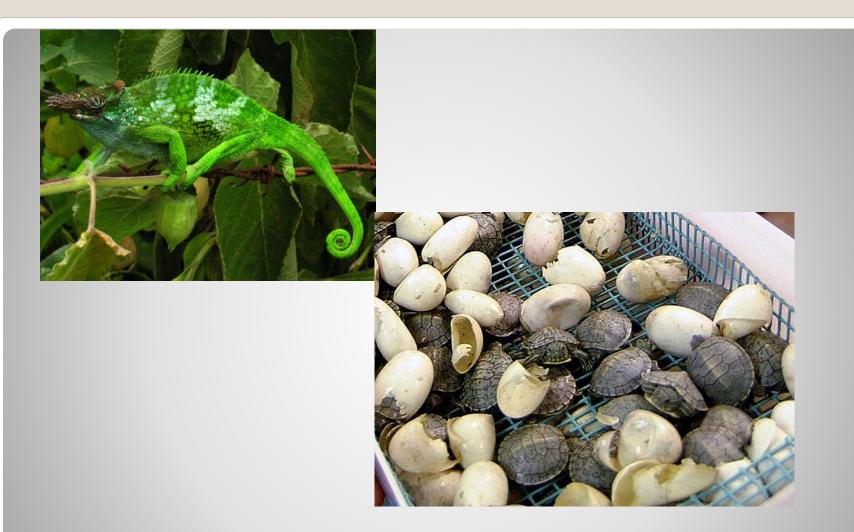
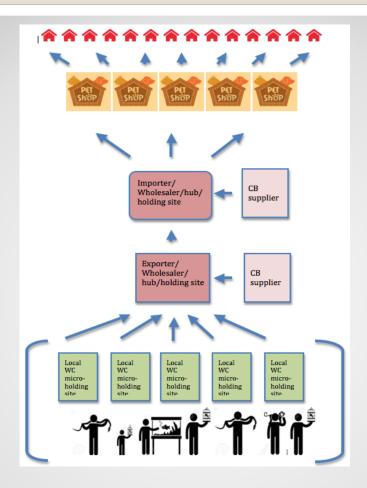
Reptile pets: sourcing, stress and sociobiology

Canada 2018

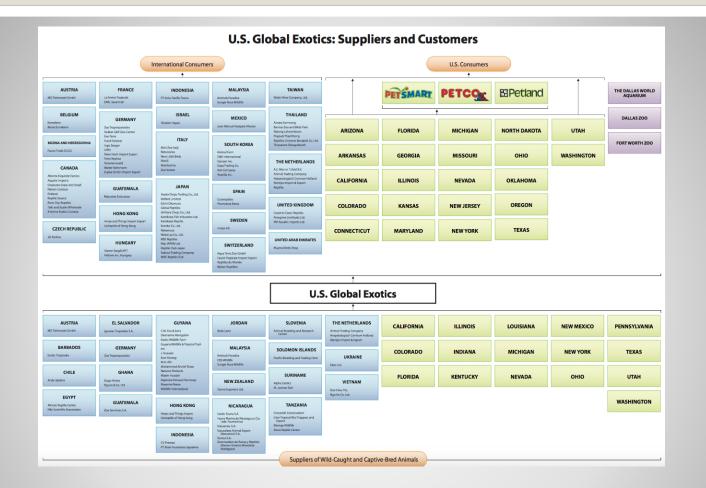
Clifford Warwick PGDipMedSci CBiol CSci EurProBiol FOCAE FRSB Biologist & Medical Scientist



Animal sourcing and distribution Photos: Alex kokourek; iStock; LSUAgCenter



A bigger supply and distribution picture! icons: Icons123rf, Freepik.com, Iconshut.com



