate identification, enclosure location, births, deaths and husbandry/management notes including names of people working directly with them.
- Up-to-date records of **anti-venin** held with source, date delivered, use-by date and amount in stock readily accessible and updated. See Appendix II for information on anti-venin.
- **Personal Records** should detail name, age, next of kin contact details, allergies (including drugs) and bite/sting history of all staff that work with any RAFI species. These should be stored at a known location, for example with the anti-venin. In the event of a bite or sting, these records should go to the hospital with the victim.
- **Taxa records** describing the taxa and how it bites/stings/spits and what the possible effects on the victim are. These records should be taken with the victim to the hospital.

Husbandry and Management

It is very important that persons working with poisonous or venomous RAFI taxa understand, accept and adhere to a working/management procedure that takes in to consideration the following points.

- All enclosures must be clearly labelled with the scientific name and 'Venomous/Poisonous Species' in red.
- Terrestrial species should have a secondary space around the tank for the animal to escape in to. For species in an enclosure, there should be a two door system. Management areas should be kept clear so escaped animals can be seen.
- Specimens in tanks should be kept in a secure unit, such as a locked unit room that is not accessible to unqualified staff or the public or public area. Doors to enclosures should be locked. These areas must be clearly labelled.
- If working with the specimen outside its enclosure/tank, prepare an area of the service area for the purpose of working with poisonous or venomous species and ensure it is clear and free of potential hiding places.

- Prepare all safety equipment, food, water and other cage requirements before opening the tank/enclosure.
- Indicate to other members of staff that a procedure is being carried out. For example hang a sign displaying 'do not disturb' or 'warning, working with dangerous species' in red outside the relevant area.
- Wherever possible work with one enclosure and one specimen at a time.
- Be aware that poisons or venoms may still be a risk to handlers after the animal is dead.
- Detailed husbandry records of any work carried out must be kept (see Records section).

Keeper Safety

It is very important that persons working with poisonous or venomous RAFI taxa understand, accept and adhere to a working/management procedure. To this end;

- Only trained, named staff should be allowed to work with poisonous or venomous RAFI taxa. Ensure there are enough experienced staff to provide continuous cover throughout the time the collection houses poisonous or venomous RAFI taxa. A list of these people should be available to management involved with staff rotas.
- Ensure training of junior staff is thorough providing a continuity of safe and experience care throughout the time the collection houses poisonous or venomous RAFI taxa.
- More than one person qualified to handle poisonous or venomous RAFI taxa should be on duty at once in case of an accident.
- Staff should be cautious, not cut corners and remain aware of the potential dangers of the animals they are working with at all times.
- Do not work with poisonous or venomous specimens outside working hours, at times of staff shortages, when feeling unwell or nervous.
- Appropriate safety equipment when servicing any poisonous or venomous species must be available and used. These may include long forceps, hooks, gloves, grabs, tubes, safety goggles and deep-sided secondary catchment trays (to prevent an animal escape should there be an accident).
- The relevant senior zoo personnel must be kept up-to-date with the list of qualified staff and the specimens held.
- Safe working/management procedures exist and staff should be assessed on their qualification to work with the relevant species regularly.
- All members of staff on the relevant section must be familiar with the Emergency Procedure and Emergency Incident Card.
- Trained medical staff and senior zoo personnel must be aware of the Emergency Procedure and the Emergency Incident Card.
- A first aid box should be present on the relevant section containing appropriate medical equipment. This should be clearly labelled, accessible and updated as necessary.
- Integrate the Emergency Procedure in to the general zoo emergency protocols.

- Risk Assessments should be drawn up and reviewed regularly, particularly if there is a change in taxa or staff.

Reception of Specimens and Identification

All unseen or unidentified RAFI should be treated as dangerous until a positive identification has been made.

It is advisable to seek a second opinion on the identification of a possibly poisonous or venomous specimen if there is any doubt. Reliable sources include members of TITAG, Herp.TAG and FAITAG, natural history museums and other learned societies.

