Husbandry Manual For

GIDGEE SKINK

Egernia stokesii

Reptilia: Scincidae

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Western Sydney Institute of TAFE, Richmond
Course Name and Number: Certificate III Captive Animal Management
Lecturers: Graeme Phipps.

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1 Introduction

Gidgee skinks range from 10.5 to 12 inches in length with a stout body and rough edged scales, which are used to help minimize water loss. The tail is about 1/3 the actual size of the body, flat and has very strong spines that prevent the reptile from being dislodged while hiding within rock crevices. Their legs are well developed with five toes; however the fourth toe appears to be longer than the rest. The tongue is oval, flat and contains a mucus secreting membrane. The mucus allows the skink to keep hold of insects it catches. The body colour ranges from olive brown to reddish brown and some may have paler scales with dark edges; some are even black all over. The underside tends to have either white or a creamy yellow coloring. Gidgee skinks live long lives; up to twenty-five years.
Gidgee skinks are relatively new to captivity although they have appeared in private collections for many years, zoos and wildlife parks have been slow to embrace these reptiles as educational and conservational tools.
Information within this manual has been gathered from my own personal experiences in the field studying the gidgee's from my own captive specimens and from many well respected herpetologists.

OH&S

Gidgee skinks are innocuous animals meaning they are low risk.

Zoonotic diseases: Salmonella
Ticks/mites
Ringworm

Wash hands always after working with animals or within exhibits. The use of PPE eg, gloves; masks will reduce the risks of zoonotic disease.

Chemicals that are recommended for use when cleaning
Bleach - used for cleaning water bowls only
Vercon - all purpose-cleaning agent
Repti clean – all purpose cleaning agent
Windex – outside exhibit glass (public area)
Metho – inside exhibit glass
Top of descent - used within cage for mite control: remove all food and water bowl when fumigating cage.
F-10- used to clean all utensils, spray hands between cages, or between animals.
Please refer to appendix for material data sheets on each of the chemicals.

2 Taxonomy

2.1 Nomenclature

Class Reptilia
Order Squamata
Family Scincidae
Genus *Egernia*
Species *stokesii*

2.2 Subspecies

E.s badia
E.s aethiops
E.s zellingi

2.3 Recent Synonyms

None known

2.4 Other Common Names

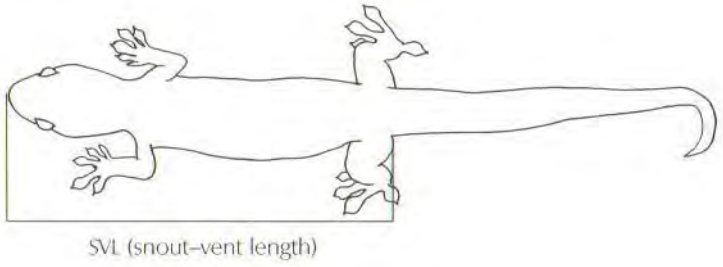
Gidgee
Spiny tailed skink
Stokes skink

3 Natural History

(Biology of the species with particular reference to any details that may be relevant to husbandry in captivity including any research that has been carried out.)

3.1 Morphometrics

3.1.1 Mass and Basic Body Measurements

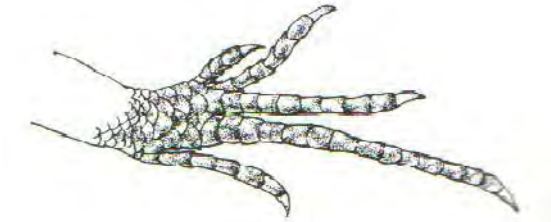


E.s badia (SVL) snout vent length, 194mm
E.s aethiops SVL 158mm
E.s zellingi SVL 180mm
E.s stokesii SVL 180mm (cogger 2000)

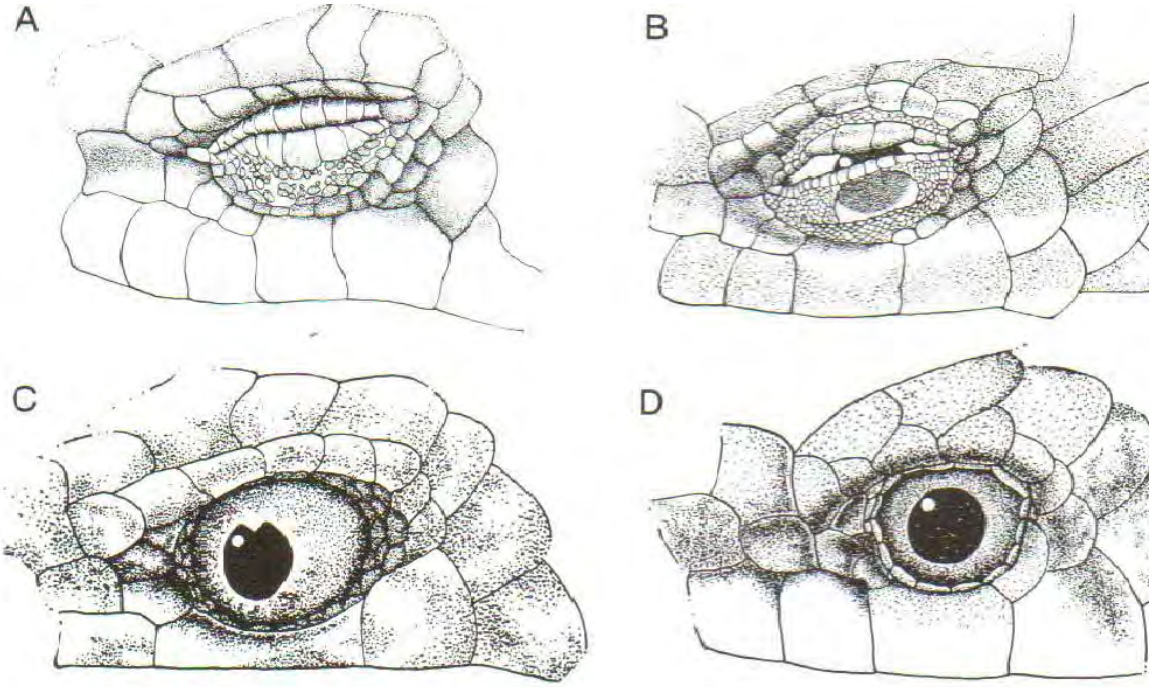
3.1.2 Sexual Dimorphism

Males are slightly larger then females, males have wider and longer tails, and generally the male has a broader head then the female. (Cogger 2000)

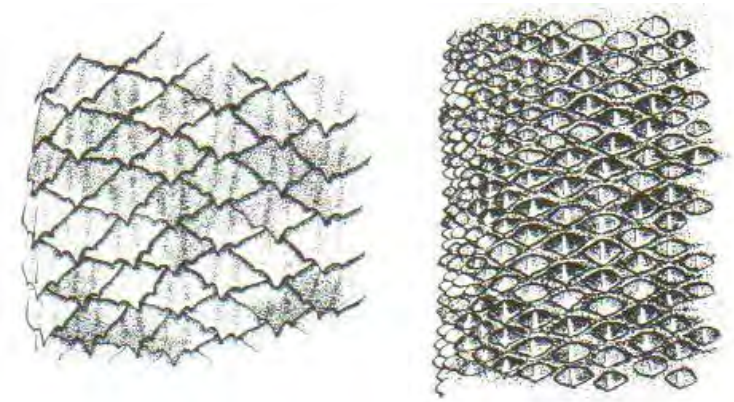
3.1.3 Distinguishing Features



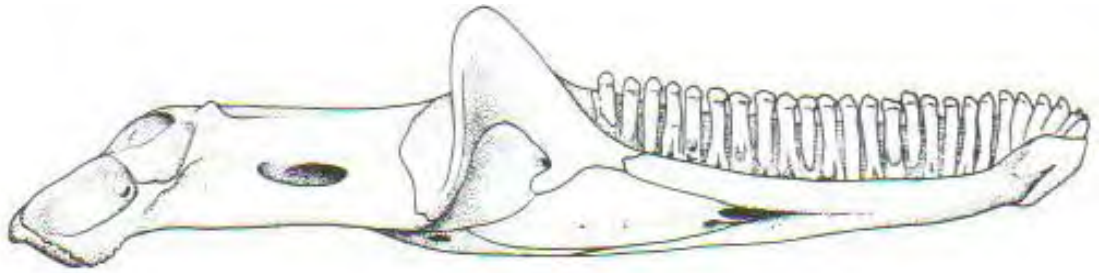
Example of Egernia foot (K.Bowshall Hill)



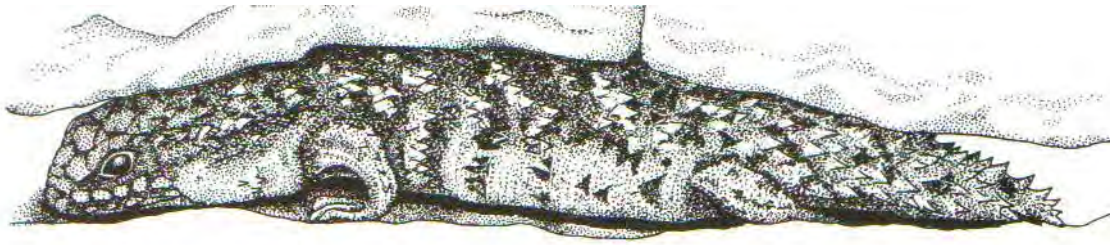
Example of moveable eyelid in skinks (K. Bowshall Hill)



Example of Egernia raised scales (K. Bowshall Hill)



Example of Egernia jaw and teeth structure (J. Thurmer)



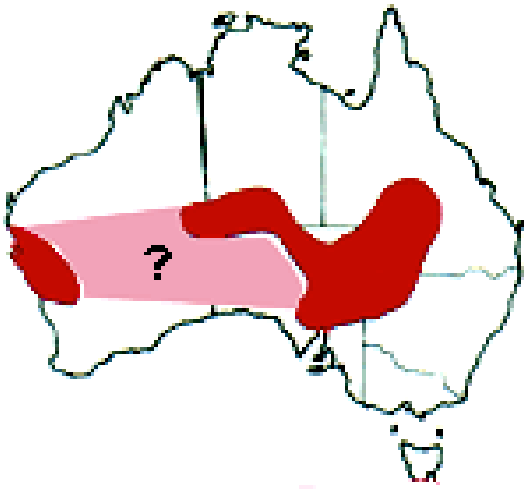
Example of Egernia depressa wedged between rocks escaping predator (M. Cilento)

Egernia stokesii are usually described with these distinguishing features.
Scales in 32-38 rows at midbody, the scales generally with a single, large spinose keel, but the caudals sometimes with a small lateral keel on either side of the enlarged median keel. Base of the tail without a median series of enlarged and expanded upper caudals. 1-4 moderate to rugose ear lobules. 4-7 supracilliars. Post-naira groove conspicuous. Head shields regular, unfragented. Nasals almost invariably separated, occasionally in point contact. Interparietal nearly as wider as the frontal. Subdigital lamellae under the fourth toe 12-20, each smooth or with a blunt median keel, undivided. The tail strongly depressed and about 35% of snout vent length.