Supply and distribution chain for a single wholesaler

• From

- 22 countries
- 16 States

• To

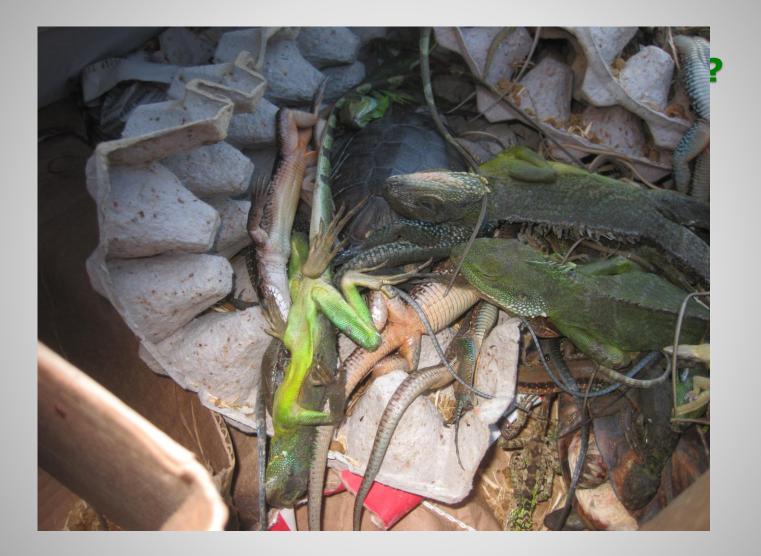
- 25 Countries
- 22 States

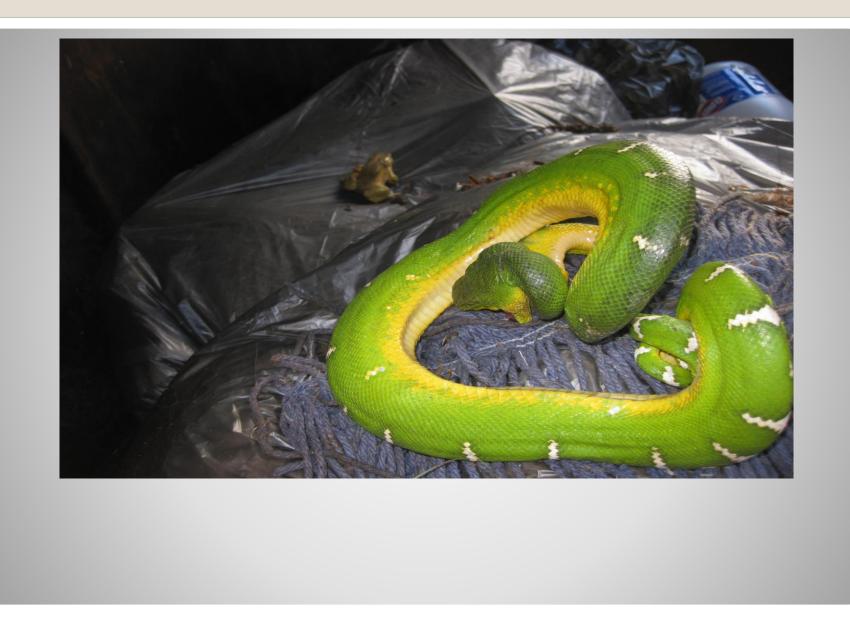
USGE Consignments received and shipped

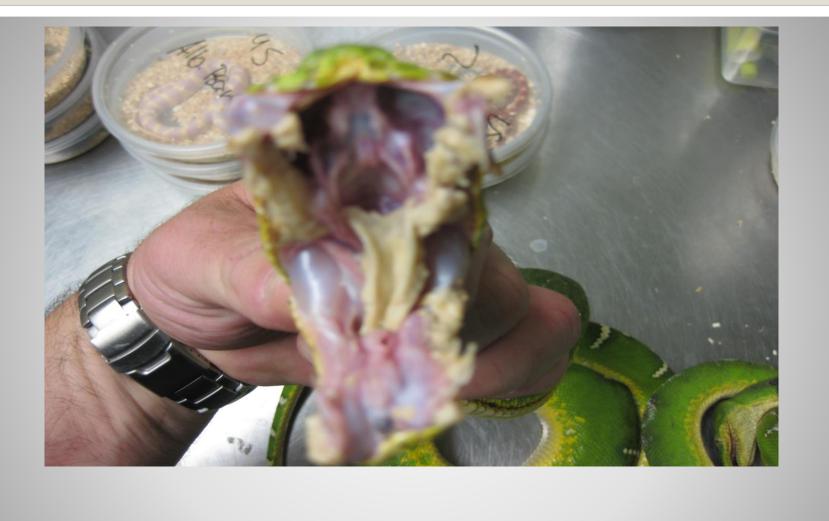
Animal welfare: stressed and sick animals spread disease

- 26,400 animals on site
- 80% were sick, injured, or dead
- around 3,500 dead and dying animals (12% of stock), mostly reptiles, being discarded on a weekly basis (=1.7% per day).