All persons dealing with the reception of a specimen must be fully aware of the potential hazards and understand the management and accident procedures of that particular collection.

It must be noted that an animal brought to a collection, particularly if from a non-specialist source, may not be in an appropriate container. Therefore a further, appropriate container and tools with which to move the animal and water for re-hydration should be available.

Appropriate safety equipment such as long handled tweezers, gloves, tongs and safety glasses should always be made available.

Transport of a Venomous or Poisonous Reptile, Amphibian, Fish or Invertebrate.

For all transportations refer to the Secretary of State's Standards of Modern Zoo Practice and in particular paragraphs 6.3 and 6.3 a.

By Post

It is **illegal** to send live animals via post unless they are admitted species as detailed in the Universal Postal Convention regulations. Special note must be taken of Article 26 paragraph 6, Article 18 paragraph 1.4 when moving invertebrates. **Do not** advise or imply a third party to send prohibited species by post.

By Air

For detail on the transport of animals by air refer to Chapters 1-12 and appendix A-F of the International Air Transport Association for their live animal regulations.

Establishing an Accident Procedure

The implementation of an accident procedure is likely to differ from one zoo to another so some suggested guidelines to establish such a procedure are set out below.

- Close liaison with the local hospital should be established. This hospital should be aware of species held by the collection and associated information in case of a bite/sting. The medical team responsible for dealing with this type of emergency should have a list of specialists and references to call upon if required (see Appendices I and II).
- An 'Emergency Incident Card' should be displayed near enclosures concerned with copies at an agreed location (such as with the anti-venin). The card must be completed and taken with the patient to the hospital. This is in order to give full details to the doctor in charge of the situation. See Appendix III for the BIAZA Emergency Incident Card.

- Trained, approved staff working with poisonous or venomous species (as defined here) should have Personal Records (see section on records) which must accompany the victim to the hospital.
- Up-to-date anti-venin must be held either at the zoo, hospital or other agreed location - see Appendix I for places that hold anti-venins. The zoo should be responsible for getting the correct anti-venin to the hospital with the patient or at the very least, must check the correct anti-venin is available to the patient once at the hospital.
- It is the responsibility of the zoo staff to carry out procedures as stated on the Emergency Incident Card. It is **NOT the responsibility of zoo staff to administer anti-venin**, this lies with the medical staff at the hospital.
- Make the appropriate arrangements for zoo staff to carry out an agreed emergency protocol in the event of an envenomation (see Emergency Incident Card).

Appendix I; Anti-Venins

Contact below for sources of Anti-venins:

Professor David Warrell

Nuffield Department of Clinical Medicine,
John Radcliffe Hospital,
Headington,
Oxfordshire OX3 9DU
Phone 0186 522 1332
Office 0186 522 0968
Mobile 07785 242 978

Dr David Theakston

School of Tropical Medicine,
University Hospital,
Pembroke Place
Liverpool L3 5QA
Phone 0151 708 9393

Black Widow *Latrodectus* sp.

Merck Sharp and Dohme
Hertford Road, Hoddesdon, Herts EN11 9BU
Tel. 01992 467272

Non-licensed, supplied under the 'named patient' procedure. Provided free of charge on compassionate grounds, normally prompted for replacement by Merck. 3 x 2.5ml vials supplied.

Merck must be informed if any suspected adverse events occur during or after treatment - reply forms are in the venom file.

Munich AntiVenom INdex (MAVIN) www.toxinfo.org/antivenoms gives information on all antivenins and their availability.

Records of Anti-venin should have source, date delivered, use-by date and amount in stock readily accessible and updated.

N.B. The location of the anti-venin should be approved by specialist medical advice and the local occupational health officer.