Similar species E.depressa, E. cunnighami, E.hosmeri.
E. depressa are smaller SVL of 117mm pale fawn to bright orange-red above, with a series of dark brown to black irregular transverse markings forming obscure cross bands.
E. cunnighami SVL 150mm many variations in colours, tail more or less round in section, tapering gently, about 100% of SVL.
E. hosmeri SVL 180mm the tail round, tapering, about 60% of SVL. A series of pale brown or cream spots and blotches on the head, neck and labials, with a few scattered pale spots and dark brown spots on the back, flanks and limbs and sometimes on the tail. (Harold Cogger 2000)

3.2 Distribution and Habitat

Australia New South Wales
Northern Territory
Queensland
South Australia
Western Australia



Widespread through patchy in dry to semi-arid habitats. E.s stokesii occurs under limestone slabs on Houtman Abrolhos Is off mid-w coast of WA, and Edel land Pen. And Baudin Is., Shark Bay. E.s badia occupies rock crevices and hollow timber in sw. interior of WA and on Dirk Hartog Is., Shark Bay E.s.zellingi lives in rock crevices and hollow timber in estn interior of aust.

3.3 Conservation Status

E.s. badia is endangered (C'wealth; IUCN Red list) rare likely to be extinct (WA)
EN A1c
A taxon is endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the following criteria (A to E):

A) Population reduction in the form of either of the following:

1) An observed, estimated, inferred or suspected reduction of at least 50% over the last 10 years or three generations, whichever is the longer, based on (and specifying) any of the following:

a) direct observation

b) an index of abundance appropriate for the taxon

c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

d) actual or potential levels of exploitation

e) the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.

3.4 Longevity

3.4.1 In the Wild

Gidgee skinks may live between 5-25years. Habitat destruction, predation, illegal collection for pets, bush fires all contribute to a reduction in the populations, this causes a real concern for the survival of these lizards. More study is required so a better understanding of how we can manage the wild populations that are in danger of disappearing forever.

3.4.2 In Captivity

Due to the lack of captive information on the longevity of these lizards one can only speculate they may possibly live for 15-25 years similar to other Egernia species.

3.4.3 Techniques Used to Determine Age in Adults

X-RAYS to determine bone density, can sometimes aid the determination of age in an adult lizard but good record keeping can eliminate any guesswork.

4 Housing Requirements

4.1 Exhibit/Enclosure Design

(General principles, precautions that should be taken and mistakes to avoid)

General principles: There is no standard type of reptile enclosure as the many kinds of reptiles used in captive collections are wide and varied, and each has their own special requirements. First things we need to consider are, is the reptile terrestrial, arboreal, aquatic? What size and sex of the animals we intend to house? Will it be an indoor or outdoor enclosure? What will be the best way to access the exhibit and carry out routine maintenance? How will the public view the animal(s)? How can we educate the public with that animal?
After taking these few principles into account we should look at the precautions we should take to avoid mistakes.

- Consult the Exhibited animals Act; find out the required standards for your animal.

- Make a plan for the exhibit, a concept where the broad design considerations can be examined.

- Talk with keepers/experts in the field, Gaining information from those who have already housed your reptile(s) will help to minimize mistakes.

- Discuss the design with maintenance, engineering and keeping staff. It's always important to get other points of view on how a design will work best.

Consider these features when you're designing a reptile enclosure, such as a Gidgee skink.

- Indoor/outdoor enclosure – What is your preference? Which is more convenient and practical?

- Enclosure size – Standard requirements, number of animals, what sex are they, what size will they grow too.

- Drainage – what substrate will be used, will it affect the drainage of the exhibit. What types of drainage pipes do we need. Can we use a natural slope within an exhibit to benefit the drainage?

- Enclosure materials – Wood, glass, concrete, wire or fly screen.

- Shape of enclosure – terrestrial, arboreal, aquatic.

- Security of enclosure – escape proof, does it keep the public, vermin or predators out.
- Keeper's access – for daily maintenance of exhibit.

- Heating – how will you maintain the enclosures heat sources. Heat rocks/ cords/ mats, globes. What is the animals PBT (preferred body temperature), dose it require heating day or night. What thermal gradient dose it require. What type of thermostat should be used?

- Light cycle – How do you maintain a regular day/night cycle (timers) for your animals. What wattage do you use?

- Substrate – choose a substrate that stays dry, makes removal of faces easy, reduces odors and assists with drainage.

- Shelter – hide boxes, hollow logs, rocks provide shelter shade and security.

- Ventilation – how can you provide good ventilation, dose the room itself have a ventilation system? Will you use ventilation panels, wire tops, or simply drill holes in the side of cage.

- UV – how can you provide uv light? Take animals outside into a sunning cage. Use uv tubes or globes, house the animals outside.

- Environmental enrichment – where do the animals live in the wild how can we recreate its natural environments in captivity.

- Humidity – dose your reptile require humidity at all? If so will you use a humidifier, ventilation, substrate, water provisions or heating to create humidity?

- Food – will feeding your animals be practical within your cage system.

- Water – What should be provided? Swimming areas, drinking, water for humidity levels. Do you need to simulate rain, a dripping system, a filtration system?

- Sanitation – how practical is cleaning the cage? Does it make spot cleaning easy? Can you remove all cage furniture in and out easy? Can the cage be disinfected thoroughly rinsed and dried?

(reptile and amphibian care 5882n, Andrew Titmus)
E.A.P.A standards for lizards.

4.2 Holding Area Design

When reptiles are held in an area off display, whether for breeding, quarantine, or simply just because of space. The cageing system should be designed purely with animal management, keeper management and OHS requirements as priorities. They need to be ergonomically efficient and safe. Cages are generally smaller then the exhibit and are not always aesthetically nice to look at, its how well the cage operates that's important. With the right design, cages can be stacked one on top of the other, reducing wasted space.

Examples of holding facilities and cage designs on the market.

4.3 Spatial Requirements

(Include any regulations if such exist covering minimum standards for keeping animals in captivity)

a) sufficienent space must be provided, both horizontally and vertically, to meet the activity needs of the animals and to enable husbandry to protect animals from undue dominance or conflict.
b) The enclosure must be large enough to provide a temperature gradient that allows reptile(s) to thermoregulate.
c) The minimum floor space allowable for any enclosure must be increased in area by 20% for each additional specimen over one or two specimens for which a minimum floor space formula is established.(as per E.A.P.A standards)

Minimum floor area for 2 specimens = 2.5L x 2.5L
(L = total length of longest specimen)
b) Medium term Holding Enclosures and display at temporary establishments
Minimum floor area for 2 specimens = 1.5L x 1.5L
c)Minimum height for terrestrial species
The larger of either 2 x head-body length or 40cm
d)Minimum height for arboreal species
The larger of either 4 x head-body length or 60cm. (E.A.P.A)

4.4 Position of Enclosures

This really depends on availability of space, but if you are designing an outdoor exhibit trying to position the exhibit in an area that receives at least eight hours of sunlight a day, would benefit greatly. An East or North Easterly facing exhibit would be ideal as to obtain most sunlight particularly that of morning sun. In the colder months of the year it would also benefit to receive maximum sunlight hours of the day when daylight hours are considerably of shorter duration.

In indoor enclosures, positioning the skinks in an area that isn't interrupted by extremes in temperature variances, eg: under air conditioners, near doorways etc. will help maintain a constant thermal environment.

4.5 Weather Protection

Outdoor exhibits should have good drainage systems to reduce risk of flooding. Rock caves hollow logs, provide great hiding places away from wind, rain, and excessive heat. Planting grasses, small shrubs, trees give shelter. Depending on your location within Australia and the conditions you may likely endure throughout the year you may need to consider wind brakes or barriers.

4.6 Temperature Requirements

Gidgee skinks are found in arid terrain and can withstand high temperatures. Keeping these lizards in a captive environment means we have to recreate these temperatures in order for them to live happy and fulfilling lives. Too cold they cannot digest food, breed, carry out daily activities and before long illness or disease can take hold.
Temperatures should range from 25-38dec during the summer months and between 18-23 during winter. Thermal gradient is important throughout cage, so the lizards can choose between the hotter or colder ends to rest, or increase PBT.
Temperatures can be achieved by the use of basking globes, heat rocks, heat pads, and tube lighting.
* note all heating equipment must be thermostatically controlled to avoid over heating.

MICROCLIMATE THERMOSTATS

The Microclimate thermostats are top of the range thermostats made in the UK. They are all fully wired with flexible probes attached making them not only high quality but also user friendly. Due to the varying uses of thermostats, there are a number of different products for different requirements. For further information, go to www.urswholesale.com.au

MICROCLIMATE ON/OFF THERMOSTATS

These are fully wired with a probe attached. All microclimate range of thermostats are high quality and made in the UK.

MINISTAT 100
75mm X 52mm X 27mm ON/OFF thermostat for controling up to 100 Watts of heating cords and mats only
04.100

MINISTAT 300
75mm X 52mm X 27mm ON/OFF thermostat for controling up to 300 watts of ANY HEATING source
04.300

MICROCLIMATE DIMMING THERMOSTATS

These regulate power output and dim the power source rather than turning it on and off. This method of temperature regulation allows you to use them with incandescent globes as the dimming prolongs the life of these globes. These thermostats can be used with all other heat sources also and control up to 600 watts.

B1 THERMOSTAT
101mm x 78mm x 41mm
Dimming thermostat for controlling up to 600 watts of ANY HEATING source
04.B1

B1ME THERMOSTAT
101mm x 78mm x 41mm
Dimming thermostat (with 'magic eye' for night time drop) for controlling up to 600 watts of ANY HEATING source
04.B1ME

B1ME/HT THERMOSTAT
Dimming thermostat (with 'magic eye' for night time drop) for controlling up to 600 watts of ANY HEATING source This unit can be set for higher temperatures than the standard B1ME model.
04.B1MEH

DL1 THERMOSTAT
101mm x 78mm x 41mm
Microprocessor based (with alarms) dimming thermostat for controlling up to 600 watts of ANY HEATING source
04.DL1

DL1ME THERMOSTAT
101mm x 78mm x 41mm
Microprocessor based (with alarms & 'magic eye' for night time drop) dimming thermostat for controlling up to 600 watts of ANY HEATING source
04.DL1M

MICROCLIMATE PULSING THERMOSTATS

These are Pulse proportional thermostats controlling up to 600 watts of any non light-emitting heat source. These thermostats are extremely accurate and great for use in vivariums or incubators!

<u>Not suitable for use with incandescent globes.</u>

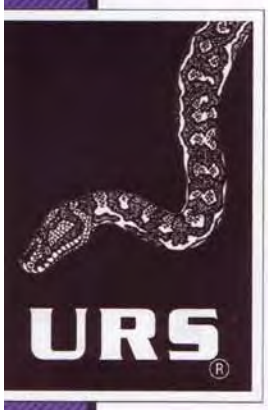
B2 THERMOSTAT
101mm x 78mm x 41mm
Pulse proportional thermostat for controlling up to 600 watts of NON LIGHT-emitting heat source
04.B2

B2ME THERMOSTAT
101mm x 78mm x 41mm
Pulse proportional thermostat (with 'magic eye' for night time drop) for controlling up to 600 watts of NON LIGHT emitting heat source
04.B2ME

B2/HT THERMOSTAT
Pulse proportional thermostat for controlling up to 600 watts of NON LIGHT-emitting heat source This unit can be set for higher temperatures than the standard B2 model.
04.B2H

DL2 THERMOSTAT
101mm x 78mm x 41mm
Microprocessor based (with alarms) pulse proportional thermostat for controlling up to 600 watts of NON LIGHT emitting heat source
04.DL2

DL2ME THERMOSTAT
101mm x 78mm x 41mm
Microprocessor based (with alarms & 'magic eye' for night time drop) pulse proportional thermostat for controlling up to 600 watts of NON LIGHT emitting heat source
04.DL2M



These Oz Purple globes are incandescent nocturnal heat lamps that are suitable for viewing nocturnal reptiles and their natural behaviour at night. Simulating natural moonlight, they will no disturb the animal while it is being observed. These globes also have the added benefit o radiating heat, allowing the animal to bask beneath them.