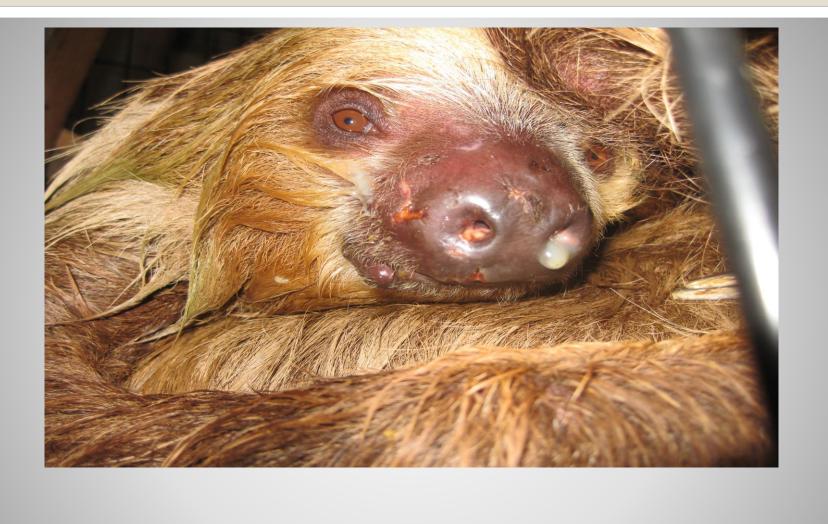


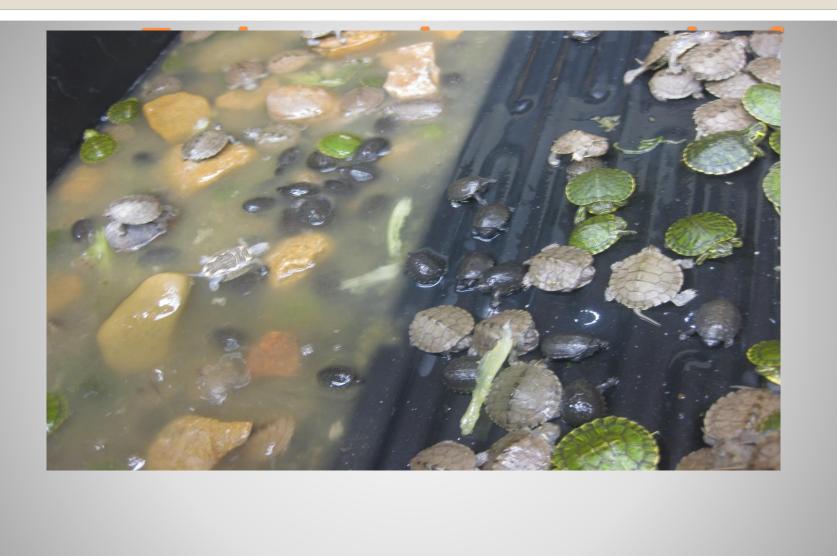






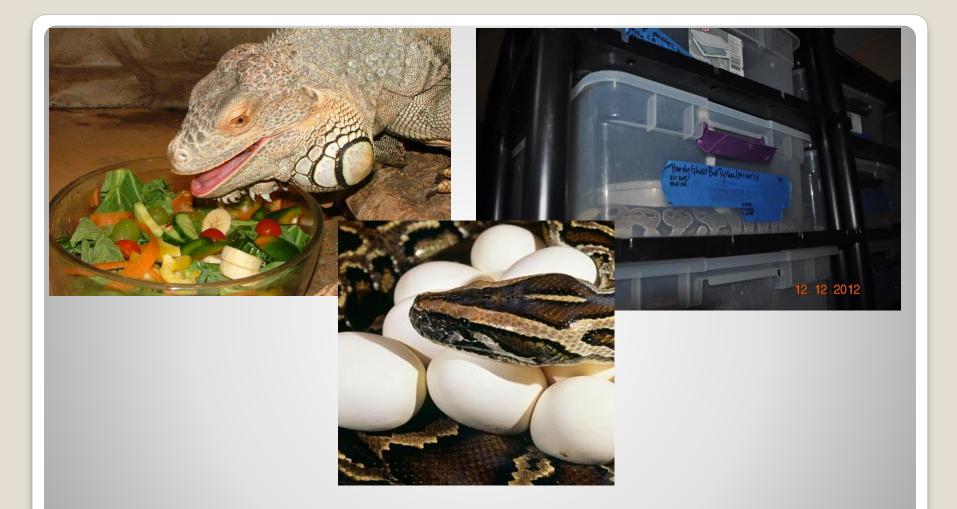






75% of reptiles do not survive 1 year in the Home (Toland et al, 2012)