Appendix II: References and Further Information

National Poisons Information Service (London Centre)
Medical Toxicology Unit, Guy's and St Thomas' Hospital
Avonley Road, London SE14 5ER)
Phone 0870 600 6266

Note Public enquiries must go via **NHS Direct - 08 45 46 47**

Bettinik, S. (ed), 1978. Arthropod venoms. In: *The Handbook of Experimental Pharmacology*. Berlin:Springer Verlag **48**, 977 pp (ISBN 3-45-08228-X)

Chen, Y.L. (ed), 1979. Snake venoms. In: *The Handbook of Experimental Pharmacology*. Berlin: Springer **52**, 1130pp (ISBN 3-540-08709-5)

DETR 03/200. *Secretary of State's Standards of Modern Zoo Practice*.

D.G. Hughes et al 1993. *IWG3/93 Hazardous Invertebrates*.

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Russell, F. E. 1980. *Snake venom poisoning*. Philadelphia: J.B. Lippincott Co, 56 pp (ISBN 0-397-50472-1).

Sutherland, S.K. 1983 *Australian Animal Toxins. The creatures, their toxins and care of the poisoned patient*. Melbourne: Oxford University Press, 527 pp. (ISBN 0-19554367)

Tu, A.T. 1984. Insect poisons, allergens and other invertebrate venoms. In: *Handbook of natural toxins*. New York, Basel Marcel Dekker Inc. New York, **2**:1-732

Worrall, D.A., 1987. Animal poisons. In: Manson-Bahr, P.E.C. & Bell, D.R. (eds) *Mason's Tropical Diseases*. London: Balliere Tindall (19th revised edn), Chp 48 pp. 855-989 (ISBN 0702011878)

Worrall, D.A. 1992 Venomous bites and stings. *Medicine International* pp4529-4533

Munich AntiVenom Index (MAVIN) www.toxinfo.org/antivenoms gives information on all antivenins and their availability.

Appendix III: Emergency Incident Card

To be at hand by all enclosures holding poisonous or venomous reptiles, amphibians, fish or invertebrates. In the case of an incident, this is to be filled in and taken to the hospital together with the victim's Personal Record Card and the correct anti-venin

ACTION BY ZOO STAFF

1. Ensure that the animal (Snake, Lizard, Fish Invertebrate) can not repeat attack and is secured – do not place yourself or others at increased risk.
2. a) if **snake, lizard of invertebrate bite/sting** – rest victim on floor in first aid recovery position.
 b) If **spitting cobra, scorpion or millipede venom to eye** – immediately wash eye with cold running water or saline solution or, if these are unavailable, milk.
 c) If **fish sting** – immediately wash wound site with hot (not scolding!) water then rest the victim on floor in first aid recovery position (continue using hot flannels to cover wound site). **ATTEMPT NO FURTHER TREATMENT: DO NOT SUCK WOUND, SLASH WOUND SITE, APPLY TOURNIQUET, GIVE FLUIDS OR WALK VICTIM. IF FISH STING, DO NOT WASH WITH COLD WATER AS THIS CAN INCREASE DISCOMFORT.**
3. Arrange to get victim to hospital by making a single call to internal switchboard who as pre-arranged will:
 - a) Alert hospital on type of emergency and give estimated time of arrival.
 - b) Request transport from previously designated person or call paramedics.
4. Fetch antivenin from refrigerator (ensure someone is with the patient at all times).
5. Reassure victim and monitor condition – responses, respiration, pulse (see box overleaf).
6. Fetch staff medical card with details of blood group, allergies, etc or look for medical alert cards/medallions carried by victim.
7. Fill in **Incident details above** while victim is in transit and **monitor condition** (See table overleaf)

INCIDENT DETAILS VICTIM OF ENVENOMATION

DATE: TIME:
 NAME: AGE:
 ANIMAL INVOLVED:
 (Common & Scientific Names)
 SITE OF BITE OR STING:
 ANTI-VENIN SUPPLIED:
 Name of Manufacturer:
 AMOUNT OF ANTI-VENIN SUPPLIED (NUMBER OF UNITS/PACKS):
 BATHCODE:
 NAME & CONTACT DETAILS OF ACCOMPANYING PERSON:

CONDITION MONITORING

Admit victim to hospital as soon as possible. The maximum time between bite/sting and admission to hospital, ideally, should be under an hour. In any event, a carefully timed record of changes in condition/response can be very useful to the attending physician.