OZ PURPLE NIGHT
Heat & Light - Small
40 watt 04.80a
60 watt 04.80b
75 watt 04.80c
100 watt 04.80d
150 watt 04.80e

OZ PURPLE NIGHT
Heat & Light- Large
75 watt 04.125a
100 watt 04.125b

The purple globe simulates moonlight and is a great aid fo those wanting to view the nocturnal behaviour of thei animal. An added benefit is tha the purple globe also emits heat.

OZ MOON NOCTURNAL
Heat and Light
40 watt 04.95a
60 watt 04.95b
75 watt 04.95c
100 watt 04.95d

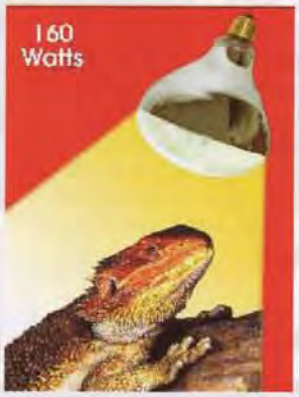
These Infrared Spot Lamps are an ideal way of keeping your herps warm and are great for being able to view them at night without disturbing them. These lamps are great value for money, being ES globes.

INFRARED SPOT LAMP
40 watt 04.17a
60 watt 04.17b
75 watt 04.17c
100 watt 04.17d
150 watt 04.17e

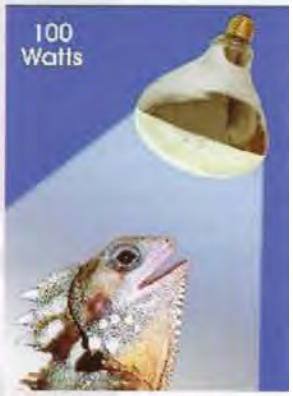
BASKING SPOT GLOBE
40 watt 04.33
60 watt 04.33a
75 watt 04.33b
100 watt 04.33c
150 watt 04.33d

The Basking spot bulb is a broad spectrum UVA daylight bulb for providing a basking area for your reptile. The UVA benefits the animal by increasing appetite and activity. Alternate this globe with either the infrared or Oz purple globe to simulate a day and night period of lighting with the benefit of heating for your animal.

DAY BLUE BULB
60 watt 05.07a
100 watt 05.07b



OZ BRIGHT
UV Heat & Light 04.20b
160 watt



OZ BRIGHT
UV Heat & Light 04.20a
100 watt

The flood style Oz Bright Heat and Light bulbs produce UVB, UVA, LIGHT and HEAT and are available in two wattages. These bulbs are one of the most effective ways of simulating daylight, providing UV and also producing heat. Oz Bright Heat and Light bulbs are self ballasted Mercury Vapour lamps that are screw in. Use with the Lamp 'N' Clamp or other ceramic ES fitting.

4.7 Substrate

Substrate is one of the most important things we can add to an exhibit. Not only dose it serve as decoration and look appealing from the public's point of view. Different types play a very important role in the micro-climate of the cage. Digging and burrowing reptiles have different needs then tree dwelling species, whereas desert animals prefer yet an other type of substrate. Heat conductivity is very important and the absorption capacity will contribute to the overall air humidity.

(a Whilst a sterile type setting, e.g. paper substrate, is adequate for off-exhibit holding areas, this is not suitable for the exhibition of reptiles.
(b The substrate must keep the reptiles dry, and therefore must be deep enough to achieve this.
(c Where possible natural substrates must be chosen which reflect the known habitat of the species in the wild. (E.A.P.A)
In many of the habitats that Gidgees prefer they have sandy terrain, with plenty of rocky outcrops. In my opinion red sand is ideal and plenty of rocks for the lizards to bask and hide. Soils hold a lot of moisture where as sand has very little structure to it and water quickly evaporates which is important as Gidgees love hot dry conditions. Sand should be at least 2inch thick to help with drainage and allow cleaning of fecal matter using a sieve easier.



Photos of natural habitat Broken hill. photos by C. Jackson 2007

4.8 Nest boxes and/or Bedding Material

Gidgee skinks require natural hiding places, so rocks and hollow logs provide retreat areas and places to sleep. Sand or leaf litter used as substrate will promote natural digging behaviors and also aid in skin shedding. As Gidgee skinks are viviparous, (live bearing), a nest box is not required. Maintaining an enclosure that closely resembles that of their natural habitat will enhance the animal enrichment and be aesthetically appealing for public viewing and education.
*note when using rocks make sure they are place in positions that prevent lizards digging and removing sand from under them to cause rocks to fall on top of lizards and cause injuries or death.

4.9 Enclosure Furnishings

(Branches, rocks, grass tussocks, streams or ponds. Behavioral enrichment furniture. Nesting requirements)

(a The interior design and landscaping of enclosures must portray appropriate aspects of the habitat of the species, and where practical must include furnishings that encourage natural behavior.

(b To allow natural behavior, sun- basking species, held indoors, must be provided with a basking site as a rock or log, upon which a radiant light/heat source must be directed for appropriate periods of time, at an appropriate intensity. (E.A.P.A)

Example of exhibit furnishings

Desert Park Gidgee exhibit

Habitat in the wild Alice Springs

Desert Park Gidgee exhibit
Photos by C. Jackson

5 General Husbandry

5.1 Hygiene and Cleaning

Enclosure must be kept clean to reduce risk of contamination of pathogenic diseases from spreading to keepers or cage mates.
Waste should be removed from enclosure daily, using gloves and face mask while cleaning.
Sick animals should be quarantined immediately to avoid spread of disease.
Food should be prepared with high standards of cleanliness to both food and the utensils used (as per EAPA of NSW)
Fresh food and water must be given to the animals every day.
Food and water bowls should be cleaned every day.
Substrate should be removed monthly and entire enclosure cleaned thoroughly.

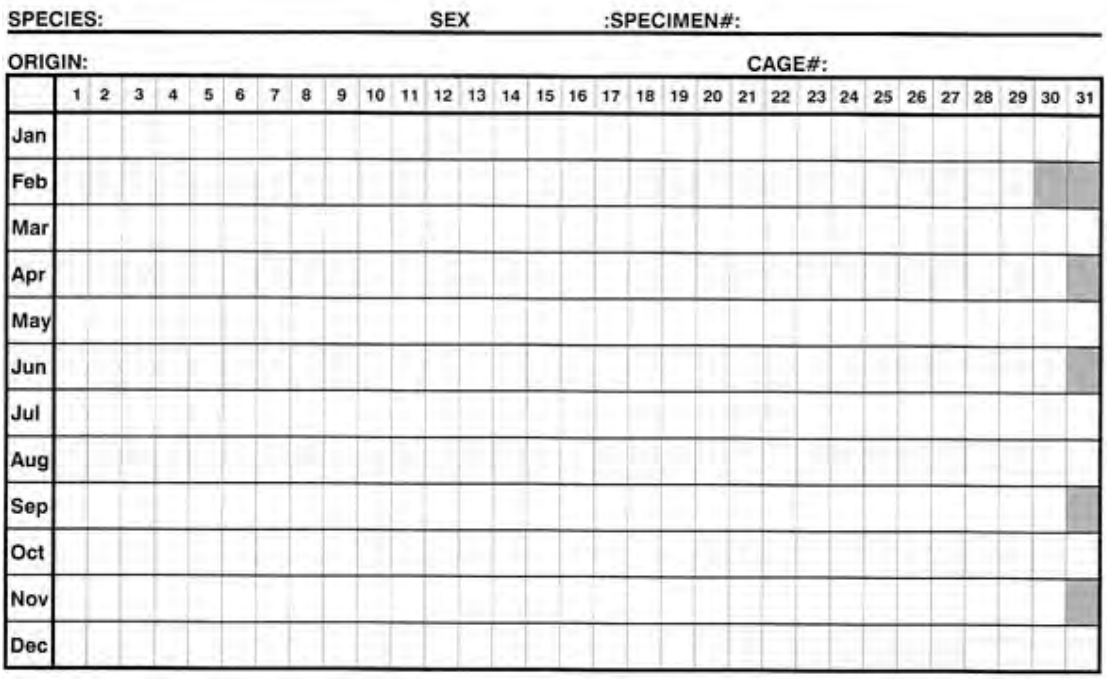
Chemicals that are recommended for use when cleaning
Bleach - used for cleaning water bowls only
Vercon - all purpose-cleaning agents
Repti clean – all purpose cleaning agent
Windex – outside exhibit glass (public area)
Metho – inside exhibit glass
Top of descent - used within cage for mite control: remove all food and water bowl when Fumigating cage.
F-10- used to clean all utensils, spray hands between cages, or between animals.
Please refer to appendix for material data sheets on each of the chemicals.

5.2 Record Keeping

It is essential to keep clear and accurate records of all animals in your care.

Daily visual examinations of your animals should be done to be aware of behavioral changes or illness. Dietary needs medical, sloughing, weights, id numbers should be cataloged on cage cards. And any notable events of the day written in daily diaries. When cage cards are finished stored in filling cabinet.

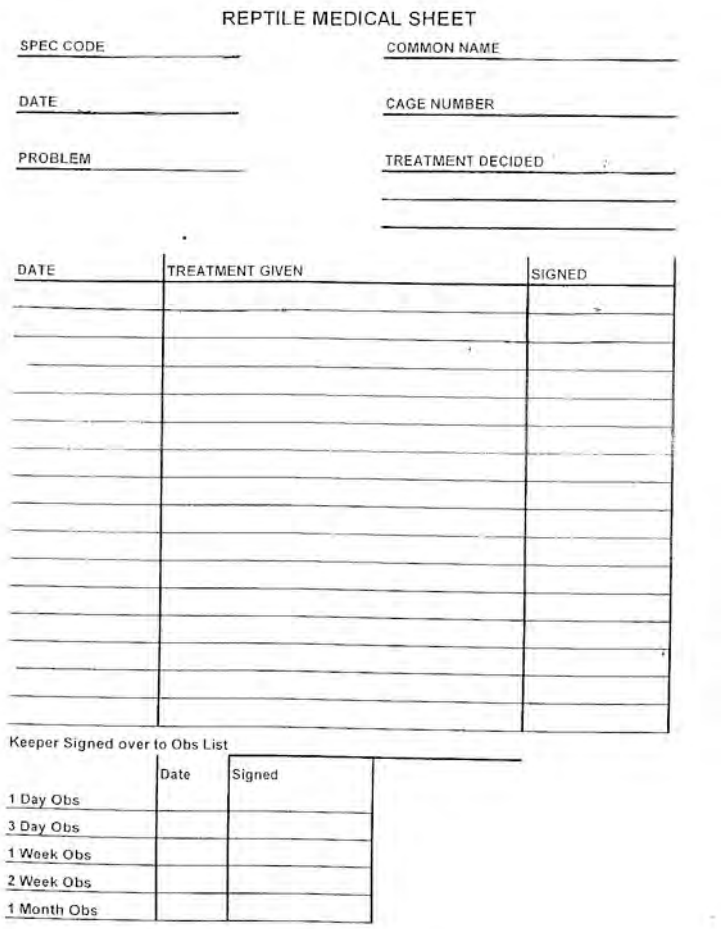
Example of cage card



Back of cage card

DATE	DETAILS	DATE	DETAILS

Example of medical sheet



REPTILE MEDICAL SHEET

SPEC CODE _____ COMMON NAME _____

DATE _____ CAGE NUMBER _____

PROBLEM _____ TREATMENT DECIDED _____

DATE	TREATMENT GIVEN	SIGNED

Keeper Signed over to Obs List

	Date	Signed
1 Day Obs		
3 Day Obs		
1 Week Obs		
2 Week Obs		
1 Month Obs		

5.3 Methods of Identification

Micro-chips and individual body marks are good forms of identification photographs and sketches also help to id individuals within colony groups.