Dying to be pets



Folklore husbandry

- `Reptiles wouldn't feed, grow or breed if they were stressed by captivity'
- 'Snakes are insecure in large spaces'
- 'Snakes are agoraphobic'
- 'Snakes don't use and don't need space'
- `Snakes don't need to stretch out'

Folklore husbandry



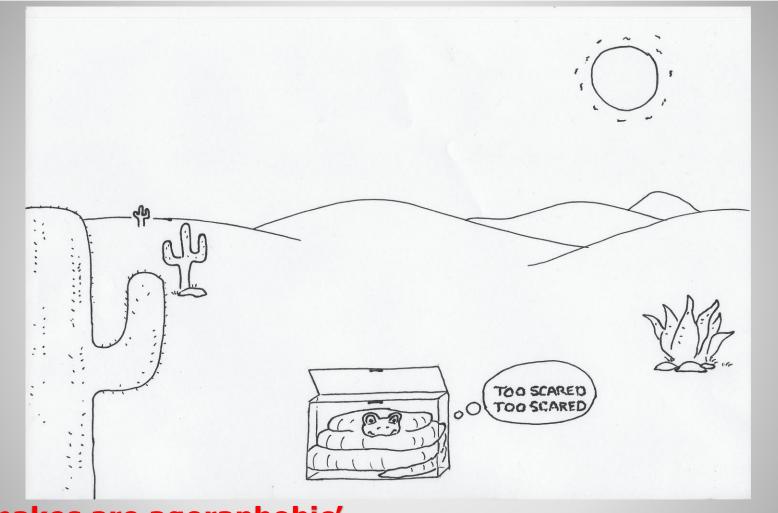
'Reptiles wouldn't feed, grow or breed if they were stressed by captivity' False!

Photo credit: Compassion Over Killing/Wikipedia



'Snakes are insecure in large spaces' False!Pho

Photo credit: Brocken Inaglory Wikipedia



'Snakes are agoraphobic' False!



'Snakes are insecure in large spaces' False!

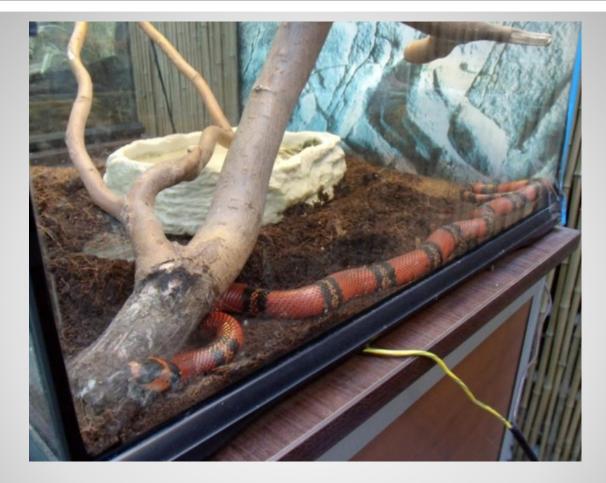
Example home ranges for snakes

- 59.9ha, averaging 7.9ha, individual snakes travelled average 273m per move. Baxley & Qualis (2009
- 92 396ha, single movement events of 338m. Hamilton (2009)
- 21.1ha 39ha. Miller et al. (2012)
- 33ha and 1,528ha Hyslop et al. (2013
- 44ha 76ha, and 156ha 202ha for males and females respectively. Breininger et al. (2011)
- 22.5km². Hart et al. (2015)

'Snakes don't use and so don't need space' Then open the cage doors and find out!



'Snakes don't need to stretch out' False! Straight line body posture



'Snakes don't need to stretch out' False! Straight line body posture



`Snakes don't need to stretch out' False! Attempted straight line body posture



'Snakes don't need to stretch out' False! Attempted straight line body posture



Snake racks Photo credit PETA

- In our recent study of snake behaviour in captivity, more than one-third of snakes were found to adopt a straight line posture within just 1 hour of observation.
- Our survey of clinicians identified 22 behavioural and medical conditions directly associated with housing snakes in small enclosures.

The smaller the cage, the greater the problems!



Inside a snake rack Photo credit PETA

 "Once I couldn't even spell 'Erpatologist' and now I are one!" (Tom Huff)

 Most 'herpetologists' are no more a herpetologist than a cat owner is a 'mammologist'

Real herpetologists and 'erpers!







Petsmart



Petsmart







Petsmart



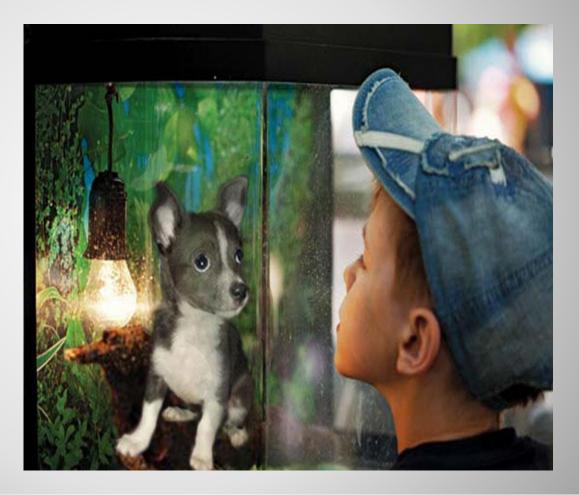
Swamp

Would not accept

Strongly contraindicated

A. Cumulative/ intensified hygiene problems

B. Negative animal welfare compounding issue



Should not accept



Bad becomes normal

A. Greater pathogen diversity/ prevalence

B. Greater compounding animal welfare issues

Cognitive, emotional and social capabilities of reptiles and amphibians

- Problem solving
- Use buttons
- Play
- Memory year on year
- Eye contact

Photo Pere Soler



gy, College Gates, 2 Deansway, Worcester, WR1 23D (Gt. Britain) ntion 14 November 1989)

N. Ansterdam — Printed in The Notherlands blogy In Captivity: Observations of as and an Evaluation of Their

). Reptilian ethology in captivity: observations of some problems and an avaluwere made of > 4000 repulses maintained in captive situations to assess numerous vere mane or z ann reponse manuamen in captive structures to assess numerous viours and any related environmental and other influences. Certain behavioural NOURS and any related environmental and other influences. Certain behavioural trans concern because they regult to physical injuries while others are primarily they achieve the reconstruction of the momentum contactor in the better. Reconstruction utants concern because they result to physical mutures while others are primarily bited ethological expression; this paper concernates on the latter. Hypersonicity, nues convenent expression; the paper concentrates on the latter. Hyperscheidy, persecution from other occupants, disposition related environmental temperature PERSONANT, FOR OTHER OCUPARIES, OSPECIAL-SPACE EXPERIENCE IN PERSONAL PROPERTY AND A SUPERIOR OF A DAY nemention with same purch courseries and assession are a reversimples of abror for realiting from curcept and design deficient artificial environments, and all may prove describilities and environments artificial environments and a second second second second second second s the resulting from concept- and ceogn-dencient articles environments, and all may poor idaptability and environmentally induced trauma. It is probable that the adapt

proof seapranusty and environmentally induced training. It is produced that the fundamental of the fundamental services meeting in a substantially compromised by the fundamental services meeting and the substantially compromised by the fundamental services and the substantial services and the substant services and the substantial ser erentee to unnatumi environments is substantially compromised by the turodamental principle of their innate education system which results in greatly reduced susceptibility function in a superson useance influences. portance of a gound knowledge of a species natural life style (wherever possible prior to portance of a sound knowledge of a species natural rite style (wherever possible prior to Disition.) is to be emphasised if preventative action regarding abnormal behaviour and unation) is to or emphasissing a preventative action registring abnormal behaviour and 1918 of current problems are to be choroughly addressed. Very 'ittle work has been done or 1919 and sectors and the company of another and the sector of a ens of current prodents are to be thoroughly andressed, very ittle work has been done on ject probably because natural behaviours of repilles may present observational difficulties when there it and how to be the production of the balance behaviour of the second statement of the second state use: pronatory cercuse natural benav;ours of rep;ties may present observational attrictures cause "lover" vertebrates are often perceived as being highly adaptable to captivity and

errant low priority.

Reptilian ethology in captivity has been neglected in comparison with, for Republic comparison with for a comparison with comparison of the effects of a comparison of a comparison of the effects of a comparison of a comparison of the e in the second state of the icial environments on repute occupants, in particular those which potentially have traumatic influences, are rarely scrutinised or described. This is a disapple of the second se nove commons introduces, are rarely acrumined or described. This is a disap-pointing situation because there are many opportunities for study among herpointing situation occause there are many opportunities for solary among her-petological collections internationally. The lack of common investigation of

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Health and Welfare of Captive Reptiles

Edited by Clifford Warwick Fredric L. Frye and James B. Murphy

SPRINGER-SCIENCE +BUSINESS MEDIA B.V.

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	Applied Animal Behaviour Science 147 (2013) 286-298 Contents lists available at SciVerse ScienceDirect Applied Anima I n
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for captive population of the second	l enrichment and cognitive complexity in phibians: Concepts, review, and impliant
Gordon M. Burghardt	l enrichment and cognitive complexity in Ophibians: Concepts, review, and implications
ARTICLE INFO Article history: Received a start	Minimary Biology, 1404 Circle Drive, University of Tennessee 1
Keywords: Repeile	Reptiles and amplify
Amphibians Enrichment Controlled deprivation	Reptiles and amphibians have been neglected in research on cognition, eme need for enriched and stimulating environments, and other topics that have enriching captive environments to reduce boredon. This is also evident but have psychological well-being. This paper provides that and environments and amphibians a birefer to reduce boredons responsible for the complexity and the role of concepts, methods and to for the topic for the Most work has been done.
estate Behavior Cognition Enotion Play	comparison and the second seco
	await those willing to study them and aquariums are important reso technology now available.
ntroduction	© 2013 Elsevier B.V. All rights ress

1. In

There is increasing interest in improved methods for increase in increasing interest in improved internous for managing captive reptiles and amphibians (Murphy et al., managang capture expenses and antiputomatic (concepting taking) 1994; Schaeffer et al., 1992; Warwick, 1990; Warwick and the second statements of 1504, Stractier et al. 1906, Valver, 1000, Valver, 1000, Valver, et al., 1995). Unfortunately, there is still a serious dearth et an. 1990/ Otherstatery, there is out a determined and of a determined and of a determined and of the determined and of the determined o or entryments a subset of simon supervise or struct on the state of a structure of the state of a structure of the state of structure of the binder of back or structure of the binder of back or structure of the binder of the b atoris, rest i will be the state approximate so that the state of of behavior, provide a brief overview of the kinds of behav. ioral complexity seen in these animals, and discuss some toral complexity seen in trace and the source of the sourc sciences that should be considered by those maintaining scrousness that stroute be considered by those maniness herpetological exhibit and research collections. This is all

 Corresponding author, TeL: +1 865 974 3300; fax: +1 865 974 9530.
E-and Authorization Automatics and authorization automatics automatics and automatics automaticated automatics automatics automatics automaticated automatics automaticated automatics automatics automatics automaticated automatics automaticated auto 0168-1591/8 - see front matter © 2013 Elsevier B.V. All rights reserved.

preparatory to a discussion of the concepts of 'environ preparations to a use to an interaction of the total state of the stat internation transformed to the processing of the state of or emancing the psychological and being noted we investigation of captive animals and a critical review of the still sparse, or captive animals and a critical screen or internal managements but growing, literature on reptiles and amphibians. Stress but growing increase on replace and amprovements success and other physiological consequences of captivity are also inportant (e.g., Greenberg, 1992), but will not be treated important (e.g., strenderg, 1556), but with the tertante here except as ancillary measures. Due to the available life nere except as antinary measures, true to the avanable me erature, amphibians will be less covered than nonavian reptiles; regardless, the depth of information and application guidelines found for some domesticated species (e.g., pigs, Van der Weerd and Day, 2009) can scarce by (C6, Pgs, var) des precis and case (core) (and sensitivity of expected. Nonetheless, I suggest that the applied trainexpectice, nonecificress, i studiets that the approximation ing and enrichment methods used in zoos, aquariums, and the studiets and the studiets of the studiets and the studiets of the stud ng ang ennennen mennon usen n 2005, aguaranna, an Wildlife parks, properly carried out and reported, care encirch winding pairs, property carried out and reported carried as a cademic studies of behavior as well as enhance the lives ecauciin, suunes oi ociaviui as reci as ciulante lue i of those entrusted to our care (cf., Hosey et al., 2009).

Psychological (cognitive, mental)

- Innateness & hard-wiring
- Stimulation/arousal/alertness (environment, searches, social interaction)
- Understimulation ('boredom') lack of above

Ethological (behavioural, psychosocial, social)

- Spatial needs & overly restrictive environments
- Environmental needs & provisions
- Conspecific interaction (positive & negative)

Table 1: Behavioural signs of captivity-stress

Behaviour	Sign	Possible cause
Interaction with transparent boundaries (ITB)	Persistent (up to 100 per cent activity period) attempts to push against, crawl up, dig under or round the transparent barriers of enclosure	Related to exploratory and escape activity. Self-compounding and destructive. Inherent psychological organisation and adaptational constraints result in failure to recognise abstract invisible barriers
Hyperactivity	Abnormal high-level physical activity, surplus or redundant activity	Often associated with ITB. Overcrowding. Self-compounding and destructive. Overl restrictive, deficient and inappropriate environments
Hypoactivity	Hypothermia, disease, injury, pain, co-occupant harassment	Too low temperature, infection/organic dysfunction, falling, dropping, co-occupant attack, transport trauma, occupant harassment
Anorexia	Hypothermia, disease, injury, pain, co-occupant harassment	Too low temperature, infection/organic dysfunction, falling, dropping, co-occupant attack, transport trauma, occupant harassment
Hyperalertness	Abnormal high level of alertness 'nervousness' to environmental stimuli	Often related to fear, defence and escape behaviour. Common in overly restrictive, and exposed, deficient and inappropriate environments
Rapid body movement	Abnormal 'jerky' locomotor or jumping actions	Often related to fear, defence and escape behaviour. Common in overly restrictive, and exposed, deficient and inappropriate environments
Flattened body posture	Flattening of body against a surface often combined with hyperalertness	Often related to fear, defence and escape behaviour. Common in overly restrictive, and exposed, deficient and inappropriate environments
Head-hiding	Deliberate seclusion of head including under objects or substrate	Often related to fear or ambient light/photo stress behaviour. Common in overly restrictive, and exposed (including excessive ambient light for nocturnal species), deficient and inappropriate environments
Inflation of the body	Deliberate (often repeated) inflation and deflation of the body. May or may not be associated with 'hissing' sound	Often related to fear, defence and escape behaviour. Common in overly restrictive, and exposed (including light for nocturnal species), deficient and inappropriate environments
Hissing	Hissing sound, accompanied with deliberate repeated inflation and deflation of the body	Often related to fear, defence and escape behaviour. Common in overly restrictive, and exposed (including excessive ambient light for nocturnal species), deficient and inappropriate environments
Co-occupant aggression	Aggressive or defensive displays, biting, chasing cage mates	Often related to courtship routines, inability to avoid cage-mates when required, overly restrictive, and exposed deficient and inappropriate environments. Hunger
Human-directed aggression	Mock/real strikes using jaws or tail	Often related to fear, defence and escape behaviour. Common in overly restrictive, and exposed (including excessive ambient light for nocturnal species), deficient and inappropriate environments.

124 In Practice March 2013 | Volume 35 | 123-131

EXOTICS

(Table 1 continued)		
Clutching	Snake or lizard tightly grasps human or object	Often related to fear or ambient light/photo stress behaviour. Common in overly restrictive, and exposed (including light for nocturnal species), deficient and inappropriate environments
Death-feigning	Animal (commonly snake) appears limp, upside- down, unconscious	Often related to fear
Loop pushing	Snake uses 'arch' of body to resist/deflect physical contact from cage-mate or human	Often related to fear or ambient light/photo stress behaviour. Common in overly restrictive, and exposed (including light for nocturnal species), deficient and inappropriate environments
Freezing	Eye contact with or general presence of observer results in freezing posture/tense immobility	Often related to fear or ambient light/photo stress behaviour. Common in overly restrictive, deficient and inappropriate environments
Grating of jaw	Turtles and tortoises tightly rasp together ramphotheca causing an abrasive grating sound	Often related to fear or light stress behaviour. Common in overly restrictive, and exposed (including ambient light/photo for nocturnal species), deficient and inappropriate environments. Pain
Hesitant mobility	Animal uncharacteristically moves in 'fits and starts'	Often related to fear. Common in overly restrictive, inappropriate environments
Wincing	Hypersensitivity to minor stimuli causing retraction of head, limbs or tail	Often related to fear. Common in overly restrictive, inappropriate environments. Pain, disease
Prolonged retraction of head, limbs or tail	Tortoises and turtles retracting head, limbs or tail for minutes or longer	Often related to fear, pain, disease
Open mouth breathing	Sporadic, usually slow, open-mouth respiration or gasping	Hyperthermia, infection/organic dysfunction/disease, major head/neck injury, falling, dropping, co-occupant attack, transport trauma
Panting	Rapid open-mouth breathing, sometimes accompanied by extension of dewlap (skin flap under lower jaw in lizards). Also, cloacal evacuations may occur	Hyperthermia
Cloacal evacuations when handled	Urination, defecation, excretion of malodorous substance from cloaca	Often related to fear
Projection of penis or hemi-pene	Projection of penis or hemi-pene associated with human presence or contact	Often related to fear
Voluntary regurgitation of food	Regurgitation of food associated with human presence or contact	Often related to fear
Tail autotomy	Voluntary autotomy of tail (some lizards) associated with human presence or contact	Often related to fear
Pseudovocalisation	Crocodilians, some lizards and turtles producing squeaks or whines (aside from sexual context)	Often related to fear, physical irritations, pain, injury, disease
Venom spitting	Venomous snakes ejecting venom associated with human presence or contact	Often related to fear
Squirting blood from eye	Some lizards eject blood from eye associated with human presence or contact	Often related to fear
Pigmentation change	Typically some lizards (especially chameleons) change colour – may be rapid or slow	Often related to fear, pain, hyperthermia, hypothermia, overly restrictive, deficient and inappropriate environments, injury, disease
Atypical locations	Reptile occupies an atypical location for an unusual amount of time or other unusual context (eg, an arboreal chameleon on cage floor)	Often related to disease, injury, discomfort, co-occupant aggression, hyperthermia, hypothermia