Time																			
Pulse (per minute)																			
Breaths (per minute)																			
Blood Pressure *																			
Swelling **																			
Fainting/collapse																			
Vomiting																			
Bleeding from gums																			
Eyelids drooping ***																			
Other notes:																			
Name & contact details of recorder																			

* If equipment is available; ** local, at bite/sting site and indicate degree of spread; *** not retracted when victim asked to look upwards

ACTION BY MEDICAL STAFF

1. Follow instructions supplied with anti-venin, additional advice available from **National Poisons Information Service (London Centre)**, Medical Toxicology Unit, Guy's and St Thomas' Hospital, London, SE14 Phone 0870 600 6266: Nuffield Dept of Clinical Medicine, **John Radcliffe Hospital**, Headington, Oxfordshire, Phone: 0186 522 1332 Office 0186 522 0968, Mobile 07785 242 978 (Prof D. Warrell): School of Tropical Medicine, University Hospital, Liverpool L3, Phone 0151 708 9393 (Dr D. Theakston) or consult TOXBASE online at www.spib.axl.co.uk and the Munich AntiVenom INdex (MAVIN) website at www.toxinfo.org/antivenoms
2. Additional anti-venin can be supplied after discussion with the above via (north) University Hospital, Liverpool, phone 0151 525 5980 and ask for pharmacy; or (south) National Poisons Information Service, London, phone 020 7635 9191 (24hr emergency service). See also note 1 below.
3. Fish and other marine venoms are often thermolabile and so are inactivated by heat applications. While heat treatment can continue for 15-20 minutes, it is normally reported that the pain eases in only a few minutes. Do not use water above 45°C (110°F).
4. Ensure follow-up examination of victim in 10-14 days and check for serum sickness.

NOTES

1. Anti-venins. For critical information refer to: Theakston, R. D. g. & Worrall, D. A. 1991. Antivenoms, a list of hyperimmune sera currently available for the treatment of envenoming bites and stings. *Toxicon* **29** (12): 1419-1470. Updated lists of anti-venoms (HN 78.13) are available through the two National Poison Centres (London and Liverpool). Extract copies of these documents should be kept with this card in a conspicuous place near the area(s) of highest risk, together with staff medical cards and any other critical data (see 2,3 below).
2. Poisonous Venomous animals include certain snakes, lizards, amphibians, fish and terrestrial and aquatic invertebrates (coelenterates, echinoderms, molluscs, wasps, ants, scorpions, spiders) as described as Category 1 in the Secretary of States Standards for Modern Zoo Practice and listed in the Dangerous Wild Animal Act, 1976 (reviewed periodically).
3. Management Guidelines for the maintenance of poisonous or venomous reptiles, amphibians, fish and invertebrates in captivity is published by the Zoo Federation. This document provides information on staff training, safety procedures, animal holding, systematic barriers, first aid and medical back-up. Users of this card who are engaged in animal management should be familiar with current best practice and seek advice.

BACKGROUND LITERATURE

- Bettinik, S. (ed), 1978. Arthropod venoms. In: *The Handbook of Experimental Pharmacology*. Berlin:Springer Verlag **48**, 977 pp (ISBN 3-45-08228-X)
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- Oxford Textbook of Medicine, current edition, available to all hospital departments.

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This Emergency Incident Card is published by the BIAZA, Regent's Park, London NW1 4RY (phone 020 7586 0230). The card was originally prepared by Prof G. McG Reid, Mr B. Livingstone, Miss I. McGeorge and Mrs K. King-Sharp, North of England Zoological Society, Zoological Gardens, Caughall Road, Upton by Chester, CH2 1LH in close consultation with potential users and the relevant scientific and medical authorities.

Version 4 – revised July 2004. This card is reviewed and updated regularly, suggestions for improvement are welcome. Please ensure you have the current version and destroy previous copies.