5.4 Routine Data Collection

Feeding patterns, temperatures min/max, breeding, sloughing, fecal samples, seasonal behaviors,

6 Feeding Requirements

6.1 Wild Diet

Arthropods such as beetles, grasshoppers, moths, grubs, spiders and plants make up the wild diet and the seasonal changes effect what is eaten. A field study conducted in the Warruwarldunha range near Hawker in the lower flinders ranges of South Australia by Glen A. Duffield and C. Michael Bull (1998) showed that the fecal samples taken from adult skinks had significantly more plant material than that of the juvenile skinks.
I took a trip out to broken hill in October (2007) to locate some gidgee's look at the habitat and plants and record some temps and any other info I could gather. Fecal samples showed evidence of insect and plant material. Some of the plants I found in close proximity to the gidgee's

6.2 Captive Diet

Gidgee skinks are omnivorous, so their captive diet should include both plant and meat sources. Diets should include fruit, vegetables, commercial lizard food, dog/cat food, (non – fish varieties), mice and insects. Feeding juvenile lizards on a daily basis is important to promote growth. Adults will suffice with a broadened feeding regime, eg: every two to three days.
The only main diet variable is native plants and their seasonal variances. Note: do not feed lizards in low temperatures, as they will not digest their food. It will cause the food to decompose inside the animal and will kill it. When feeding live insects, do not offer too many, as some insects can hide inside exhibits and later injure lizards.
A good diet is a varied diet; here are some plants that are safe to feed your gidgee's. Collard greens, turnip greens, mustard greens, parsley, dandelion greens, beans, figs (raw or dried), raspberries, leeks, snow peas, blackberries, grapes and pears. Pick three of these as the staple and each time you make up a fruit mix add them to it but swap them around as much as you like. You can feed plants such as spinach, beets, beet greens, celery stalk or Swiss chard but as they contain Oxalic acid a chemical which binds with calcium to form calcium oxalate an insoluble salt rendering it unusable. Eating them in excess can cause calcium deficiency. So feed this in very small amounts or not at all. Other plants such as carrots, bananas, grapes, lettuce and once again spinach contain large amounts of Tannins and tannin binds protein ,fights digestion by inhibiting key enzymes involved and can also render iron and vitamin B12 unavailable tannin can also Damage the liver if served in excess.
(www.baskingspot.com/iguanas/igbook/nutrition.html)

Insects can either be breed or bought to feed out which ever suits your facility. In N.S.W commercial insect breeders Critter Snax have a variety of insects and good quality which I can recommend if you require large quantities (see appendix for more details on Critter Snax). If you decide to breed your own then I would recommend buying Professional Breeders Series Live Foods by Frank Bruse. Dr Michael Meyer. Wolfgang Schmidt (2004) this is a great book with everything you need to know on breeding insects. (See

appendix for more info where to buy book). Again variety is the key insects like crickets, cockroaches, moths, mealworms, spiders, beetles should be offered.

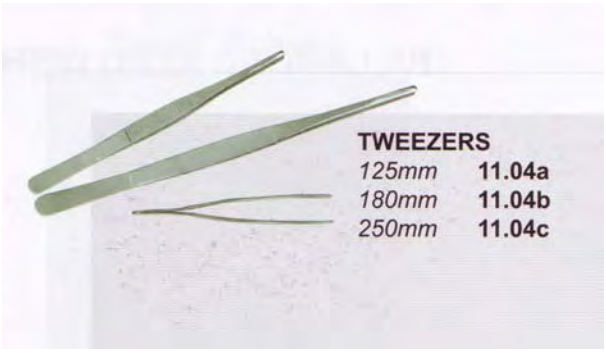
6.3 Supplements

Supplements are beneficial for gravid females and juveniles to promote growth. Supplements can be easily added to the skinks diet in either a powder or liquid form and does not affect the palatability and are readily absorbed by the animal. Supplements should be added to food weekly to maintain long term health nutrition. They can be purchased at most pet stores, or from professional reptile suppliers like URS Ultimate Reptile Suppliers (see appendix for details on URS).

6.4 Presentation of Food

(Also list behavioral enrichment feeding)

When feeding fruit mixes food should be presented on a flat plate enabling lizard's easy access to the food. When offering insects use forceps to keep track of who has eaten. If providing enrichment feeding what I have found works well with my pair of males. Yes that's right "males" is the use of an artificial log with a jar of insects inside one hole opening where the insects can slowly escape into the exhibit. This encourages the lizards to exercise and forage throughout the day instead of receiving their daily insect feed all at once it is dispersed over the day.



7 Handling and Transport

7.1 Timing of Capture and Handling

Reptiles need to be captured for many reasons, whether it is medical examinations and treatments, cage cleaning, identification and moving animals or education, handling should be performed so as to ensure safety to animal and handler. Gidgee skinks are innocuous animals so there should be minimal risk when handling. Reducing temperatures before capturing will further reduce risk of injury to animal itself. Capturing animal early in morning i.e.: before feeding will reduce unnecessary stress placed upon animal.

7.2 Catching Bags

A lightweight cotton bag is the safest method for holding and transporting a captured lizard. It is recommended the catching bag is twice as deep and as wide as the animal you are transporting. Placing a secure knot on top of bag or using bag ties, eg: elastic bands or rope will prevent escape.

7.3 Capture and Restraint Techniques

Gidgee skinks are medium sized lizards, so capture should be by grasping around chest area initially with one hand, and with the other supporting hind limbs. Pressure should be firm, but not too tight as to reduce breathing ability.

7.4 Weighing and Examination

The easiest method to weigh the lizard is to tear the cloth bag first, then place lizard in bag onto scales and record weight.
Examinations can be done two ways, a **distant examination**, simply by looking at the animal for signs of; dehydration, discharges, deformities, lameness or stiffness, injuries or sores, weight loss, not sloughing properly, change in behavior and diahorrhoea. If any of these signs are observed, a **physical examination** is needed. This involves actually picking the animal up to have a closer look.
A thorough physical examination should include palpating for any abnormalities in joints and skin, looking for signs of abnormal respiratory sounds, poor skin condition, lumps in skin, ulcers, blisters or parasites and foreign bodies. If any symptoms occur, seek veterinary advice.

7.5 Release

If no medical treatment was given then the lizard can be returned to cage as soon as examination is finished. How ever if treatment was given and will be on going, then the lizard should be quarantined to separate quarters away from cage mates, who could cause further injury and minimize spread of disease.

Gidgee's live in a colony so adding new cage mates is not recommended unless strict monitoring is taken. The risk of fighting and serve injuries to animals with different sent is likely, when individuals of the same sex are introduced.

7.6 Transport Requirements

IATA

Container Requirements

CONTAINER REQUIREMENT 41

The illustrations shown in this Container Requirement are examples only. Containers that conform to the principle of the written guidelines for the species but look slightly different will still meet the IATA standards.

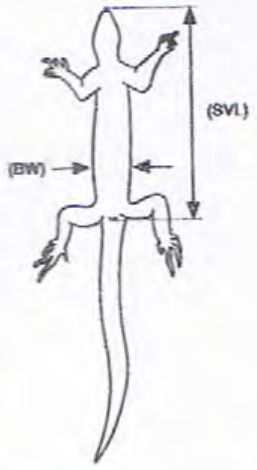
Applicable to Lizards and Tuataras

See USG Exceptions in Chapter 2 and Exceptions CO-01 and UA-05 in Chapter 3.

The following instructions must be complied with in addition to the principles laid down in the General Container Requirements for Reptiles and Amphibians.

Measurement

Lizards (including Chameleons) and tuataras should be measured by snout-to-vent length (SVL) and in body width (BW).



Specific Requirements

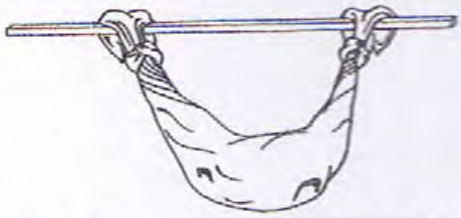
All containers and bags should have some kind of packing material (i.o. crumpled paper). Animals in the same containers or bags should belong to the same size class to avoid damage to smaller individuals.

The maximum number of animals per bag or container must not be increased even when larger bags or containers are used.

Packing Density for Lizards and Tuataras (not including Chameleons and farmed Iguana iguana):

Snouth-vent-length (SVL)	Body-width (BW)	Maximum no. of animals per bag	Minimum bag size
≥ 20 cm (8 in)	≥ 5 cm (2 in)	1	Depending on the size of the animal
≥ 15 < 20 cm (6 < 8 in)	≥ 2.5 < 5 cm (1 < 2 in)	15 10	45 x 60 cm (18 x 24 in) 30 x 45 cm (12 x 18 in)
≥ 10 < 15 cm (4 < 6 in)	< 2.5 cm (1 in)	30 20	45 x 60 cm (18 x 24 in) 30 x 45 cm (12 x 18 in)
< 10 cm (4 in)	< 2.5 cm (1 in)	30	30 x 45 cm (12 x 18 in)

If the bag is suspended the bag must be suspended horizontally from opposite ends of the bag the maximum number of animals per bag should be divided by two.



For lizards, rigid containers can be used instead of bags with a maximum of 25 animals, under the same conditions for the snake containers.

Arboreal geckos will be provided the use of the surface area of the floor and wall space of rigid containers.

Large Animals

Lizards whose length range from 90–120 cm (36–48 in) SVL require double bags for shipping.

Lizards of 120 cm (48 in) or more in length must follow the same primary enclosure requirements as crocodiles excluding the taping or banding of the mouth.

The direction of the head should be indicated on the outer enclosure.

CONTAINER REQUIREMENT 41 *(cont'd)*

Lizard species that should be packed singly because they are either aggressive, cannibalistic or delicate:

Malagasy leaf geckoes (Uroplates spp.)
New Caledonian giant geckoes (Rhacodactylus spp.)
Asian gliding agamid (Draco spp.)
Sail-finned lizard (Hydrosaurus spp.)
Angle-headed dragon (Gonocephalus spp.)
Helmeted basiliscs (Corytophanes spp.; basilicus spp.) — (except hatchlings and juveniles)
Caiman lizard (Dracaena spp.)
Emerald tree monitor lizard (Varanus prasinus)
Black tree monitor lizard (Varanus beccari)
Solomon Island pre-hensile tailed skink (Corucia zebrata)

Venomous lizards that must be handled and packed like venomous snakes (see Container Requirement 44), these are:

Gila monster, beaded lizard (Heloderma spp.)

Specific Requirements for Chameleons including African Dwarf Chameleons (Rhamphoelon) and Malagasy Dwarf Chameleons (Brookesia)

All species with the exception of young and small specimens (see below) must be packed individually.