Table 2: Behavioural signs of quiescence and 'comfort'

Behaviour	Sign	History
Normal/relaxed alertness	Relaxed interest/awareness in proximate or novel objects, relaxed visual explorations	Normal environmental investigation
Calmly smelling or tasting objects or air	Calm chemical sample of surrounding	Normal environmental investigation, food searches
Subtle changes in body posture and orientation	'Stretching out' of limbs while basking, relaxed adoption of body angles using furnishings, etc	Normal thermoregulatory behaviour and rest
Unhurried body movements and locomotion	Relaxed environmental exploration	Normal environmental investigation, food searches
Moderate to relaxed grasp on handler or object	Snake or lizard maintains relaxed (but possibly firm) grasp on human or object	Normal relaxed behaviour and rest
Relaxed drinking	Unhurried drinking	Normal maintenance behaviour
Relaxed feeding	Unremarkable feeding habits	Normal maintenance behaviour
Relaxed breathing	Unremarkable breathing habits	Normal relaxed behaviour
Physical quiescence	Unremarkable relaxed activity, eg, free from apprehension and fear activities	Normal relaxed behaviour

Exploratory/ search behaviour



Hyperactivity





Common captivity-stress behaviour Interaction with transparent boundaries



Common captivity-stress behaviour Interaction with transparent boundaries

Sedentary behaviour/ Biological shut-down



Hypoactivity

Social dependence

Social/antisocial tendencies





Social needs http://www.brackenbird.com/lovebirds

Special Issue R9

Play in fishes, frogs and reptiles

Gordon M. Burghardt

What animals engage in play? Not too many years ago play was considered by most scholars and scientists as something we see in rather intelligent warm-blooded animals, such as monkeys and apes, dogs, cats, elephants, otters, bears, and some birds, such as crows and parrots. Of course, horses play, especially young ones: the origins of the phrase 'horsing around' are not hard to fathom. In fact, many other mammals play, including marsupials such as wombats and kangaroos. Indeed, the play behavior of no animal has been studied as much as that of the laboratory rat: Serge and Vivien Pellis wrote a book largely devoted to reviewing some of the

should: (1) be incompletely functional in the context in which it appears; (2) be spontaneous, pleasurable, rewarding, or voluntary; (3) be different from other more serious behaviors in form (for example, be exaggerated) or timing (for example, occur early in life, before the more serious version is needed); (4) be repeated, but not in abnormal and unvarying stereotypic form (for example, rocking or pacing); and (5) be initiated in the absence of severe stress. In a single sentence: play is repeated, seemingly nonfunctional behavior differing from more adaptive versions structurally. contextually, or developmentally, and initiated when the animal is in a relaxed, unstimulating, or low stress setting (Burghardt, 2014).

Applying these criteria allows us to determine if a possible example of animal behavior satisfies all the criteria or just some of them, pointing to others that we need to investigate and apply. But even when the five



Figure 1. A young Nile soft-shelled turtle interacting with colored rings. (Photo: Gordon M. Burghardt.)

Game changer!

Problems

- Trade sourcing and practices out of control
- Captive breeding no panacea
- Demand created by disinformation
- Folklore husbandry pervasive
- Reptiles typically unsuitable as pets

Solutions

- Bans
- Positive lists of approved only species
- Pet labelling
- Only scientific, objective information permitted

Summary of the issues & Solutions