Chameleons 10 cm (4 in) or greater in SVL need to be packed in adequate space to rest naturally. The enclosure needs to conform to the body shape and size. Specimens should be packed one per inner enclosure. The inner enclosure may be cloth, woven material, or rigid container. Crushed or crumpled paper must fill at least 25% of inner enclosure.

Chameleons of 2.5–10 cm (1–4 in) in SVL must be packed one per inner enclosure. Inner enclosures may be fibrous woven tubes with each open end of tube securely enclosed in a manner that can be resealed, cloth, rigid container, or heavy gauge paper enclosures. Heavy gauge paper should be defined as a container that is sufficient to hold specimens without escape.

Inner enclosures must be easily opened and closed. If heavy gauge paper enclosures are used as inner enclosures, they must be secured to a frame of support bars in the primary or outer enclosure with tacks or nails with head diameter of at least 0.6 cm (¼ in). No burlap (hessian) bags as inner enclosures are permitted.

Chameleons less than 2.5 cm (1 in) SVL can be packed with a maximum of 10 per 0.5 liter rigid enclosure. At all times, the specimens must be able to have full contact with the container floor. At least 50% of the inner enclosure must be filled with loosely crumpled paper.

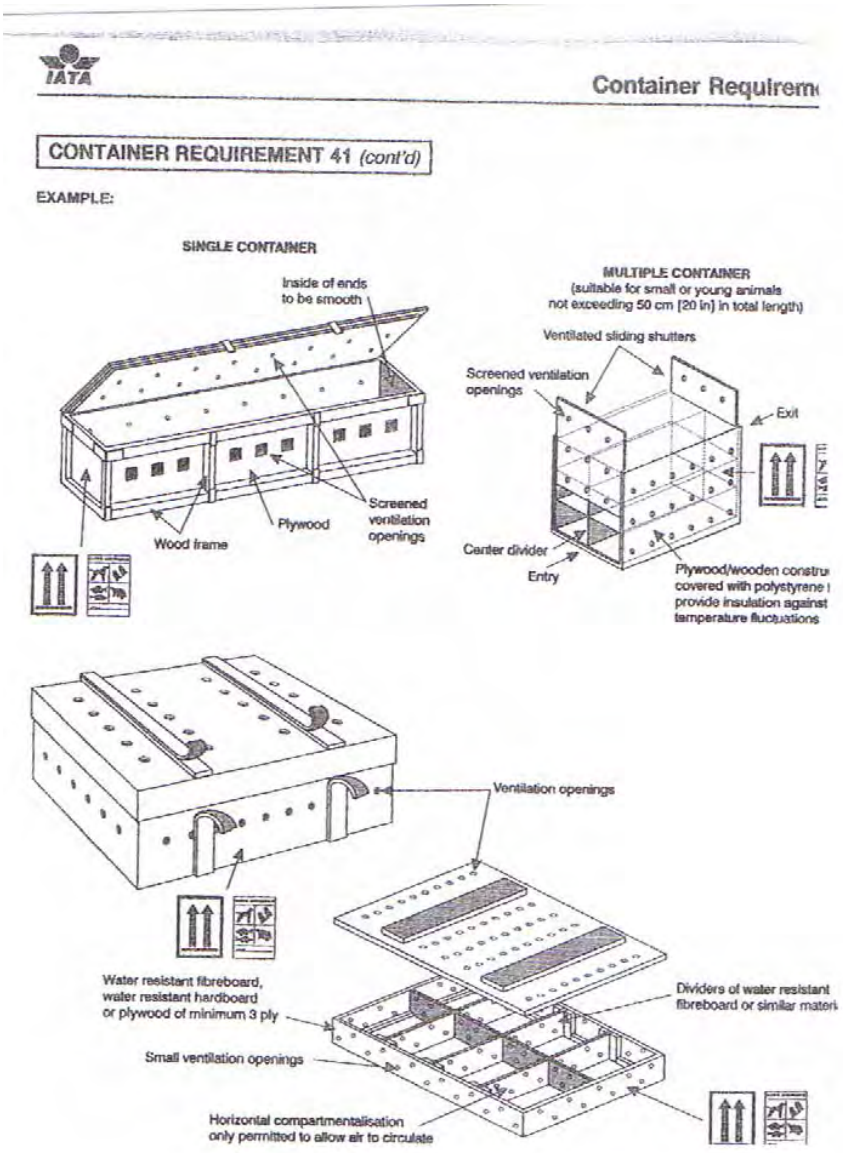
Crushed or crumpled paper must be provided to ensure a

Packing Density for Farmed Green Iguanas (Iguana iguana)

Since farmed Green Iguanas (Iguana iguana) are usually in good condition, free of diseases and used to handling, the use of following special packing density is allowed.

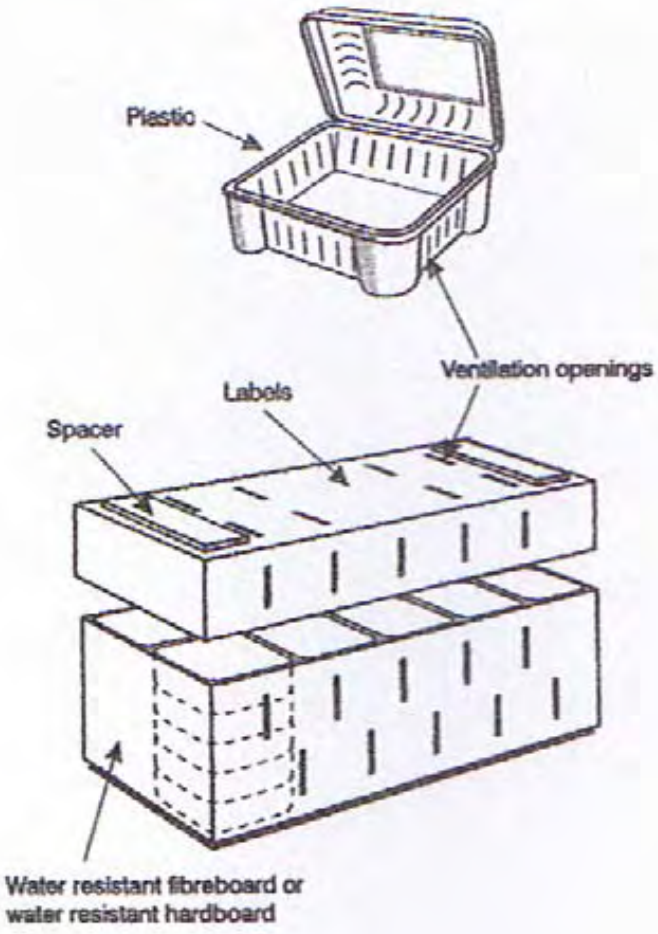
Snout-vent-length (SVL)	Maximum no. of animals per bag/box	Minimum bag size	Minimum box size
> 25 cm (10 in)	1	Depending on the size of the animal	—
> 20 cm (8 in)	6	45 × 85 cm (18 × 34 in)	—
> 17.5 cm (7 in)	6	30 × 60 cm (12 × 24 in)	20 × 40 × 9 cm (8 × 16 × 3½ in)
> 12.5 cm (5 in)	20	30 × 45 cm (12 × 18 in)	20 × 40 × 6.5 cm (8 × 16 × 2½ in)
> 10 cm (4 in)	30	30 × 45 cm (12 × 18 in)	20 × 40 × 4.5 cm (8 × 16 × 1¾ in)
> 8.75 (3.5 in)	40	30 × 45 cm (12 × 18 in)	20 × 40 × 4.5 cm (8 × 16 × 1¾ in)
0–8.75 cm (3.5 in)	50	30 × 45 cm (12 × 18 in)	20 × 40 × 4.5 cm (8 × 16 × 1¾ in)

7.6.1 Box Design



CONTAINER REQUIREMENT 41 *(cont'd)*

MULTICOMPARTMENT CONTAINER



7.6.2 Water and Food

No food or water is required during transport for live reptiles over short distances. (Water must be provided prior to transport to prevent dehydration. This may involve placing the animal in shallow tepid water for an appropriate time prior to departure. (E.A.P.A)

7.6.3 Animals per Box

Snout-vent-length (SVL)	Maximum no. of animals per bag/ box	Minimum bag size	Minimum box size
> 25 cm (10 in)	1	Depending on the size of the animal	—
> 20 cm (8 in)	6	45 × 85 cm (18 × 34 in)	—
> 17.5 cm (7 in)	6	30 × 60 cm (12 × 24 in)	20 × 40 × 9 cm (8 × 16 × 3⅝ in)
> 12.5 cm (5 in)	20	30 × 45 cm (12 × 18 in)	20 × 40 × 6.5 cm (8 × 16 × 2⅝ in)
> 10 cm (4 in)	30	30 × 45 cm (12 × 18 in)	20 × 40 × 4.5 cm (8 × 16 × 1¾ in)
> 8.75 (3.5 in)	40	30 × 45 cm (12 × 18 in)	20 × 40 × 4.5 cm (8 × 16 × 1¾ in)
0–8.75 cm (3.5 in)	50	30 × 45 cm (12 × 18 in)	20 × 40 × 4.5 cm (8 × 16 × 1¾ in)

7.6.4 Timing of Transportation

Transporting reptiles is best done during early morning or during the evening as outside temperatures are reduced. Good ventilation air conditioned vehicle is best. Reduces stress and overheating of animals. Reptiles must be transported under conditions which protect them from extremes of temperature .Reptiles must not be transported unless they have been maintained for a sufficient time prior to departure at a temperature that will ensure complete digestion of any ingested food.(E.A.P.A)

7.6.5 Release from Box

Reptiles can be released from transport box at any time providing the cage has fresh water available, and sufficient heat to allow animals to reach their PBT as soon as possible to familiarize themselves with there surroundings.. If there is more then one individual all animals should be released into exhibit together.

8 Health Requirements

8.1 Daily Health Checks

(List the routine observations undertaken daily during cleaning and feeding.)

It is important to monitor your animal's health regularly so that any signs of ill health can be picked up early and treated. Every day we should observe the animals during feeding and cleaning routines.

1. Identify each animal
2. Perform a distant examination
3. If any abnormalities are noticed perform a physical examination
4. If there is a problem report to supervisor
5. Seek veterinarian advice and diagnosis

Note; Abnormalities can be as a result of something other than ill health eg. Change in diet, change in environment, introduction of new animal(s), breeding season or pregnancy.

8.2 Detailed Physical Examination

Once a month a physical examination should be preformed on each of the animals. It involves capturing the animal and having a closer look and feeling for any abnormalities. These may include;

1. Discharge from cloaca, eyes, ears, or mouth.
2. Swollen joints
3. Loss of weight
4. Poor skin condition
5. Parasites
6. Ulcers
7. Blisters
8. Feel for lumps under skin
9. Sloughing problems
10. Difficulty in breathing, gurgling wheezing
11. Abnormal smells
12. Injury or sores, broken bones, cut and abrasions
13. Lameness or stiffness

In order to effectively examine an animal you need to know what is 'normal' that way when something appears abnormal steps can be taken to correct the abnormality.

8.2.1 Chemical Restraint

This would only be required if surgery was necessary, and in the form of anesthesia performed by a veterinarian. Our job would be to capture the lizard place in bag transport to vet, place in box or induction chamber for the use of Halothane anesthetic gas, or we maybe asked to restrain the lizard whilst vet injects ketamine hydrochloride.

8.2.2 Physical Examination

8.3 Routine Treatments

1. Worming endoparasite control
2. Ectoparisite control
3. Cut and abrasions

Worming should be done every three months to keep endoparacites at bay. Ivermectin, penacur are two of the main drugs used to worm reptiles as they cover most of the worm invaders and are completely safe when used correctly and with correct dosages.

Ectoparisites can be a nightmare for any collection so routinely treating for them even if there is no evidence of outbreak is a could way to ensure healthy parasite free animals. The main form of Ectoparisite is ticks and mites. Using top of decent aerosol sprays, formulated mite sprays or pest strips are the easiest way to rid these parasites.

Note; if using aerosol or pest strips remove waterbowls during treatment as the water will accumulate vapors and may kill reptiles if ingested.

Cuts and abrasions can cause secondary health problems when not treated. Simply wash wound with a salt solution then apply betadine to area daily. This will help to eliminate bacteria and infection to the area.

8.4 Known Health Problems

1. Respiratory infections
2. Canker or mouth rot
3. Scale rot or blister disease
4. Abscesses
5. Skin disorders
6. Endoparacites
7. Ectoparasites
8. Nutritional disorders
9. Injuries

1. ***RESIRATARY INFECTION***

CAUSE- Commonly caused by high humidity levels, or a result of poor hygiene and cold conditions

SIGNS- Closed eyes, head raised, loss of appetite, torpor, wheezing and nasal discharge

TREATMENT- Mild cases move lizard to warm dry well ventilated clean cage, and give access to natural sunlight. More serious cases require vet nary treatment with antibiotics.

PREVENTION- Keep lizards in hygienic conditions and the correct environmental conditions.

2. ***CANKER OR MOUTH ROT***

CAUSE- Lizards kept in less than optimal conditions.

SIGNS- Swelling of the mouth tissues preventing mouth from closing properly. The presents of grey – white cheesy matter in the mucus membrane of the mouth.

TREATMENT- Rectify the caging conditions. Rinse mouth out with water and 3% hydrogen peroxide then apply an antibiotic ointment to the infected part and a course of injectable antibiotics maybe required.

PREVENTION – Keep lizards in hygienic conditions and correct environmental conditions. Regular health checks.

3. ***SCALEROT OR BLISTER DISEASE***

CAUSE- Combination of poor cage sanitation and cold, damp or humid conditions. It can also be a result of having live plants in the cage without consideration for dryness and sanitation.

SIGNS- Patches of ulcerated skin usually on the underside of the animal. Series of blister like lesions appear between and beneath the scales. Blisters can be filled with fluid and reddish in colour.

TREATMENT- Rectify caging conditions. Disinfect affected skin. In serious stages of disease antibiotics will be necessary.

PREVENTION- Keep lizards in hygienic conditions and correct environmental conditions. Maintain any live plants keep sanitized and in well ventilated end of cage.

4. ***ABSCESSES***

CAUSE- Often by wounds from cage mates biting or injuries to themselves from cage furniture.

SIGNS- Hard lump of varying sizes under the skin. Well encapsulated accumulation of pus and necrotic debris. Internally grey or white matter.

TREATMENT- Involves an incision to drain and thoroughly remove all debris from abscess followed by antibiotics.

PREVENTION- Remove inadequate cage mates. Treat wounds or injuries before they progress into an abscess.

5. ***SKIN DISORDERS***

CAUSE- Occasionally skin sloughing problems can occur this is due to dehydration of animal or inadequate water supply.

SIGNS- Old skin dried and still attached. Several layers that have not been shed.

TREATMENT- Soak lizard in warm water for half an hour to soften skin. The old skin can then be gently rubbed off, from head to tail direction to avoid damage to new skin.

PREVENTION- During sloughing ensures enough water is made available. Keep animals rehydrated daily.

6. ***ENDOPARASITES***

NEMATODES

There are over 500 identified reptilian nematodes, with most occurring in the stomach, small intestine, and large intestine. Certain larval forms are also found in the esophagus, lungs and other unusual locations due to their migration as larvae. Lesions are produced either as larvae migrate through organ systems or by adults entrenched in the gastrointestinal tract. Large numbers can result in organ obstruction, loss of nutrients, tissue destruction, and the introduction of bacteria.

ROUNDWORMS (Ophiascaris, Polydelphis)
They have an indirect life cycle and require an intermediate host

CAUSE- Acquired by ingesting an intermediate host such as, frog, fish, lizards, rodents and marsupials.

SIGNS- Usually based on thick walled eggs in fecal floatation. Heavy infestations adult worms maybe seen in feces or regurgitated contents.
Roundworms can be seen with the naked eye and look like round white spaghetti like worms in their adult stage.

TREATMENT- Penacur 25-50 mg/kg orally once a week for three weeks.

PREVENTION- Freezing food items before feeding, deparasitzing food colonies.

HOOKWORMS (Oswalsocruzia sp.) Direct life cycle

CAUSE- Contaminated food or water with feces.

SIGNS- Thin walled oval eggs on fecal flotation. Bloody and or mucus –laden stools

TREATMENT- Penacur 25-50 mg/kg once a week for three weeks

PREVENTION- Change substrate regularly remove feces ASAP always provide fresh water and high quality foods.

PINWORMS (Oxyurus sp.) Direct life cycle

CAUSE- Exposure to focally contaminated food or water

SIGNS- They live in the lower GI tract obstruction and compaction can occur. Eggs found in fecal flotations.

TREATMENT- Penacur 25- 50 mg/kg once a week until negative stools is obtained.

NOTE; Mouse pinworms are often seen in stools of rodent eating reptiles and the eggs are passed through the GI tract. Mouse pinworms do not cause disease in reptiles.

PREVENTION – keep lizards in hygienic conditions and in correct environmental conditions. Remove feces ASAP.

STOMACHWORMS (Physaloptera sp.) Indirect life cycle

CAUSE- Found in lizards that eats ants. Ants being the intermediate host... Can cause inflammation and obstruction of the GI tract.

SIGNS- Fecal flotation finding eggs

TREATMENT- Penacur 25-50 mg/kg once a week until negative fecals are obtained.

PREVENTION- If feeding ants to your lizards as part of their natural diet then regular fecal samples should be performed.

LUNGWORMS (Entomelas sp.) Direct life cycle

CAUSE – The larvae that hatch from eggs can gain entrance to the host by percutaneous penetration and by ingestion of fecally contaminated food and water.

SIGNS – Fecal floatation

TREATMENT- Penacur 50-100 mg/kg Ivermectin at 0.2 mg/kg orally. Penacur is given weekly and ivermectin given every two weeks. Three treatments are recommended.

PREVENTION -
Removal of fecal matter and good hygiene, strict cleaning is required.

STRONGYLOIDES This parasite is similar to Rhabdias. Direct life cycle

CAUSE- Eggs hatching larvae percutaneous penetration and oral ingestion of fecally contaminated food and water.

SIGNS- Diarrhea due to GI tract irritation mucus laden stools. Respiratory distress. Finding larvae not eggs in fresh fecal smears

TREATMENT- Penacur 25 – 50 mg/kg once a week for three treatments

PREVENTION – strict cleaning and hygiene

HEPATIC WORMS (Capillaria sp) Indirect life cycle

CAUSE- Found in lizards that eats earthworms. Heavy parasite loads can cause reduced hepatic function.

SIGNS- Finding operculated eggs on fecal floats (football shaped with knobs on both ends)

TREATMENT- Penacur 25-50 mg/kg once a week for three treatments.

PREVENTION- Regular inspections fecal floats should be done if lizards eat earthworms in their diet.

CESTODES Or tapeworms are common in all reptiles.

CAUSE- They require an intermediate host. Reptiles acquire the tapeworms by ingesting the intermediate host, invertebrates and mammalians.

SIGNS- Few signs associated with tapeworms though large numbers can cause secondary malnutrition. Inflammation and enteritis due to mechanical irritation and mechanical obstruction. Eggs in fecal flotation's. Visibly seeing tapeworm passed. Proglottids are small pieces of the adult worm that break off and serve to carry eggs to the outside.

TREATMENT- Droncit (praziquantel) 5 mg/kg orally or by injection. A second dose should be given in two weeks.

PREVENTION- Regular fecal samples taken. Don't feed live foods were possible. Freeze foods before feeding. Keep lizards in hygienic conditions and correct environmental conditions.

TREMATODES

This group includes the digenetic and renifer group of flukes. Flukes are commonly observed in the mouth, esophagus, lungs, intestine, and the kidneys of their host. Flukes are rarely transmitted in captivity. Snails are a common intermediate host.

SIGNS- Observing adult flukes in the mouth, cloaca or feces. Fluke eggs are large yellow-brown with a solitary operculum at one end.

TREATMENT- Dronit 5-8 mg/kg physically remove flukes observed in the mouth. Freeze food items prior to feeding.

PROTOZOANS

Very common in reptiles, all of the following have direct life cycles so they can build up in captivity.

COCCIDIA- Eimeria, Isospora, Caryospora, Cryptosporidium sp.) These are common protozoan's that are generally acquired by exposure to focally contaminated food or water and the environment.

SIGNS- Diarrhea, anorexia, debilitation, and eventual death. Finding oocysts on direct fecal smears or fecal floats of fresh stools.

TREATMENT- Albon (sulfadimethoxine) 50 mg/kg daily for three days. Repeat after 48 hours or until parasite is eliminated.

PREVENTION- Strict hygiene, monitor health regular fecal samples.

CRYPTOSPORIDIOSIS- Caused by exposure to sporulated oocysts in contaminated food and water and the environment. They build up in captivity and are highly contagious even to humans. Infected mice may also transmit the disease.

SIGNS- The main lesions induced by parasite cause irritation of the intestinal wall leading to vomiting/regurgitation. Initially, vague signs of anorexia, listlessness, wasting and depression. Recommend staining fresh fecal material to view oocysts. Very small can be overlooked a histopathology slide from a biopsy maybe required.

TREATMENT- Trimethoprim sulfa 30 mg/kg once daily for seven days. Supportive care consists of fluid, electrolyte and nutrient supplementation. Euthanasia.

PREVENTION - regular health checks fecal samples, isolate affected animals to prevent spread of disease.

FLAGELLATES- Hexamita, Trichomonas, Tritrichomonas) found in GI tract.

CAUSE- Exposure to infective cysts. In contaminated food or water and during copulation.

SIGNS- Diarrhea mucous or blood in stools and anorexia. Direct smear of fresh fecal sample staining may make it easier to diagnose.

TREATMENT- Flagyl (metronidazole) orally 25-50 mg/kg once with a follow up dose in 3-4 days.

7. ECTOPARASITES

Ticks and Mites

Ticks and mites are the most commonly encountered external parasite. Both are irritating and possible sources of disease.

MITES- (Acariasis) there are over 250 different types of mites(mader, 1990) Lizard mites (Hirstiella trombidiiformis)

These mites feed on blood which is needed for the transformation from one mite life stage to another. Under the right conditions (heat, humidity)mites reproduce profusely. The mites will accumulate in the areas of the body that provide the most protection. Under scales, skin folds, near the vent, postorbital areas. They will also take advantage of any nook and cranny inside the cage and its substrate.

In small numbers can cause irritation ,discomfort and agitation. In moderate to severe numbers mites can cause.

- Rough eroded damaged scales which predispose the skin to infection.
- Anemia
- Depression
- Anorexia
- Difficulties in shedding
- Death

TICKS- As with mites ticks are a nuisance and also a significant source of disease. Ticks also tend to hide under scales, around the eyes and near the vent. Maybe responsible for blood borne infections.

TREATMENT FOR TICKS AND MITES- Manual removal of ticks using forcepts, then apply betadine or hydrogen peroxide solution to the area. Antibiotic ointment (Neosporin) can be applied after the area has been cleaned.

Disinfect the cage furniture and remove substrate. All areas of the cage should be disinfected with 1tsp of bleach / litre water. Ivermectin can be used topically 10 mg to 1 litre water and spray reptile and the entire cage as well. No pest strips placed in a jar(to stop lizard gaining access) with holes in the lid so vapor can escape. Expose for three hours for 4-5 days for at least 3 weeks. Remove waterbowl during treatment as water will take on poison if ingested can kill animal. Top of descent is also a good way to treat mites, again remove waterbowl and spray the cage daily for 4-5 days repeat in 2 weeks time.

8. *NUTRITIONAL DISORDERS*

VITAMIN DEFICIENCY- (Avitaminosis)

Vitamin A deficiency- signs eye damage, clouding and swelling and skin infections

Vitamin D deficiency- signs softening of bones, loss of teeth, bone fractures.

Vitamin B deficiency- signs paralytic symptoms in the hind legs and base of tail, molting and growth problems, skin changes loss of coloration (paling) lack of resistance to infections.

TREATMENT AND PREVENTION- A good diverse diet the more varied the better. The use of vitamin supplements and access to natural light, correct levels of UVB lighting in cages.

VITAMIN EXCESS- (Hypervitaminosis)

Too much vitamin A can lead to bleeding in the internal organs.

Too much vitamin D can cause the onset of calcification of the arteries and uncontrollable bone and cartilage growth can occur.

Offer vitamins in moderation to avoid these conditions.

DIGESTION PROBLEMS- an incorrect diet can sometimes lead to diarrhea and similar gastric disturbances. If not corrected intestinal prolapse may occur as reptiles that are suffering diarrhea or constipation for long periods of time will have a prolapse in the rectum.

9. *INJURIES*

Physical injuries come in a variety of forms. Including thermal burns, broken bones, ripped or torn skin. Initially they may appear serious but most lizards can recover from these types of injuries. Minor cuts and abrasions should be treated daily with betadine. Major cuts and abrasions, loss of eyes may need stitches and should be treated by a veterinarian. Likewise a veterinarian should be consulted for crushing injuries and broken bones. Antibiotic treatments maybe required in these cases.

8.5 Quarantine Requirements

The purpose of Quarantine is to allow the detection of those animals, which may be incubating a disease with a short incubation period and also to detect the clinical signs of disease with a longer incubation period. The quarantine premises must be appropriate for the species. Quarantine for all animals is a minimum of 30 days, however reptiles have a minimum of 90 days and the facility must have adequate thermal requirements for the individual needs of the species to allow thermal regulatory behavior.

Fecal examination, direct flotation, for protozoan (especially Cryptosporidia sp. And Amoeba sp.) and metazoan parasites. Three or more consecutive tests should be negative.

Culture faces for Salmonella sp. Note: 80% of reptiles can test positive for Salmonella sp. Evidence of infection may not preclude release.

Carry out complete blood count and PCV

Examine blood smears for haemoparasites.

Swab/nasal wash and examination for Mycoplasma sp. And Mycobacteria.sp.

Check for tick infestation.

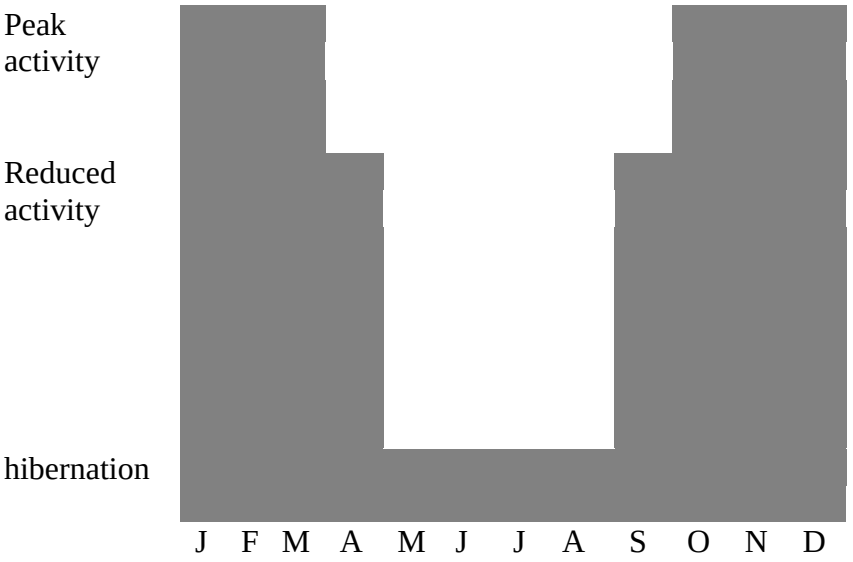
These tests should be undertaken by a veterinarian during quarantine

9 Behavior

9.1 Activity

Group Size can be between 6-16 individuals varying in size, age and sex

Spring through to summer is their peak activity period. March through to May is their reduced activity; thought they are still active until temps drop between 23-18degC, at witch they will begin hibernation.



9.2 Social Behaviour

Naturally occurring group size can range between 6-16 individuals. Very little aggression shown between the group.

They display a high tolerance towards each other of the same sex.

The finding of Kin recognition in E.stokesii suggests that family groups may be a component of social organization in E.s.badia and E.s.aethiops
(Main & Bull 1996; Bull et al 2000)

Social groups deposit fecal droppings in piles outside their refuges. This marks territorial boundaries to adjacent colonies.

Scat piles outside refuges Broken Hill. Photos by C.Jackson

9.3 Reproductive Behaviour

After winter cooling, courtship occurs in early spring through to early summer. Females give live birth (Viviparous) from December – March.

MORE RESEARCH IS NEEDED IN THIS AREA.

E.s.badia Information from the subspecies is limited to a single observation of a female from near Wubin, WA, giving birth to one live birth to one young on the 12th December. (Nankivell 1976)

For the species, Duffield & Bull reported litter sizes of 5.07 se +/- 0.29 (Range = 1-8; N = 29)
Young were produced between 15 February and 29 march in a population from near Hawker, SA (Duffield & bull 1996)

9.4 Bathing

As all species live in arid, semi arid or woodlands areas, very few permanent bodies of water would be available year round to bath.
However during rainy periods, animals will sit out in rain to drink. This helps in the cleaning of sand build up from between the scales.

9.5 Behavioral Problems

Gidgee skinks are social animals and should never be housed separately.
Their desire to be with others will increase anxiety they will become agitated and start pacing. Problems that stem from pacing are face rubbing on glass or cage doors inflicting injuries to snout or nose. Continuous handling for medication will increase stress levels and reduce immune system, refusal to eat and depression may set in and in sever cases, death may occur.

9.6 Signs of Stress

SIGNS OF STRESS	SYMPTOMS	REASONS WHY	HOW TO ELEVIATE SIGNS
Reduced appetite	Weight Loss Lethargic	Depression Inadequate environmental conditions. Incompatible cage mates	Compatible cage mates Correct environmental condition Varied diet Animal enrichment
Lack of Toileting	Compaction Constipation	Inappropriate food size Inadequate environmental condition	Increased temperatures Feed correct food item sizes Correct environmental condition
Pacing	Running up and down a well worn track along glass front of cage	Boredom Incompatible cage mates Not enough hiding places for all cage mates	Environmental enrichment Supply plenty of hiding areas House only members from same family group
Skin Shedding Problems	Retained skin	Inappropriate cage temperatures Dehydration	Supply fresh clean water always Correct environmental conditions
Digestive Problems	Regurgitated food	Food item size too big Incorrect environmental conditions	Feed appropriate food items Correct environmental conditions
Respiratory Problems	Breathing difficulties Gurgling sounds	Inadequate environmental conditions	Correct environmental conditions
Biting Keeper	Keeper Injury	Not used to being handled Handled Incorrectly	PPE Gloves
Mouth Rot (Necrotic Stomatitis)	Pussy mouth Mouth cannot close properly	Fighting Incorrect environmental conditions	Separate incompatible cage mates Correct environmental conditions

9.7 Behavioral Enrichment

It is important that animals are given things to enrich there daily lives. Training animals can be rewarding not only for the animal but the keeper as well. Particularly if the training helps us to do routine medical checks, or to brake dangerous or stereotypic behaviors. Captivity can be boring for most animals so giving an activity to the animal(s) every now and then can do wonders for there wellbeing. Creating an enrichment calendar for the week and keeping records of what works well what registers as a good response and even some negative responses so these activities can be repeated or improved for later dates.

Enrichment Calendar for Gidgee Skinks

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
A M	Scatter feed insects	Sent cage with herb spray	Fruit mix		Insect feed (locusts)	Browse	Flowers and herbs
P M	Browse	Spray down entire cage	Scatter feed insects	Place snake skin in cage for 20mins		Sent cage with herb spray	

9.8 Introductions and Removals

Individuals from other institutions must be quarantined for a minimum of six weeks before introducing to the main group. Females and juvenile males can be introduced without little disturbance to the group. Adult males however from non related groups, are not recommended to be introduced into a well established group, as aggression can be severe and deaths can occur. Instead it would be advisable to house new adult males in an enclosure separate to an established group, and introduce females to the enclosure.

If animals are removed for medical purposes time away should be minimized to reduce aggression on their return. Never return animals unless they have fully recovered from anesthetic/ surgery or are strong enough to respond if any aggression occurs. Observe all animals when first returned to exhibit.

9.9 Intraspecific Compatibility

Due to lack of information and limited captive specimens the only known mixed species exhibit is located at Desert Park in Alice Springs. The exhibit houses various species of birds including red robins , wood swallows and honey eaters as well as four gidgee skinks. There are no known diseases that will transfer from species to species and no aggression has been observed within the past twelve months between the species in fact they successfully bred their gidgees (one young) in the past breeding season.

9.10 Interspecific Compatibility

As discussed earlier Gidgee's are sociable animals and related males have a high tolerance of each other throughout the year with some dominant displays occurring during courtship only.

9.11 Suitability to Captivity

Gidgee skinks have proved to be very easy to maintain, they are hardy animals can be successfully bred and there food sources are easily obtained. They are innocuous animals making them keeper friendly and are great for public displays. Gidgee's would suit mixed species exhibits or make an impressive display on their own. Currently there are very few Gidgee skinks in captivity which is surprising when they are in real trouble in the wild. In short they are incredibly well suited to captivity and more institutes should embrace these very unique animals.

10 Breeding

10.1 Mating System

An adequate knowledge of the reproductive biology of this species is not yet known. Intensive captive management of *Egernia stokesii* needs to be addressed. Are they monogamous, polygynous, polyandrous, polygamous or a combination of these we don't know. Given that they live in colonies a combination of these mating systems may occur.

10.2 Ease of Breeding

There has been success in breeding *Egernia stokesii* at the Desert Park in Alice Springs. One young was recorded unfortunately little information was gathered. Comparing to similar species hosmeri and cunninghami these species are easy to breed under captive management , so it would be conceivable stokesii would be easy to breed as well. Triggers to make them breed like most reptiles and amphibians would be the detection of appropriate changes in humidity, temperature and light cycle.

10.3 Reproductive Condition

If the animals both male and female are not in good health with good body condition your chances of breeding will be reduced. As this will reduce the reproductive response and ability to produce healthy young.

10.4 Techniques Used to Control Breeding

Separate cages for males and females.

10.5 Occurrence of Hybrids

Not known for this species.

10.6 Timing of Breeding

Breeding is a seasonal occurrence for stokesii , courtship begins in spring through to summer. Females gestation can last for up to three months, with most births occur in March.

10.7 Age at First Breeding and Last Breeding

Breeding age for females is at eighteen months to two years where as males breed at three years of age.

10.8 Ability to Breed Every Year

If the females have a good balanced diet and regain condition after giving birth they will have the ability to breed every year from the age of eighteen months.

10.9 Ability to Breed More than Once Per Year

There is very little known about the breeding and for most reptiles that are viviparous they produce one clutch in a season, I can only assume this would be the case in stokesii.

10.10 Nesting, Hollow or Other Requirements

In many cases stokesii live in tree hollows or rock crevices so providing these would allow not only retreat or hiding areas but privacy to give birth. Wooden hide boxes or cardboard boxes would be a cheap alternative.

10.11 Breeding Diet

During the breeding season the diet should be high in protein and calcium lots of greens and plenty of vitamins.

10.12 Clutch Size

The average is one to three however they can have up to five young.

10.13 Age of Removal from Parents

There is no need to remove juveniles from their parents as stated earlier they are social lizards and tolerate up to sixteen individuals within the colony before the colony begins to become compromised and males will generally move to an adjacent colony.

10.14 Growth and Development

I have not found any solid information on the *stokesii* growth and development but look forward to updating this section in the future.

11 Acknowledgements

Thanks to Graeme Phipps for all of his advice and expertise on this manual.

A big thank you to Kate for all her help and computer expertise. I couldn't have done this without you.

Thanks to the Desert park for allowing me to use photos of their exhibits. And to the reptile department for there advice and information on there captive gidgees.

Thanks to my niece Teena for all your help during our trip to Broken Hill.

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14 Glossary

Abundance – present in great quantity

Anterior – situated at or near the front end of the body (head)

Arthropod – a group which includes insects, spiders and crustacea a member of the phylum arthropoda

Caudal – relates to the tail

Cloaca – the common chamber in reptiles into which the intestinal and reproductive and urinary ducts open the external opening of the cloaca is the vent or anus

Crepuscular – mostly active during twilight hours evening or early morning

Ectothermic – regulation of temperature largely by means of external heat sources

Lateral – pertaining to the sides

Mucus – is the slimy secretion derived from mucous membranes, such as those lining the nose, air passages, stomach, intestines etc

Omnivorous – feeding on both animals and plants

Ovovivparous – birth to live young which have developed in the oviduct. With little or no connection between fetus and mother

Posterior – pertaining to the hind part of the body

Snout vent length – the distance between the tip of the snout and the anterior opening of the vent measured along the vertebral line

Spinose – with spines

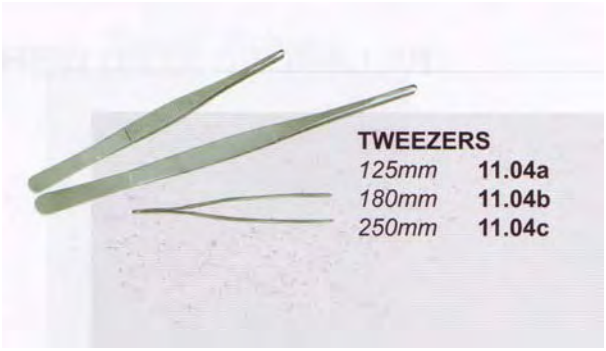
Ventral – pertaining to the lower surface of the animal

Viviparous – live bearing usually with connection between mother and embryo

Zoonoses – diseases communicable between animals and man

15 Appendix

(E.g. equipment details, suppliers and drug details)
The following products are supplied from the URS Ultimate Reptile Suppliers



MICROCLIMATE THERMOSTATS

The Microclimate thermostats are top of the range thermostats made in the UK. They are all fully wired with flexible probes attached making them not only high quality but also user friendly. Due to the varying uses of thermostats, there are a number of different products for different requirements. For further information, go to www.urswholesale.com.au

MICROCLIMATE ON/OFF THERMOSTATS

These are fully wired with a probe attached. All microclimate range of thermostats are high quality and made in the UK.

MINISTAT 100
75mm X 52mm X 27mm ON/OFF thermostat for controling up to 100 Watts of heating cords and mats only
04.100

MINISTAT 300
75mm X 52mm X 27mm ON/OFF thermostat for controling up to 300 watts of ANY HEATING source
04.300

MICROCLIMATE DIMMING THERMOSTATS

These regulate power output and dim the power source rather than turning it on and off. This method of temperature regulation allows you to use them with incandescent globes as the dimming prolongs the life of these globes. These thermostats can be used with all other heat sources also and control up to 600 watts.

B1 THERMOSTAT
101mm x 78mm x 41mm
Dimming thermostat for controlling up to 600 watts of ANY HEATING source
04.B1

B1ME THERMOSTAT
101mm x 78mm x 41mm
Dimming thermostat (with 'magic eye' for night time drop) for controlling up to 600 watts of ANY HEATING source
04.B1ME

B1ME/HT THERMOSTAT
Dimming thermostat (with 'magic eye' for night time drop) for controlling up to 600 watts of ANY HEATING source This unit can be set for higher temperatures than the standard B1ME model.
04.B1MEH

DL1 THERMOSTAT
101mm x 78mm x 41mm
Microprocessor based (with alarms) dimming thermostat for controlling up to 600 watts of ANY HEATING source
04.DL1

DL1ME THERMOSTAT
101mm x 78mm x 41mm
Microprocessor based (with alarms & 'magic eye' for night time drop) dimming thermostat for controlling up to 600 watts of ANY HEATING source
04.DL1M

MICROCLIMATE PULSING THERMOSTATS

These are Pulse proportional thermostats controlling up to 600 watts of any non light-emitting heat source. These thermostats are extremely accurate and great for use in vivariums or incubators!

<u>Not suitable for use with incandescent globes.</u>

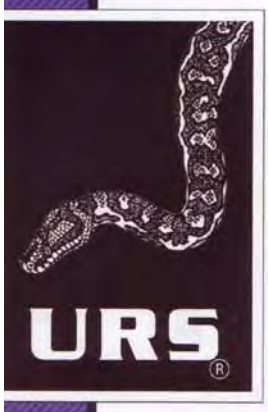
B2 THERMOSTAT
101mm x 78mm x 41mm
Pulse proportional thermostat for controlling up to 600 watts of NON LIGHT-emitting heat source
04.B2

B2ME THERMOSTAT
101mm x 78mm x 41mm
Pulse proportional thermostat (with 'magic eye' for night time drop) for controlling up to 600 watts of NON LIGHT emitting heat source
04.B2ME

B2/HT THERMOSTAT
Pulse proportional thermostat for controlling up to 600 watts of NON LIGHT-emitting heat source This unit can be set for higher temperatures than the standard B2 model.
04.B2H

DL2 THERMOSTAT
101mm x 78mm x 41mm
Microprocessor based (with alarms) pulse proportional thermostat for controlling up to 600 watts of NON LIGHT emitting heat source
04.DL2

DL2ME THERMOSTAT
101mm x 78mm x 41mm
Microprocessor based (with alarms & 'magic eye' for night time drop) pulse proportional thermostat for controlling up to 600 watts of NON LIGHT emitting heat source
04.DL2M



These Oz Purple globes are incandescent nocturnal heat lamps that are suitable for viewing nocturnal reptiles and their natural behaviour at night. Simulating natural moonlight, they will no disturb the animal while it is being observed. These globes also have the added benefit o radiating heat, allowing the animal to bask beneath them.

OZ PURPLE NIGHT
Heat & Light - Small
40 watt 04.80a
60 watt 04.80b
75 watt 04.80c
100 watt 04.80d
150 watt 04.80e

OZ PURPLE NIGHT
Heat & Light- Large
75 watt 04.125a
100 watt 04.125b

The purple globe simulates moonlight and is a great aid fo those wanting to view the nocturnal behaviour of thei animal. An added benefit is tha the purple globe also emits heat.

OZ MOON NOCTURNAL
Heat and Light
40 watt 04.95a
60 watt 04.95b
75 watt 04.95c
100 watt 04.95d

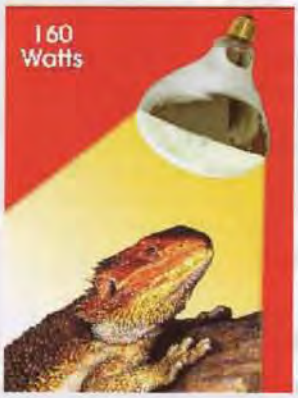
These Infrared Spot Lamps are an ideal way of keeping your herps warm and are great for being able to view them at night without disturbing them. These lamps are great value for money, being ES globes.

INFRARED SPOT LAMP
40 watt 04.17a
60 watt 04.17b
75 watt 04.17c
100 watt 04.17d
150 watt 04.17e

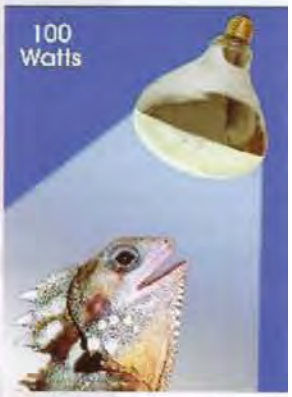
BASKING SPOT GLOBE
40 watt 04.33
60 watt 04.33a
75 watt 04.33b
100 watt 04.33c
150 watt 04.33d

The Basking spot bulb is a broad spectrum UVA daylight bulb for providing a basking area for your reptile. The UVA benefits the animal by increasing appetite and activity. Alternate this globe with either the infrared or Oz purple globe to simulate a day and night period of lighting with the benefit of heating for your animal.

DAY BLUE BULB
60 watt 05.07a
100 watt 05.07b



OZ BRIGHT
UV Heat & Light 04.20b
160 watt



OZ BRIGHT
UV Heat & Light 04.20a
100 watt

The flood style Oz Bright Heat and Light bulbs produce UVB, UVA, LIGHT and HEAT and are available in two wattages. These bulbs are one of the most effective ways of simulating daylight, providing UV and also producing heat. Oz Bright Heat and Light bulbs are self ballasted Mercury Vapour lamps that are screw in. Use with the Lamp 'N' Clamp or other ceramic ES fitting.

If you need any reptile product I would recommend you contact URS
6 High street, Dry Creek SA 5094
PO Box 11 Enfield Plaza Enfield SA 5085
Phone: (08) 82629162 Fax: (08) 82629164
Email: sales@urswholesale.com.au
Website: www.urswholesale.com.au

For live insects contact Critter Snax
Phone: 0425200309
Or contact Peter Birch peter@colourfulcritters.com

For information on breeding your own insects I would recommend you buy the book Professional Breeders Series Live food F. Bruse , M . Meyer , W . Schmidt. The book has everything you would ever need to know about breeding a range of insects and can be purchased on Mike Swan Herp Books.

Annual Cycle of Maintenance Activities for Gidgee skinks

Breeding season												
Enclosure renovations												
Full clean of exhibit												
Enclosure repairs												
Routine health check												
Annual vet check												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC