

**THE BRITISH
HERPETOLOGICAL SOCIETY
BULLETIN**



**No. 51
Spring 1995**

THE BRITISH HERPETOLOGICAL SOCIETY

*c/o Zoological Society of London
Regent's Park, London NW1 4RY*

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The British Herpetological Society was founded in 1947 by a group of well-known naturalists, with the broad aim of catering for all interests in reptiles and amphibians. Four particular areas of activity have developed within the Society:

The Captive Breeding Committee is actively involved in promoting the captive breeding and responsible husbandry of reptiles and amphibians. It also advises on aspects of national and international legislation affecting the keeping, breeding, farming and sustainable utilisation of reptiles and amphibians. Special meetings are held and publications produced to fulfill these aims.

The Conservation Committee is actively engaged in field study, conservation management and political lobbying with a view to improving the status and future prospects of our native British species. It is the accepted authority on reptile and amphibian conservation in the UK, works in close collaboration with the Herpetological Conservation Trust and has an advisory role to Nature Conservancy Councils (the statutory government bodies). A number of nature reserves are owned or leased, and all Society Members are encouraged to become involved in habitat management.

The Education Committee promotes all aspects of the Society through the Media, schools, lectures, field trips and displays. It also runs the junior section of the Society - THE YOUNG HERPETOLOGISTS CLUB (YHC). YHC Members receive their own newsletter and, among other activities, are invited to participate in an annual "camp" arranged in an area of outstanding herpetological interest.

The Research Committee includes professional scientists within the ranks of the Society, organises scientific meetings on amphibian and reptile biology and promotes The Herpetological Journal, the Society's scientific publication.

Meetings

A number of meetings and events take place throughout the year, covering a wide range of interests.

Publications

The BHS Bulletin, Herpetological Journal and YHC Newsletter are all produced quarterly. There are in addition a number of specialised publications available to Members and produced by the various Committees, such as notes on the care of species in captivity, books and conservation leaflets.

Subscriptions

All adult subscriptions become due on the first day of January each year. Payment by Banker's Order is much preferred.

Ordinary Members	£20	(Receive Bulletin only)
Full Members	£25	(Receive Bulletin and Journal)
Family Members	£30/£37.50	(Without/with Journal) Family members with children also receive the YHC Newsletter
Student Members	£18	(Receive Bulletin and Journal)
Institutional rates	£36	(Receive Bulletin and Journal)
YHC (Age 9-18):		
Basic Membership	£6	(Receive YHC Newsletter)
Bulletin Membership	£12	(Receive Newsletter and Bulletin)
Group Membership	-	For Schools, Youth Groups etc. Contact Education Officer (Address on inside of back cover) for details)

Correspondence, Membership applications, subscription renewals and purchase orders for publications should be addressed to the Secretary (address as at page top) EXCEPT for YHC matters. YHC Membership and renewal details are available from the Education Officer (address on inside of back cover). PLEASE INCLUDE A STAMP-ADDRESSED ENVELOPE WHEN WRITING TO THE SOCIETY.

The Society does not, as a body, hold itself responsible for statements made or opinions expressed in the Bulletin; nor does the Editorial necessarily express the official opinion of the Society.

The Bulletin is edited and produced by
Simon Townson and John Spence.

Contributions and correspondence arising from the Bulletin should be sent to:
John Spence, 23 Chase Side Avenue, Enfield, Middlesex EN2 6JN

FRONT COVER

Green Iguanas (*Iguana iguana*), see article by S. Divers on page 8.

BRITISH HERPETOLOGICAL SOCIETY REMAINING MEETINGS FOR 1995

Meetings are usually held at Birkbeck College, Malet Street, London WC1, unless otherwise stated.

May 21st "Leapers & Creepers" events, organised by Surrey Wildlife Trust, followed by later (7-9 pm) visit to Beam Brook*.

*For those unfamiliar with Beam Brook, this is an old nursery site with a series of small ponds near the village of Newdigate (south of Dorking) in Surrey. Since 1905 it has been home to a variety of both native and introduced species of amphibians and reptiles, and is particularly renowned for its colonies of edible frogs, Italian crested newts and alpine newts. BHS Members may either turn up at 7 pm at the Beam Brook site, or go there following attendance at the "Leapers & Creepers" session that runs through the day and should finish by 5 pm (for more details, contact Julia Wycherley on 01737 643827). There will be no charge for entry, and Members will be allowed to examine and net the various ponds during the visit (but not to take away any animals caught).

For those going directly to Beam Brook, the nursery is situated in Partridge Lane approximately 1 mile due east of Newdigate village (map ref. TQ 216423). It is reached from Newdigate by taking the road leading out to the north-east, which after about a mile turns south-east and becomes Partridge Lane. Beam Brook is signed on the west side of the road.

May 27th Mark Hewick and Gavin Murray, "Breeding reptiles commercially for the pet trade". Birkbeck College, 5-7 pm.

July 29th Paul Eversfield, "Chelonians in captivity". Birkbeck College, 5-7 pm.

August Family Reptile Holidays in Dorset. Combine your family holiday with field Herpetology and socialize with other members staying at a Field Centre. Events for all the family. Outdoor vivariums on site.

For full details of this BHS event please send a large S.A.E. to the BHS Education Officer, address on inside back cover. Deadline for booking 1st July.

October 7th (Provisional) Joint BHS/IHS meeting. Dr. Wolfgang Böhme (eminent German herpetologist) and Eugene Blessett (American python/boa breeder). Woolaton Hall Nature Centre, Nottingham.

October 14th October General Meeting. Stephen Divers, "Mortality and disease of imported Royal Pythons"; Rob Quest, "Reptile imports"; Mary Swan, "Results from the National Amphibian Survey". Birkbeck College, 1-5 pm.

November 11th Annual BHS CBC Stock Sale. New Denham Community Centre, Bucks (off M40, J1), 2-6 pm.

Birkbeck College is situated in Malet Street, London, WC1. Nearest tubes are Goodge

Street, Russell Square, Tottenham Court Road and Euston Square. Limited free parking in the University of London car park, entrance in Malet Street.

BHS NORTH WEST MEETINGS 1995

April 18th	Reptiles, Amphibians and invertebrates of the rainforest. Ian Wileman.
June 13th	Reptiles and Amphibians of Spain. Bob Worthington.
August 5/6th	Reptile Rally. From 10.30 until 5.00 pm. Exhibition of native and exotic species.
October 10th	Yet to be decided.
December 5th	Yet to be decided.

All meeting commence at 8.00 pm except where stated and are all held at Wildfowl and Wetlands Centre Martin Mere, Burscough, Lancs. Tel: 01704 895181

BHS ANNOUNCEMENT

The British Herpetological Society (BHS) wishes it to be known that it has no connection or involvement with the company trading as British Herpetological Supply (BHS).

MEMBERS' ADVERTISEMENTS

FOR SALE: Captive bred juvenile Boa Constrictors, 1994 off-spring of a Surinam Red-Tail (*constrictor*) and a Colombian (*imperator*). Beautifully marked and feeding well. Also captive-bred 1994 female Miami Corn Snake and adult Alpine Newts. Can supply frozen pinkie mice at £20 per hundred. Simon Townson. Tel. 0181-531 1378.

FOR SALE: Fire Salamanders (*Salamandra s. gallaica*), this year's young, £8.00 each. John Spence Tel. 0181-366 8127.

CAPTIVE BREEDING COMMITTEE REPORT

When I first took over the CBC in the winter of 1991/92 there had not been a regular input from the Captive Breeding Committee for some time and it was thought that the Society needed some form of resurrection of input on this front. One of the first things we did was to create the Captive Breeding Open Day at Birkbeck College. This proved to be a great success as it was one of the few shows that specializes in captive bred stock only, at the time. Further to this it generated enough income to substantially help in the production of updating the by now out of date care sheets and arranging several eminent speakers from overseas to lecture at BHS Meetings. We also, with the help of a sympathetic veterinary surgeon, professional parasitologist and bacteriologist helped to set up an independent organisation aimed at aiding the professional and amateur herpetologist, conservation, scientific or captive breeding minded groups of the herpetological community. This in the long term could prove to be one of the most beneficial things to have been achieved for the good of reptiles and amphibians in captivity and in the wild. This group and its ideology was set up by a practising veterinary surgeon by the name of Mark Geach and its potential has as yet been used only in an embryonic way.

These past years have not been without their problems from changing legislation, some good, some bad. Animal rights activists have also played a part in our problems when trying to organise members days, these are primarily for the membership to sell, buy and exchange captive bred animals, discuss husbandry techniques and generally chew over the advances in captive propagation of new and difficult species. The obstacles placed in our way to prevent us from running such events have been a major problem. Other things we have been asked to do were to produce a list of 12 species recommended as suitable for the beginner in herpetology, guide lines for displaying reptiles and amphibians at the CBC and other similar open days. Below we reproduce these suggestions.

GUIDELINES FOR DISPLAYING REPTILES AND AMPHIBIANS AT THE BHS CAPTIVE BREEDING COMMITTEE OPEN DAY

- 1) No venomous species.
- 2) No overcrowding of animals.
- 3) Suggest temporary display of single animals in clear containers.
- 4) Adequate background heating if required.
- 5) Intergeneric and interspecific housing of animals is to be discouraged.
- 6) Any animals that are considered to be inappropriately housed will have to be removed.
- 7) Appendix 1 species are not permitted to be displayed, without a licence.
- 8) Only captive bred animals are permitted.

A Veterinary Surgeon will be in attendance.

Antiseptic handwash facilities will be provided in the toilets.

LIST OF RECOMMENDED SPECIES OF REPTILES AND AMPHIBIANS CONSIDERED TO DO WELL IN CAPTIVITY

- 1) Fire Salamander, *Salamandra salamandra*.
- 2) European Treefrogs, *Hyla arborea*.
- 3) Yellow Bellied Toad, *Bombina variegata*.
- 4) Red Eared Terrapin, *Chrysemys picta elegans*.
- 5) Eyed Lizard, *Lacerta lepida*.
- 6) Leopard Gecko, *Eublepharis macularius*.
- 7) Blue Tongue Skink, *Tiliqua* species.
- 8) Bearded Dragon, *Pogona vitticeps*.
- 9) Boa Constrictor, *Boa constrictor*.
- 10) Corn Snake, *Elaphe guttata*.
- 11) Californian Kingsnake, *Lampropeltis getulus californiae*.
- 12) Chequered Garter Snake, *Thamnophis marcianus*.

NEW BOOK

In addition Simon Townson has worked extremely hard on editing a new book, "Breeding Reptiles and Amphibians", 262 pages, 20 colour plates and 50 black and white plates of papers from The British Herpetological Society Bulletin, 1980-1992, price £18.00p. Several hundred have already been sold in the U.S.A. and it may well be necessary to reprint before long due to demand.

All in all thanks to a fantastic team – the Captive Breeding Committee is alive and well. As from the A.G.M. John Spence is hoping to take the chair over. John has been a great help to me as secretary and adviser in the last 3 years.

Terry Thatcher (Retiring Chairman, March 1995)

HERPETOLOGY COMBINED MUSEUM COLLECTIONS DATABASE

The Department of Herpetology, California Academy of Sciences is host to the *Herpetology Combined Museum Collections Database*. At present, the entire herpetological holdings of the following institutions are on-line and accessible: California Academy of Sciences (CAS), Carnegie Museum (CM), Louisiana State University (LSUMZ), Texas Natural History Collection (THNC), University of California, Berkeley (MVZ), University of Texas, Arlington (UTA), Smithsonian (USNM), and the Peabody Museum, Yale (YPM). In addition the database includes the Caudata and Gymnophiona holdings of Harvard University (MCZ).

Data are limited to numbers of specimens held in each institution by genus and/or species; i.e., who has what and how many. The HCMC Database is accessible by (1) searching gopherspace via Veronica using the keyword "herpetology", (2) by accessing the CAS gopher directly: % gopher gopher, calacademy.org; or (3) via World Wide Web: <http://www.calacademy.org>.

Institutions wishing to add their data to the HCMCD should contact:

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California Academy of Sciences
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EVER-EARLIER BREEDING MIGRATIONS BY ALPINE NEWTS (*TRITURUS ALPESTRIS*) LIVING WILD IN BRITAIN

TREVOR J.C. BEEBEE

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Alpine Newts have been living and breeding in my garden and its ponds ever since the introduction of just a few individuals nearly 20 years ago, before the Wildlife & Countryside Act rendered such deviant behaviour inadmissible. *Triturus alpestris* proved very successful, rapidly building up to such numbers as to become the second most abundant of the four species using my ponds every year. One aspect of Alpine Newt behaviour that became apparent very early on, however, was late arrival at the ponds in spring. Over the first five years when the colony was becoming established the average day of first sighting an Alpine Newt was March 17th; this was a good six weeks later than the first Smooth Newts, which arrived around the start of February, and some five weeks later than the Palmates and Crested Newts that share the same pools.

One thing I have tried to do over the years is to keep accurate records of the dates upon which newts first enter my ponds. This is not difficult since it involves no more than stepping outside the back door for a few minutes after dark and inspecting the ponds (which are cleared of weed every autumn) with a powerful torch. I am therefore pretty confident that my records are accurate, at least to within a day or two. On the basis of these observations, a dramatic trend is apparent over the 17 years since the newts were first introduced. As shown in Figure 1, the Alpine Newts have arrived progressively earlier over the years with the result that by the early 1990s the average time of arrival was January 28th, a full 7 weeks ahead of their migration times in the late 1970s.

What could be the reason for this change? Interestingly, the trend has not been confined to Alpine Newts but all four species have become earlier over the years and, for example, the average time of Smooth Newts during the early 1990s was December 31st. Differentials have therefore almost been maintained, with Alpine Newts still arriving about four weeks later than the native species.

It is my belief that climate change is primarily responsible for newts migrating earlier. Winter average temperatures have risen over the past 17 years, and at least a few newts have changed their behaviour accordingly. However, the situation is by no means straightforward because the first newts to arrive in the ponds often do so quite some time before the bulk of the population. I am not at all clear, because the detailed observations are difficult to make, whether *most* newts have responded in the same way as the vanguard individuals. My impression is that newts are responding at the population level, but less dramatically than would be implied by Figure 1, it is not unusual now to find newt eggs in my ponds in January, for example, but I estimate that even in recent years newt numbers probably peak in March. However, ten years ago April was undoubtedly the month to see newts at their most abundant.

It will be interesting to see whether current trends continue. This year (1994-5, not shown on the graph) the first of the three native newts arrived on November 21st, and the first Alpine on December 27th, earliness records in all cases. On December 29th I found male Crested Newts and Smooth Newts in full breeding condition in

a pond in Hampshire, and on January 14th I made similar observations with Smooth and Palmate Newts in Sussex dewponds at quite high elevations.

It is now well established that atmospheric carbon dioxide levels, as well as other “greenhouse” gases, are increasing fast and are already higher than at any time since the last ice age. This is bound to cause global warming, and amphibian migration might well be a sensitive indicator of these changes. Or we might just be seeing a temporary trend that will later reverse, or something that has nothing to do with climate at all. Though the latter seems unlikely to me, a cautionary observation is that Common Frogs, which also use my ponds, have not changed their first spawning date significantly over these same 17 years; the average remains more or less the same as it always was, the final days of February.

Despite the caveats, I must admit to finding all this quite exciting. Since the earliest writings about herpetology in Britain, such as Bell’s “British Reptiles” of the mid nineteenth century, we have expected our amphibians to do the decent thing and turn up in ponds just as the weather is becoming comfortable enough to enjoy watching them. We may now be facing a different prospect, perhaps the Spanish experience, in which winter becomes a major breeding season for many species and field herpetology an even rarer pursuit among naturalists than it is today.

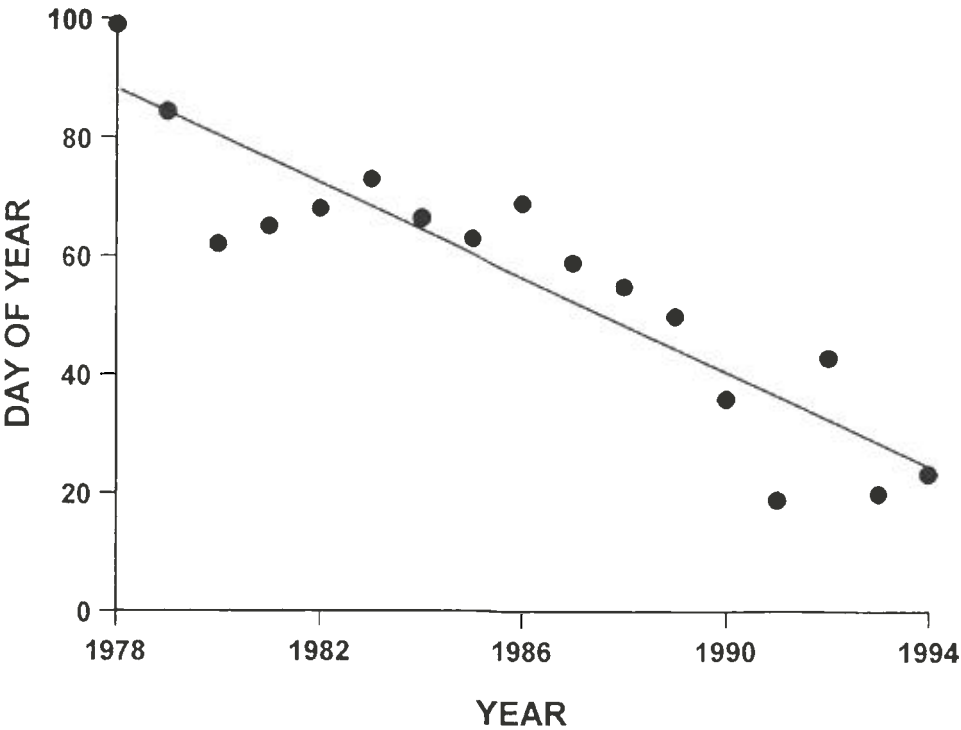


Fig 1: Day of year upon which the first Alpine Newt was seen in Woodingdean garden ponds.

THE GREEN IGUANA (*IGUANA IGUANA*): A GUIDE TO SUCCESSFUL CAPTIVE MANAGEMENT

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NATURAL HISTORY

The green iguana (*Iguana iguana*) belongs to the family Iguanidae and is a diurnal, arboreal lizard found in tropical and subtropical regions below 900 metres ranging from Mexico to Southern Brazil and Paraguay.

Iguanas have short powerful limbs equipped with strong, sharp claws for digging and climbing, and a long strong tail. Adult males can reach a length of 2 metres and weigh as much as 8kg. A dewlap hangs from the throat and helps regulate body temperature. Iguanas also have a prominent crest of soft spines, which are often longer in males, along the dorsal midline of the neck and back beginning at the base of the skull.



Fig. 1. The natural distribution of the Green Iguana, *Iguana iguana*

Mature males tend to be larger and have brighter overall colouration than females. The distinct, often orange, colouration of the male is most pronounced during the breeding season. Males tend to have larger heads than females due mainly to their swollen jowls. Both sexes possess 12-13 femoral pores located as a row along the ventral aspect of each thigh. These glandular structures secrete a waxy substance with which all iguanas, male and female, mark their territory and identify each other. The femoral pores of maturing males tend to develop slight outward projections which enable the male to better grasp the female during copulation.

The skin of the iguana is entirely covered with very small scales. Iguanas cannot change the colour of their skin in the same manner as chameleons, but exposure to natural light (sunlight or broad spectrum fluorescent light) does make their colouration and patterning more vivid.

Vision, hearing and the sense of smell are acute. In the natural habitat, juvenile iguanas are very wary, fleeing or hiding at the first sign of danger. Adults tend to be calmer and clumsy, but accomplished, tree climbers. They tend to bask on tree branches, often over or in the vicinity of water, and their social rank is reflected in the prominence of their basking position. When threatened or cornered, iguanas can successfully defend themselves with astonishingly quick, whip-like lashes of their tails and with their claws and jaws.

Both sexes lead solitary lives and are territorial in the wild, except during the mating season. Mature iguanas tend to socialise and mate in January or February. After a period of gravidity lasting about two months, the female digs in moist sand or soil, usually near the base of a tree, and deposits 10-60 eggs. The hatchlings emerge after a period of 59-90 days and measure 25cm long and 10-12g in weight. Growth is rapid ranging from 30-60cm per year and sexual maturity is usually reached by the third year.

THE PET IGUANA

Green iguanas (*Iguana iguana*) continue to be imported in large numbers and offered for sale at low prices, typically £30-£50 for a juvenile. However the facts are undeniable; large numbers of iguanas that enter the pet trade either become diseased and die before adulthood, or grow up to become deformed or aggressive. The owning of any reptile incurs responsibilities, but very few species are as demanding as the green iguana. The cost of keeping an iguana is substantial and the purchase price of £30 for a small juvenile is almost negligible in comparison to the cost of keeping the adult iguana in a large, room sized, enclosure. Unless you are prepared to invest a great deal of time and money, please do not entertain the idea of owning such a beast. There are no cheap short-cuts. If money and time are no object and you are determined to own an iguana, it is vital to become familiar with the biology and husbandry practices that will be essential in successfully raising a juvenile to adulthood.

There are two major categories of imports; wild caught and captive farmed. A significant proportion of specimens offered for sale in the United Kingdom are wild caught and typically 40-60cm long, often parasitised and in very poor condition. This trade should not be encouraged and all prospective purchasers are urged to avoid such retailers. The second type of import is the captive farmed juvenile iguana, typically smaller and 25-30cm in length and usually in much better condition than wild caught stock. At present there are several exporters of captive farmed stock operating from Colombia. Those disreputable retailers who trade in wild caught specimens or worse advertise wild caught iguanas as captive farmed or even captive bred, maintain large

numbers of iguanas in squalid conditions and fail to provide adequate conditions and care, should not simply be avoided but actively reported to the proper authorities. I have investigated several mass mortalities of imported green iguanas and have come to the conclusion that substandard husbandry during transportation and holding have led to deaths due to dehydration, bacterial septicaemias and flourishing parasite burdens, particularly flagellate protozoa.

SELECTING A JUVENILE IGUANA

A captive bred specimen is the ideal choice and in 1994 a private breeder managed to successfully breed green iguanas maintained in indoor enclosures. Nevertheless, while such successes may become more common they are still a rarity outside the United States, and therefore a captive farmed juvenile is the usual choice. It is vital that we all encourage the captive breeding of these animals in an attempt to make their importation unnecessary. Therefore when a successful breeder offers captive bred offspring at £60-£100 they should be purchased over cheaper inferior imports.

The choosing of an individual iguana is an important decision and the following protocol can be employed to prevent disappointment.

1. Always use a reputable reptile supplier that you can trust.
2. When faced with a vivarium containing several juveniles, do not immediately open the vivarium but watch their behaviour. Identify and discriminate the active and healthier juveniles from those that are ill.
3. Ask to examine one of the healthy juveniles. Initially examine the overall appearance and gauge its fitness and conformation for indications of anorexia and parasitism. Then commence logical examination from the head to the tail;
 - * Check the eyes for discharges and observe their clarity and movement.
 - * Check the nose for discharges. A white, salty secretion from the nose is often a normal finding and should not be confused with an upper respiratory infection which will cause a more muco-purulent discharge.
 - * Gently feel the lower jaw for swelling and softening due to metabolic bone disease.
 - * Feel all four limbs and examine the movement at all the joints, and again check for swellings and signs of trauma including lost digits.
 - * Examine the skin along the back and underside for damage and infection.
 - * Examine the cloaca for signs of faecal staining and diarrhoea.
 - * Examine the tail for swellings and ensure that it is present in its entirety.

ACCLIMATISATION

Acclimatisation is a critical period lasting for weeks or even months (typically 2-6 weeks) during which time the newly acquired iguana becomes accustomed to its new environment. Failure to successfully acclimatise may result in mal-adaption syndrome and eventual death.

Once purchased the iguana should be weighed and then released into the vivarium. To prevent dehydration and associated renal failure (a common cause of death in many reptiles) the vivarium should be thoroughly misted twice daily to encourage drinking. The vivarium must be allowed to completely dry out before the night time drop in temperature as continued dampness through the night will predispose to bacterial and fungal infections. A large water bowl must always be present as iguanas require access to water at all times (Boyer, 1991b). Initially the addition of a water soluble probiotic-electrolyte product such as Avipro (Vetark) will help aid rehydration and reduce the likelihood of visceral gout. This product contains electrolytes which will help rehydrate the animal, and vitamins, enzymes (amylase, cellulase and protease) and bacteria (*Lactobacillus*, *Enterococcus* and *Saccharomyces*) which help establish a beneficial gut flora and aid digestion. For those iguanas who will only drink water droplets on foliage and vivarium decor and refuse to drink from a bowl, a powder form called Avipro Paediatric (Vetark) is also available for sprinkling onto food. The iguana should not be handled until it has demonstrated its ability to feed, put on weight and slough regularly.

It is advisable to have a faecal check performed for all recently purchased iguanas. Helminth parasites are more common in older animals but *Oxyuris* nematodes may be present in juveniles and become pathogenic due to their direct life cycle and the added stresses of captivity (Boyer, 1991a). Veterinary treatment using oxfendazole or fenbendazole is effective. Flagellates are protozoan parasites that are a common cause of intestinal disease and mortality, and if discovered treatment with metronidazole is strongly advised. Faecal examination and subsequent medical treatment can only be performed by a qualified veterinary surgeon.

VIVARIUM DESIGN

The role of the vivarium is to reproduce the rain-forest conditions of the tropics, while remaining clean and serviceable at all times.

VIVARIUM SIZE AND CONSTRUCTION. The incredible disparity between the size of the juvenile and that of the adult makes it very difficult to build a single vivarium equally suited to a juvenile and later an adult. Therefore it is often necessary to construct a juvenile vivarium and later an adult enclosure. A juvenile iguana can be maintained in a standard vivarium measuring 1.0m long x 0.5m high x 0.5m wide for the first 12-15 months depending on growth. Vivaria of wooden construction with sliding glass doors are ideal and give more security than all glass aquaria, especially if the glass doors are raised on a 15cm wooden plinth and do not extend down to floor level. The requirement for higher humidity also means that all internal edges must be sealed with silicone sealant to prevent moisture damage. There is a tendency for ventilation to be reduced in an attempt to maintain humidity levels. This is wholly inappropriate, and a ventilation area of 800cm² in a 1.0m x 0.5m x 0.5m vivarium is required and will go a long way to prevent respiratory disease which is common in juveniles (Boyer, 1991a). Juvenile iguanas can be kept in small groups but all iguanas, particularly adult males, are territorial by nature (Anderson, 1991) and should therefore be kept singly.

Adult iguanas will require substantially larger quarters, at least 2.0m long x 2.0m high x 1.25m wide for an individual or pair. Similar heating and lighting equipment can be used, albeit on a larger scale. A single male and one or two females may be able to be kept together in a large enclosure with sufficient basking areas for all to bask simultaneously, i.e. at least one separate basking area for each iguana. Nevertheless aggression is a potential danger of group housing and vigilance is essential.

HEATING. Heating is best achieved by using a combination of continuous background heat and daytime basking areas. Background temperatures are best provided by infra-red ceramics, warming cables, tubular heaters, heat mats, or heat tape under the control of a reliable auto dimming or proportional thermostat. Thermostats with a night time drop facility (e.g. Microclimate DL1+, DL22+ and Vivguard, Habistat Dimming and Pulse Proportional stats) are advisable since a drop in air temperature at night is essential for continued health (Wallach, 1971). Daytime basking sites are most easily produced by the use of white or red spot-lights which are cheap, easily replaced and available in a variety of sizes and ratings. Spot light basking areas should be directed onto the upper branches in the vivarium. All heaters, especially high surface temperature infra-red ceramics, tubular heaters and spot-lights, must be screened off from the lizards with wire mesh to prevent serious burns.

LIGHTING. There is considerable debate over the use of special lighting for maintaining iguanas with the major concern being the provision of ultra-violet light (UVB, 290-320 nm wavelength) for subcutaneous cholecalciferol, and subsequently vitamin D, synthesis (Blatchford, 1987). Various authorities advocate the use of UV emitting tubes (Blacklight BL and BLB, Actinic 09 and 08, Ultravitalux) while others prefer the broad spectrum natural daylight tubes such as True-Lite. Apart from the vitamin D factor there are also psychological benefits to be derived from natural light and therefore the use of broad spectrum natural daylight tubes is preferred over blacklights. If blacklights are to be used a white fluorescent tube should be used in tandem to overcome the blue glow. Blatchford (1987) stated that the True-Lite is the light of choice because "its spectral distribution, its UV content and its colour temperature are all uncannily close to natural daylight". The fact that all UV emitting lights should be replaced every 9-12 months makes True-Lite an expensive proposition. Recently there have been several additions to the list of vivarium lights. Life-Glo is a broad spectrum light which is significantly cheaper than True-Lite, Life-Glo possesses an internal reflector to increase light output by 170% and is advertised for vivarium use. Zoo Med have recently launched the Reptisun UVB310 and Repti Iguana Light UVB310 which both have a colour rendering index of 88-93 (natural sunlight has a CRI of 100), and a stated UVB output of almost twice that of other broad spectrum tubes. These new lights should be an efficacious alternative to True-Lite although, unlike True-Lite their effectiveness has not yet been proven by the herpetological community as a whole.

Fluorescent lights should be positioned to allow all iguanas within a vivarium to bask simultaneously within 60cm of the light source(s). Suspending the tube on chains into the centre of the juvenile vivarium works well and burns, although possible, very rarely occur. Screening the tubes within a wire cage on the ceiling and providing a basking platform 30-60cm below the lights is a safer alternative. Reflectors can be used to direct and increase the intensity of the light rays. For the routine maintenance of all iguanas aim for a 14 hour day and 10 hour night photoperiod.

Metal halide lights produce heat as well as a full light spectrum and can be used to provide both quality light and basking areas. These units are expensive but may provide the most natural means of basking heat and illumination for captive iguanas.

FLOOR SUBSTRATES. There are several floor materials available, including newspaper, artificial turf, granulated bark chips and alfalfa pellets. Each of these substrates have advantages and disadvantages;

- * Newspaper is cheapest, most widely available material which is absorbent and, if changed regularly, will maintain a very clean environment. Its perceived disadvantage is its unnatural appearance, but newspaper is recommended for

newly acquired juveniles where defecation can be monitored and faecal samples collected for veterinary examination.

- * **Artificial turf** that has no frayed edges can be usefully employed as a floor covering as it can be readily washed, disinfected and re-used. Two or three pieces will be required in order to replace the floor covering while other pieces are undergoing cleaning and drying.
- * **Granulated bark** is probably the most expensive floor material available. It is absorbent, attractive and available in various grades of chip size. The absorbent nature makes granulated bark very effective at maintaining a high humidity but equally effective at harbouring and culturing bacteria. It is essential that its expense does not result in its infrequent replacement, and regular removal and replacement of soiled material is essential. To avoid consumption and possible gut impaction in the housed iguanas use a large grade.
- * **Alfalfa pellets** are absorbent and relatively cheap, being available from certain pet food suppliers as rabbit pellets. They are absorbent, but may become mouldy if the vivarium humidity is constantly very high. Their major advantage is that they may be consumed by hungry iguanas without the risk of gut impaction.
- * **Soil, sand, gravel, corn cob granules and carpet remnants** are not recommended for various reasons. Carpet poses a significant health risk as fibres can become entangled around the digits causing inflammation, infection and the eventual loss of the affected toe. Iguanas have been known to consume large amounts of floor substrate and the author is aware of several deaths due to gastric or intestinal impaction caused by the consumption of gravel or small grade bark chips.

VIVARIUM FURNITURE. Iguanas are invariably arboreal and it is essential that a selection of branches capable of holding the weight of the iguana are securely positioned in the vivarium. Avoid branches from resinous trees such as pine, cedar and fir as these are toxic. Branches from hard fruit trees, including apple and pear, and rough barked oaks are ideal. There are several varieties of decorative plastic plants that can be incorporated to provide both cover and, when sprayed, drinking water and an increase in humidity. In addition, one or two sections of cork bark will absorb moisture when sprayed and release it slowly thereby enabling humidity to be maintained. They are also useful for providing attractive seclusion for newly acquired juveniles during the acclimatisation period.

For adult enclosures cardboard boxes or small wooden dog kennels make good hide-outs, and hanging plant baskets containing wandering Jew (*Zebrina pendula*) or pothos (*Epipremnum aureum*) are excellent for humidifying the air while enhancing the aesthetic appeal of the overall set-up. If live plants are to be used it is essential that they are non-toxic (Frye, 1991).

VIVARIUM HYGIENE. The warm humid conditions of the vivarium are ideal for bacterial and fungal growth and therefore it is imperative that good vivarium hygiene is maintained at all times (Divers, 1994a). Waste materials and uneaten foods should be removed as soon as possible. The water bowl will require cleaning twice weekly and the vivarium weekly with a suitably non-toxic disinfectant. Sodium hypochlorite (2%) is acceptable, Ark-klens (Vetark) is better, but Tamodine (Vertark) is a providone iodine compound and is the preferred agent due to its wide spectrum of activity against bacteria, viruses and fungi.

TEMPERATURE AND HUMIDITY

All reptiles have a preferred body temperature (PBT) at which bodily functions such as digestion and reproduction are best performed. The PBT is not constant but may

vary with the time of day or night, the season and the age of the reptile. The preferred optimum temperature zone (POTZ) is the temperature range within which a reptile is able to maintain its core body temperature within its PBT. The green iguana has a POTZ of 29.5-39.5° (85-103°F) (Wallach, 1971) and therefore a daytime air temperature gradient of 29.5-35°C (85-95°F), dropping overnight to 25°C (77°F) is ideal (Anderson, 1991). Iguanas continually exposed to their preferred daytime temperatures (or even a few degrees above) for extended periods, without a night time drop, may well develop anorexia, skeletal muscle atrophy and inhibited spermatogenesis (Wallach, 1971).

Mean body temperatures of 36.5-37.5°C for at least eight hours a day results in improved digestive efficiency (Troyer, 1987), and therefore provision of a daytime basking area of 35.5-38°C (97.7-100.4°F) is essential. Iguanas are hind gut fermenters and it is probably not coincidental that mammalian hind gut fermenters also have similar core body temperatures (Troyer, 1984a). Several sources have suggested much higher basking temperatures of 38.5-43.5°C (101.3-110.3°F) but this seems dangerously hot and is very close to the critical high temperature for this species (Frye and Townsend, 1993). Iguanas will thermoregulate between a basking area and the cooler surrounds (Divers, 1992). A digital thermometer with a dual readout to display internal and distant probe temperatures should be used to accurately monitor the temperature gradient within the vivarium. A second minimum/maximum thermometer should also be installed to monitor the night time drop in air temperature.

The rain-forest origin of this species has also dictated that a humidity level of 60-95% be provided for at least part of the day (Cunningham and Gili, 1992; Frye and Townsend, 1993). Humidity can be provided by positioning a large water bowl close to the background heater, installing a running water system or simply by misting the vivarium with a plant sprayer once or twice daily. Failure to provide a suitable humidity often results in dysecdysis (poor shedding) and respiratory disease.

FEEDING AND NUTRITION

This large herbivorous lizard principally occupies a herbivorous niche within the rain-forest ecosystem where it feeds on fibrous leaves, flowers and fruits and relies on the fermentation of complex carbohydrates in the hind-gut colon to produce 30-40% of the energy available from the diet. The bacteria required for fermentation are acquired by hatchlings eating the faeces of adult iguanas. Iguanas facilitate this fermentation process and regulate their body temperature by basking in the sun and seeking temperatures of 36.5-38°C.

Diet for iguanas is an area that many owners have difficulty with but this is not surprising as the provision of adequate nutrition for an herbivorous reptile is a complex and demanding task. The following is a compilation of recommendations from several sources (Frye, 1991; Frye and Townsend, 1993; Barton, 1984; Boyer, 1987; Allen, 1992; Troyer, 1984a; Ullrey, 1992).

Many previous publications have stated that juvenile iguanas are insectivorous and become more herbivorous as they mature. This myth culminated in suggested diets containing up to 50% protein in the form of insects and various pet foods. Recent research has shown that green iguanas are essentially herbivorous during all stages of development, although being opportunistic will readily accept insects and other high protein foods. It is now considered sound management to provide juveniles a diet consisting of a maximum of 15% protein and a minimum of 85% plant matter (70% vegetables, 15% fruit), and adults a maximum of 5% protein and a minimum of 95% plant matter (80% vegetables, 15% fruit).

PROTEIN

- * 15% maximum for juveniles up to 2.5 years old
- * 5% maximum for adults over 2.5 years old.

Protein is required for growth but it is metabolised in the liver with the excess converted to the nitrogenous waste product, uric acid, which is then excreted via the kidneys. Excess dietary protein is one of the major predisposing factors responsible for renal failure in older iguanas and therefore reducing dietary protein in slow growing adults has real health benefits. Sources of high protein include crickets, giant mealworms, locusts, chicken, hard-boiled eggs, small pre-killed mice, low fat dog/cat food, Mazuri primate diets (Special Diet Services) and pulses (peas, beans and lentils etc).

Insects usually have a poor mineral content and therefore it is important to nutrient load insects and ensure that they have a sufficient calcium content prior to feeding them to the iguana. Crickets fed a diet consisting of crushed biscuits, breakfast cereal or fish food, with one teaspoon of Nutrobal (Vertark) added to every eight teaspoons of food powder will have a suitable calcium content and ca:P ratio. A slice of potato should be offered to provide moisture. Alternatively, feed one of the cricket supplements that are becoming increasingly available. Mealworms and buffalo worms can have their calcium content improved by feeding a diet made of a teaspoon of milk powder, three teaspoons of porridge oats, half a teaspoon of Nutrobal (Vetark) and a chunk of apple for moisture. The calcium content of locusts can be improved by offering plant material such as alfalfa hay or watercress which is relatively high in calcium.

The Composition of Various High Protein Foods used in Iguana Diets

Food	Dry Matter %	Protein %	Fat %	Energy Kcal/g	Calcium %	Phosphorous %	Ca:P	Reference
Meal Worms	38	47	35		0.23	0.71	0.32	1
Meal Worms	42.2	52.8	35	6.53	0.06	0.53	0.11	3
Meal Worms	38.1	54.6	31.4	5.35	0.07	0.71	0.1	3
Locusts	31.2	61.7	19.4		0.1	0.75	0.13	1
Crickets	38.2	55.3	30.2		0.23	0.74	0.31	1
Chicken Muscle	25.6	20.5	4.3	1.21	0.01	0.2	0.05	2
Egg, Whole	25.2	12.3	10.9	1.47	0.052	0.22	0.023	2
Mice, 1-2 Days					1.6	1.8	0.88	5
Mice, 7 days					1.43	1.29	1.1	5
Mice, Adult		19.86	8.81	2.07	0.84	0.61	1.37	4
Hills Canine r/d	24.2	25.6	7	2.4	0.5	0.36	1.39	6
Hills Feline r/d	23.4	34.6	8.5	3.5	0.94	0.47	2	6
Mzuri Primate		25.4	7.5	3.78	2.16	1.46	1.48	7

REFERENCES:

- | | |
|-----------------------------|---------------------------------------|
| 1: Zwart, 1980 | 5: Allen and Oftedal, 1982 |
| 2: Paul and Southgate, 1988 | 6: Lewis, Morris and Hand, 1989 |
| 3: Frye, 1991 | 7: Mazuri Zoo Foods Product Catalogue |
| 4: Fowler, 1986 | |

PLANT MATTER

- * 85% minimum (70% vegetables, 15% fruit and flowers) for iguanas up to 2.5 years.
- * 95% minimum (80% vegetables, 15% fruit and flowers) for iguanas over 2.5 years.

To ensure proper skeletal growth it is generally considered acceptable for a diet to have a calcium to phosphorous (Ca:P) ratio of 1-2:1 and since the vast majority of plants are high in phosphorous careful consideration is required in choosing plant foods with a suitable mineral content. Leafy lettuce (Ca:P = 0.85), bananas (Ca:P = 0.24) and tomatoes (Ca:P = 0.65) are commonly used but their poor mineral content means that their use should be avoided or at the very least severely restricted.

The Composition of Various Plant Foods Suitable for Iguana Diets

Food	Dry Matter %	Protein %	Fat %	Energy Kcal/g	Calcium %	Phosphorous %	Ca:P	Reference
Alfalfa		15.5	37.1	3.94	1.29	0.21	6.14	4
Iceburg Lettuce		1.2	2.5	0.14	0.035	0.026	1.34	4
Carrots	10.1	0.7	Trace	0.23	0.048	0.021	2.29	2
Broccoli					0.1	0.067	1.49	8
Bluegrass (Lawn)	33	2.4	1.2	1.58	0.1	0.09	1.1	4
Cabbage					0.044	0.036	1.22	8
Collards					0.203	0.074	2.76	9
Dandelion					0.187	0.078	2.4	9
Endive					0.081	0.030	2.67	9
Kale					0.179	0.062	2.9	9
Spinach					0.093	0.055	1.69	9
Parsley					0.203	0.133	1.53	9
Radishes					0.044	0.027	1.63	8
Turnip					0.055	0.019	2.89	8
Watercress					0.22	0.052	4.23	8
Mustard Cress					0.066	0.066	1	8
Blackberries					0.063	0.024	2.62	8
Cranberries					0.015	0.011	1.36	8
Blackcurrents					0.06	0.043	1.4	8
Redcurrents					0.036	0.03	1.2	8
Damsons					0.024	0.016	1.5	8
Figs					0.28	0.092	3.04	8
Lemons					0.11	0.012	9.17	8
Oranges	13.9	0.8	Trace	0.35	0.041	0.024	1.71	2
Raspberries					0.041	0.029	1.41	8

REFERENCES:

2: Paul and Southgate, 1988
8: Vetark information sheet

4: Fowler, 1986
9: Frye and Townsend, 1993

Pulses including beans, peas and lentils are also low in calcium, but their high protein and vitamin content means that they are useful as part of the protein component of the diet. Pickle jars with many holes punched into the lids are useful for sprouting pulses and various seeds including alfalfa (Fyre, 1991; Frye and Townsend, 1993). Place 1-4 tablespoons (depending on the size of the jar) of pulses or seed into the jar and soak in water overnight before draining off the excess water through the perforated lid. Rinse with clean water daily for 3-5 days until the sprouts are of the required size. Once harvested, the sprouts will last for a week or more if refrigerated. During the winter when fresh foods are difficult to obtain frozen mixed vegetables can be used in moderate quantities. Cress and alfalfa can be grown in a greenhouse or on a windowsill all year round and the garden pond can be used to cultivate watercress.



Plate 1. A selection of suitable plant foods, including kale, watercress, salad cress, mustard, carrot, endive, hibiscus flowers and various sprouts.

Variety is the key to a healthy diet and so avoid excesses of any one type of plant. Efforts should also be made to utilise the less well known varieties including, romaine, kale, endive, collards, spinach, parsley, dandelions, clover, rose petals and flowers of hibiscus, carnation and nasturtium.

On other interesting point to note is that while investigating several cases of anorexia in green iguanas it became apparent that blacklights were commonly in use. Upon changing to True-Lite or exposing the animals to unfiltered sunlight, feeding was often stimulated. This phenomenon may be due to the different appearance of foods under a natural light as opposed to the blue glow of blacklights, or the psychological and behavioural effects of natural light.

FEEDING REGIMES. Iguanas will tend to bask during the morning to warm their bodies to their PBT, consume most of their daily food intake between 11.00 and 16.00, and then bask during the afternoon to aid digestion and assimilation (Frye and Townsend, 1993). It is therefore wise to offer food between 11.00 and 16.00

and not first thing in the morning or late in the evening. Newly acquired hatchlings should have *ad libitum* access to food or be fed twice daily until they have demonstrated their ability to feed regularly and put on weight. All food should be finely chopped and supplemented with Nutrobal (Vetark). After the acclimatisation period the food can be more coarsely chopped and offered once daily, or, in the case of cress or alfalfa shoots, left whole for the iguanas to graze. Adults will require feeding every other day and the food can be coarsely chopped or left whole depending on size and texture, and supplemented twice weekly with Avimix (Vertark).

VITAMIN AND MINERAL SUPPLEMENTS. Green iguanas maintained under appropriate lighting (broad spectrum fluorescent tubes or better still regular exposure to unfiltered sunlight) and on a suitable diet high in calcium rich vegetables will require little supplementation. Conversely, poor quality lighting and a diet low in calcium but high in phosphorous and protein will require substantial supplementation at every feed. By following the lighting and nutritional protocol laid out previously the following guidelines have been found to be successful.

Juveniles up to 2.5 years are extremely fast growing and the most common condition afflicting growing iguanas is metabolic bone disease or nutritional osteodystrophy caused by too little calcium and too much phosphorous in the diet, and/or too little vitamin D₃ (Boyer, 1991; Frye, 1991; Fowler, 1986; Scott, 1992). It is therefore wise to supplement with Nutrobal (Vetark) which is high in calcium (200mg/g) and contains reasonable levels of vitamin D₃ (150IU/g). The Nutrobal product label states a dose rate of 1g of powder per kg of iguana every week, however based on a vitamin D₃ requirement of 200IU D₃/kg/week (Boyer, 1991a) I prefer to use a slightly higher dose of 1.3g/kg/week. For hatchlings and juveniles the total weekly requirement is best divided into daily doses. In practical terms this usually means a barely perceptible dusting on each meal.

Adults over 2.5 years have a lower requirement for calcium due to their reduced rate of skeletal growth. There is therefore a danger of hypervitaminosis D and soft tissue mineralisation from over zealous supplementation with products that are high in vitamin D₃, and as a consequence a more balanced product is recommended. Avimix (Vertark) is a 2:1 ratio mixture of Nutrobal and ACE-High which is best used twice a week in adult iguanas to a dose of 1g of powder per kg of iguana per week.

There is still a great deal of controversy over calcium and vitamin D₃ requirements in reptiles and this is particularly true for iguanas. Recent research by Allen in the United States suggests that vitamin D₃ may not be absorbed as efficiently from the gut as previously believed; a diet containing 2000IU D₃/kg failed to produce a significant increase in blood levels of vitamin D₃ (1,25-dihydroxycholecalciferol) (Burgmann, McFarlen and Thiesenhausen, 1993). Other authorities suggest that virtually no calcium can be absorbed from the gut unless it has first been primed with vitamin D₃ (Scott, 1992). From these and other findings it is obvious that there is still a great deal more to learn, indeed the role of vitamin D₃ may not simply be to facilitate calcium uptake within the gut in a constant manner. It is possible that calcium can be absorbed from the gut without vitamin D₃ priming as long as the diet is relatively rich in calcium. However, when the dietary calcium level falls then vitamin D₃ may be required to enhance its absorption. In summary, provide quality lighting, a quality diet and moderate vitamin/mineral supplementation (Divers, 1993).

WATER REQUIREMENTS. Fresh clean water must be available at all times (Boyer, 1991b), and not just once a week as has been previously suggested (De Vosjoli, 1990). Water should be provided in a bowl large enough for the iguana to bathe, and if situated in the warmer part of the vivarium, this will also provide a greater degree

of humidity. Certain iguanas and particularly hatchlings may only drink water in the form of droplets from vivarium plants and decor, and therefore a thorough misting every day will be required.

COMMERCIAL DIETS. There are now several commercial iguana diets on the market. Zeigler Bros. Inc. in the United States have produced a dried pelleted iguana food that can be mixed with vegetables to make it more palatable but can be fed on its own, *ad libitum*, once accepted. Zoo Med have produced tinned varieties of moist iguana food which I believe are now being made available to the U.K. iguana owner. Other diets that has found approval are the frozen varieties produced by Ocean. These frozen foods are available in both vegetable and fruit & flower varieties, with different formulations for juvenile and adult iguanas. The general principal behind a commercial iguana diet are sound if the diet has been specially formulated and is complete and balanced. If these requirements are fulfilled dietary disease may well become much less prominent than it currently is. However, until a manufacturer decides to produce these foods in the U.K. their high cost due to importation from the U.S.A. will probably limit their use to occasional treats. As a veterinary surgeon I would always recommend the use of a complete and balanced commercial diet over a variable home made ration.

HANDLING AND RESTRAINT

The relationship that an owner develops with their pet iguana is based upon good husbandry and the owners physical presence. With the exceptions of basking, mating and territorial disputes, mutual contact is not part of the iguana's normal repertoire of behaviours. It is not surprising that for a captive iguana the act of handling and stroking is not initially perceived as enjoyable but anything from an attack to a minor annoyance. However, once tame, pet iguanas can actually enjoy and seek out human contact and company. The methods of handling and restraint that are used will certainly shape the iguana's impression of the human owner and therefore it is important not to be intimidating. Once an iguana is accustomed to interaction then handling can be frequent as long as the animal is healthy, at ease and feeding regularly.

In nature, iguanas are able climbers and feel more secure when resting on high branches. This arboreal ability is due to the lock-release mechanism of each claw. When an iguana feels insecure or frightened its instant reflex action is to increase the strength of its grip. This is an important point to remember when approaching any iguana, especially a hatchling. When grasped from above an iguana increases its grip which results in a greater force being necessary to prise the iguana free. Damage or breaks to claws, toes and feet are possible when using this method. A better approach is to ease a finger under each hand and foot to disengage the claws from the surface while keeping the other hand in front of the lizard's head. Handling should be passive and by easing a hand anteriorly under the forelimbs the iguana can be encouraged to climb onto the handler. It will often take persistence and patience but remember to let the iguana feel support rather than caught.



Plate 2. Iguanas are restrained by holding the forelimbs against the sides of the chest – never fold the limbs over the back as this can fracture the long bones of the leg.

A more controllable method of restraint is often necessary for more aggressive individuals. Generally, it is the claws and tail that are employed as weapons and therefore the four limbs must be held against the lizard's body in such a way that the feet cannot be used in defence. All that is necessary is to pinion the limbs against the body wall. If required, the limbs can be strapped against the body wall with a cloth for short term restraint. Another method of short term restraint relies upon a nervous effect called the vago-vagal response which slows the heart rate, lowers the blood pressure and induces short term torpor. It is safe and effective but it should not be attempted by inexperienced persons.

DOMESTICATION AND AGGRESSIVE BEHAVIOUR

Apart from their spectacular appearance, iguanas are popular as pets because of their ability to become truly tame and domesticated, each with its own individual personality. After acquisition and acclimatisation juvenile iguanas have a great propensity for flight and attempts at handling should only take place after the animal has settled in and is eating regularly. Initial attempts to handle juveniles may well result in fast moving pursuits around the vivarium, but when handled correctly and securely, they are usually fairly calm. Interactions lasting ten to fifteen minutes, four to seven times each week will help convince the iguana that the human owner is not a threat. The development of a friendly iguana-human relationship takes considerable time and effort, but the results are most rewarding. Many iguanas will be completely resistant to any form of handling until they are a year or so old. The reason for this is unclear but may be due to the prolonged time necessary for some iguanas to adjust to captivity. It may represent a psychological change of the iguana, a change from being a small preyed upon lizard to a more mature powerful iguana which should be feared by other species.

Aggression is frequently reported in adult males, usually starting from eighteen months of age when they start to become mature. Increased frequency of handling may help



Plate 3. Pre-femoral pores of a young male iguana.



Plate 4. A smaller vivarium (6' x 2' x 2') is suitable for a single iguana for the first 12-18 months, thereafter a larger enclosure should be provided. All vivaria must contain screened heaters controlled by a thermostat, daytime basking areas, accurate thermometer, broad spectrum lighting, hide-outs, secure branches and food/water bowls.



Plate 5. A captive bred neonate is the ideal starting point for anyone wishing to own a pet iguana. These will become more readily available in the future but prospective purchasers must be prepared to pay a premium for such an animal.



Plate 6. A yearling iguana within a vivarium decorated with apple tree logs and plastic ivy.

to prevent or at least reduce violent confrontations, but some individuals may simply remain pugnacious and are best kept as display animals. Recently, Frye, Mader and Centofanti (1992) investigated eighteen cases of aggression in captive iguanas towards their owners. In all the cases investigated, the aggressive behaviour displayed by an iguana to its owner shared similar features:

- * All attacks occurred during those months in which breeding usually takes place (November to May).
- * All attacks were unprovoked.
- * The sex of the attacking iguana was invariably male.
- * The iguana was always the sole iguana in the household and a long term captive pet, obtained as a juvenile and hand-raised.
- * The males were all sexually mature with displaying, head-nodding and masturbation evident prior to every attack.
- * The pet-owner bond was often very intimate with the iguana feeding at the table, having the run of the house, showering or bathing with the owner and occasionally sleeping in the same bedroom as the owner.
- * No attacks ever involved children.
- * The victim of attack was invariably a female who was the head of the household (either single or with a male partner away for prolonged periods).
- * All female victims were of child-bearing age, with all attacks occurring during the menstruation phase of their menstrual cycle.

The authors concluded that a specific chemical signal (pheromone) produced by women during menstruation may be responsible for eliciting this sexually aggressive behaviour and that possible tactics for avoiding these attacks including housing the iguana in a vivarium during these periods or castration. I have castrated four male iguanas in an attempt to prevent overt aggressions. In three cases the male in question became more amenable over a period of 1-6 months, but in one case there was no apparent improvement.

BREEDING

According to American herpetoculture, breeding green iguanas is not nearly as difficult as it would appear from the lack of success in the United Kingdom. In 1994, a private owner successfully bred the Green Iguana using the following recommendations (Divers, 1994b).

The keys to reproductive success seem to be:

- * The maintenance of healthy adults, and keeping these animals separate except during the breeding season.
- * Adequate nutrition.
- * Seasonal environmental changes in temperature, photoperiod and food supply.
- * Having a compatible male and female.
- * The provision of a large, preferably room-sized, enclosure with suitable nesting sites and access to unfiltered daylight.

Breeding should only be attempted between healthy, mature animals in good bodily condition and at least three years old. The reproductive cycle can often be elicited by manipulating photoperiod, diurnal temperature variation and food availability, as follows:

- * Reduce the normal photoperiod from 14 hours light/10 hours dark to 10 hours light/14 hours dark.
- * Maintain the normal day time temperatures but reduce the night time temperature to 18.5-20°C (65.3-68°F).
- * Maintain the same quality diet but reduce the food intake by either feeding twice a week instead of every other day, or better still, feed half the normal quantity every other day but beware of competition for food.

These seasonal cues are best altered during the Autumn or Winter (November to January) and should be changed gradually over a period of 3-4 weeks. Maintain the breeding programme for a further 6-8 weeks and then return to normal summer temperatures, photoperiod and feeding. If during any stage of the breeding programme any signs of disease become evident, the breeding schedule must be aborted with an immediate return to a normal summer regime.

A gravid female iguana will become conspicuous by the enlarged belly and egg bulges along the abdomen. A markedly reduced food intake is often a reliable sign of successful ovulation with egg laying expected three to five weeks after the onset of anorexia or 65 days after copulation. An essential aspect of the reproductive husbandry of this species is the provision of a suitable egg laying site from day 20 of fasting. Failure to provide a nesting site may cause egg retention and egg binding which is a serious condition requiring veterinary investigation and often surgery. Large polystyrene boxes with a hole cut out of the top can be used to good effect but the tall rectangular plastic rubbish bins seem to be preferred. The bin is filled halfway with a 1:1 ratio of potting compost and soil, the lid of the bin is then taped closed and a hole 30cm in diameter is cut into the upper part of the lid. The bin is then positioned in a horizontal manner. Successful artificial nesting chambers have also been constructed from six half width solid cinder blocks (40cm x 20cm x 10cm) (Werner and Miller, 1984). One cinder block was placed flat in the bottom of a pit, one at each side, one across the back and two perpendicular to the others to form a roof. The cavity was packed with soil to a depth of 7cm and two 15cm inside diameter clay tubes, 30cm long, were placed in line with the one open side. Whichever type of nesting chamber is chosen, it should be positioned in a corner or against a wall in a warm part of the enclosure.

The following reproductive data has been obtained from several sources (Banks, 1984; Miller, 1987; Cunningham and Gili, 1992; De Vosjoli, 1992). The period from mating to oviposition is about 65 days, and laying often occurs from late January to mid March, with clutches ranging from 10 to 60 eggs. Eggs measure on average 15.4cm in length and incubation on moist vermiculite at 28-32°C (82.4-89.6°F) and 75-85% humidity should result in fertile eggs hatching over a period of up to a week, 59-85 days after laying. Hatchability ranges from 46-88%.

The care of neonates is much the same as juveniles but a greater degree of nursing may be required with particular care given to the provision of water in a bowl and by misting the vivarium twice daily. Acquisition of a normal gut flora is essential for proper digestion and in the wild neonates will consume the faeces of adult iguanas to inoculate their digestive tract (Troyer, 1982; Troyer, 1984b). Providing that the adults have been recently examined for parasites it is acceptable to place faeces from the adults into the neonate vivarium for this reason. Alternatively, the gut may be inoculated by the addition of Avipro to the drinking water or Avipro Paediatric to the food.

RECORD KEEPING

It is vital that accurate records of weight, length, diet, supplementation, diseases and treatments, sloughing, environment, and breeding are kept. Such information can be of diagnostic value to a veterinary surgeon investigating a disease problem, especially those due to dietary or environmental mismanagement.

EPILOGUE

This article has tried to do the Green Iguana justice. Proper captive care of these animals is vital not only for their maintained health but also because conservation

begins at home. Through highlighting the Green Iguana as an adaptive pet, its preservation in the wild and the preservation of its natural habitat, namely the rain forests of Central and South America, becomes more meaningful and desirable. The Green Iguana is a magnificent animal, best described in the introduction to *Iguanas of the World* (Burghardt and Rand, 1982):

"These animals popular in zoos, folklore, and illustrations from the time they were first discovered, deserve study, protection and perhaps even reverence".

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PRODUCTS MENTIONED IN THE TEXT

Avipro, Avipro Paediatric, Nutrobal, ACE-High, Avimix, Ark-Klens, Tamodine; Vetark Professional, P.O. Box 60, Winchester, Hants, SO23 9XH (Tel 01962 880376). Microclimate thermostats - DL+, DL2+, Vivguard; The Serpentarium, 8 Freer Street, Walsall, West Midlands, WS1 1QD (Tel 01922 642552).

Habistat thermostats - Dimming, Pulse Proportional; Living Earth Electronics, The Cottage in the Wall, Dawley Road, Hayes, Middlesex, UB3 1EF (Tel 0181-573 4311). Trade enquiries only but available through good specialist reptile outlets.

Actinic 08 and 09;

Philips Electrical Ltd., Lighting Division, P.O. Box 298, City House, London Road, Croydon, CR9 3QR. Trade enquiries only but available through good specialist reptile or aquatic outlets.

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REFERENCES

- Allen, M.E. (1992). Nutritional considerations in feeding reptiles. In: *Proceedings of the 15th International Herpetological Symposium on Captive Propagation and Husbandry*. St. Louis, MO.
- Allen, M.E. and Oftedal, O.Y. (1982). Calcium and phosphorous levels in live prey. In: *Proceedings of the North East Section of the American Association of Zoos, Parks and Aquaria*.
- Anderson, N.L. (1991). Husbandry and Clinical evaluation of *Iguana iguana*. *Comp. Cont. Ed. Pract. Vet.*, 13(8): 1265.
- Banks, C.B. (1984). Reproductive History of a Colony of *Iguana iguana*. *Acta Zoo. et Path. Antverpiensia*, 78: 101-114.
- Barton, S.L. (1984). Reptile nutrition: herbivorous species. *Chicago Herp Society*.
- Blatchford, D. (1987). Environmental lighting. In: *Reptiles: Proceedings of the 1986 U.K. Herpetological Societies Symposium on Captive Breeding* (Ed. J. Coote). British Herpetological Society, London. Pages 87-97.
- Boyer, D.M. (1987). An overview of captive reptile diets. *Proceedings of the Student American Veterinary Medicine Association Symposium*. Ft Collins, CO.
- Boyer, T.H. (1991a). Common problems and treatment of Green Iguanas (*Iguana iguana*). *Bulletin of the Association of Amphibian and Reptilian Veterinarians*, 1(1): 8-11.
- Boyer, T.H. (1991b). Green Iguana care. *Bulletin of the Association of Amphibian and Reptilian Veterinarians*, 1(1): 12-14.
- Burghardt, G.M. and Rand, A.S. (1982). *Iguanas of the World: Their Behaviour, Ecology and Conservation*. Noyes Publishing, Park Ridge, New Jersey.
- Burgmann, P. M., McFarlen, J. and Thiesenhausen, K. (1993). Causes of hypocalcemia and metabolic bone disease in *Iguana iguana*. *Journal of Small Exotic Animal Medicine*, 2(2): 63-68.
- Cunningham, A. A. and Gili, C. (1992). Management in Captivity. In: *Manual of Reptiles* (Eds. P.H. Beynon, M.P.C. Lawton and J.E. Cooper). BSAVA, Cheltenham. Chapter 2, pages 14-31.
- De Vosjoli, P. (1990). *General Care and Maintenance of the Green Iguana*. Advanced Vivarium Systems, Lakeside, CA.
- De Vosjoli, P. (1992). *The Green Iguana Manual*. Advanced Vivarium Systems, Lakeside, CA.
- Divers, S.J. (1992). Creating The Correct Captive Environment – Thermoregulation in Reptiles. *The Reptilian*, 1(3): 25-26.
- Divers, S.J. (1993). Calcium Metabolism in Reptiles and Amphibians. *The Reptilian*, 1(7): 16-19.
- Divers, S.J. (1994a). Health Management: Vivarium Hygiene. *The Reptilian*, 2(3): 28-30.
- Divers, S.J. (1994b). The Captive Husbandry and Breeding of the Green Iguana – Part Two. *The Reptilian*, 2(2): 24-32.
- Fowler, M.E. (1986). Metabolic Bone Disease. In: *Zoo and Wild Animal Medicine* (Ed. M.E. Fowler). Second edition. W.B. Saunders, Philadelphia.
- Frye, F.L. (1991). *Biomedical and Surgical Aspects of Captive Reptile Husbandry*. Second edition. Kreiger, Malabar.
- Frye, F.L., Mader, D.R. and Centofanti, B.V. (1991). Interspecific (lizard: human) sexual aggression in captive iguanas (*Iguana iguana*): A preliminary compilation of eighteen cases. *Bulletin of the Association of Amphibian and Reptilian Veterinarians*, 1(1): 4-6.
- Frye, F.L. and Townsend, W. (1993). *Iguanas: A Guide to their Biology and Captive Care*. Krieger, Malabar, Florida.

- Lewis, L.D., Morris, M.L. and Hand, M.S. (1989). *Small Animal Clinical Nutrition*. Third edition. Mark Morris Associates, Kansas.
- Mazuri Zoo Foods. *A Comprehensive Zoo Food Manual*. Special Diet Services, P.O. Box 705, Witham, Essex CM8 3AD.
- Miller, T. (1987). Artificial incubation of eggs of the Green Iguana (*Iguana iguana*). *Zoo Biology*, 6: 225-236.
- Paul, A.A. and Southgate, D.A.T. (1988). *The Composition of Foods*. MRC Special Report No. 297. HMSO, London.
- Scott, P.W. (1992). Nutritional Diseases. In: *Manual of Reptiles* (Eds. P.H. Beynon, M.P.C. Lawton and J.E. Cooper), BSAVA, Cheltenham. Chapter 13, pages 138-152.
- Troyer, K. (1982). Transfer of fermentative microbes between generations in a herbivore. *Lizard Science*, 216: 540-542.
- Troyer, K. (1984a). Diet selection and digestion in *Iguana iguana*, the importance of age and nutrient requirements. *Oecologia*, 61:201-207.
- Troyer, K. (1984b). Behavioural acquisition of the hindgut fermentation system by hatchling *Iguana iguana*. *Behav. Ecol. Sociobiol*, 14: 189-193.
- Troyer, K. (1987). Small differences in daytime body temperature affect digestion of natural food in a herbivorous lizard (*Iguana iguana*). *Compendium Biochem. Physiol.*, 87A(3): 623-626.
- Ullrey, D.E. (1992). Nutrition principles and dietary husbandry of reptiles and amphibians. In: *Proceedings of the 15th International Herpetological Symposium on Captive Propagation and Husbandry*. St. Louis, MO.
- Vetark Information Sheet. *Foods with adequate calcium: phosphorous ratios*. Vetark Professional, P.O. Box 60, Winchester SO23 9XN.
- Wallach, J.D. (1971). Environmental and nutritional diseases of captive reptiles. *Journal of the American Veterinary Medicine Association*, 159(11): 1632-1643.
- Werner, D.I. and Miller, T.J. (1984). Artificial nests for female Green Iguanas. *Herp Review*, 15(2): 57-58.
- Zwart, P. (1980). Nutrition and nutritional disturbances in reptiles. In: *Proceedings of the European Herpetological Symposium*. Cotswold Wildlife Park, Burford.

RANA TEMPORARIA FROM A LATE PLEISTOCENE PERIGLACIAL PIT IN BRITAIN

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Records of amphibians and reptiles from British cold stage deposits are so rare (Holman, 1990;1993) that each occurrence is singular. This note reports fossil remains of the common frog, *Rana temporaria*, from a pit at Northfleet, Kent, that yielded fossils representing animals that lived in a Late Pleistocene periglacial environment.

THE SITE

Baker's Hole pit, Northfleet, Kent, contains periglacial deposits representing the Wolstonian Cold Stage (early part of the Late Pleistocene) that have yielded the remains of large mammals and human artifacts (Smith, 1911; King and Oakley, 1936; Stuart, 1982; Jones and Keen, 1993). The mammals are: mammoth (*Mammuthus primigenius*), horse (*Equus ferus*), and woolly rhino (*Coelodonta antiquitatis*). These animals are believed to have lived near the ice margin in a periglacial environment.

Recent systematic collecting at Baker's Hole pit by Simon Parfitt of the University College London Field Archaeology Unit yielded the frog remains. Abbreviations appended to the fossil bones below are: NHM – Natural History Museum, London; SP – Simon Parfitt; BH – Baker's Hole pit; S228 (etc.) – systematic sample units.

THE FOSSILS

Rana temporaria Linnaeus (Common frog)

Material: Left ilium of a subadult NHM-BH-SP-S228, and left ilium of a juvenile NHM-BH-SP-S138. The ilia were identified as *Rana temporaria* using the criteria of Holman (1985).

Rana sp. indet. (Frog)

These fossils probably also represent *Rana temporaria*. But since none of the elements are particularly diagnostic, they will be merely designated as *Rana* sp. indet.

Material: Right angulosplenial of a subadult NHM-BH-SP-S141; right distal humerus of a juvenile NHM-BH-SP-S138; limb fragment of a subadult NHM-BH-SP-S141; and posterior vertebra of an adult NHM-BH-SP-S141.

COMMENTS

At least two individuals of *Rana temporaria*, a subadult and a juvenile; and at least three individuals of *Rana* sp. indet., an adult, a subadult and a juvenile, were represented at Baker's Hole pit.

Rana temporaria occurs today north of the Arctic Circle, reaching the northern tip of Norway, Sweden, Finland, and occurring throughout the Kola Peninsula (Frazer,

1983, fig. 9). Thus, it may not be surprising that this species existed near the ice margin in glaciated Britain. Nevertheless, its presence in such a cold environment where it lived with the woolly rhino and mammoth is noteworthy. *Rana temporaria* probably existed in parts of southern England during all glacial time, and must have been one of the first, if not the first, amphibian to have reinvaded recently deglaciated areas.

ACKNOWLEDGEMENTS

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REFERENCES

- Frazer, D. (1983). *Reptiles and Amphibians in the British Isles* London: Collins.
- Holman, J.A. (1985). Herpetofauna of the Late Pleistocene Fissures near Ightham, Kent. *Herpetological Journal* 1, 26-32.
- Holman, J.A. (1990). New records and comments on British Pleistocene cold-stage amphibians and reptiles. *British Herpetological Society Bulletin*: 34: 39-41.
- Holman, J.A. (1993). British Quaternary herpetofaunas: a history of adaptations to Pleistocene disruptions. *Herpetological Journal* 3, 1-7.
- Jones, R.L. and Keen, D.H. (1993). *Pleistocene Environments in the British Isles* London: Chapman and Hall.
- King, C.A.M. and Oakley, K.P. (1936). The Pleistocene succession in the lower part of the Thames Valley. *Proceedings of the Prehistoric Society* 2 52-76.
- Smith, R.A. (1911). A Palaeolithic industry at Northfleet, Kent. *Archaeologica* 62, 515-532.
- Stuart, A.J. (1982). *Pleistocene Vertebrates in the British Isles* London and New York: Longman.

The following article has been reprinted from New Scientist, 22 April 1995

TADPOLES SNATCH SALVATION FROM THE JAWS OF DISASTER

LAURA SPINNEY

Red-Eyed Tree Frog tadpoles can choose to hatch early to avoid being eaten by snakes, according to an American zoologist.

The Red-Eyed Tree Frog faces a classic dilemma. Females lay their eggs on vegetation which overhangs ponds, where they may be eaten by the cat-eyed snake. Once the tadpoles hatch they drop into the water, so by hatching early the tadpoles can thwart their snake predators. The problem, however, is that if they hatch early the tadpoles are less well developed, and are more vulnerable to attack from shrimps and fish. The eggs are capable of hatching from about five days old, but if they wait until seven days their tails can grow an extra 30 per cent in length, which helps them to escape from aquatic predators.

Karen Warkentin of the University of Texas at Austin has found that the frogs respond to this dilemma by hatching early only if they come under attack from a snake. This is an effective strategy because an egg can hatch in a matter of seconds. She took clutches of spawn from the Corcovado National Park, Costa Rica, and suspended them over water in cages containing snakes separated from the eggs by partitions. When the eggs were either five or six days old, she removed the partitions. The tadpoles hatched sooner than those in control cages which contained no snakes. And those clutches which were attacked by snakes at five days hatched earlier than those attacked at six days (*Proceedings of the National Academy of Sciences*, vol 92, p 3507). Some embryos even hatched and escaped from eggs held in a snake's mouth.

But how do the eggs know when a snake is on the prowl? Warkentin claims that early hatching is more than just a general response to mechanical disturbance because it takes a very specific stimulus to induce hatching. Neither touching the eggs nor moving the jelly in which they are embedded has any effect, she found. "Young eggs are also insensitive to a variety of other stimuli, including rain, wind and earthquakes of up to 4-7 on the Richter scale," says Warkentin. But sliding forceps between the eggs and into the jelly - a stimulus that may mimic the action of a snake's jaws - makes them hatch rapidly.

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A NOTE ON *HEMIDACTYLUS TURCICUS*

J.L. CLOUDSLEY-THOMPSON

10 Battishill Street, Islington, London N1 1TE

The gecko *Hemidactylus turcicus* is widely distributed in southern Europe, northern Africa, and the Middle East extending into Iran. It has been introduced into Louisiana, Texas, Florida, Mexico, Cuba and Chile. The subspecies *H. turcicus parkeri* occurs in Somalia, the south of the Arabian peninsula, southern Iran, and Pakistan; while *H. turcicus spinalis* is found in the Balearic Islands. The genus *Hemidactylus* probably originated in the Mediterranean region where *H. turcicus* is common, often apparently cohabitating with *Tarentola mauritanicus*. Two other species of geckos occur in Europe: *Phyllodactylus europaeus* of Italy, Corsica and Sardinia, and the clawed *Cyrtodactylus kotschy* of the Balkans, Ionian and Aegean islands, southern Italy and south west Asia.

H. turcicus inhabits bark, tree trunks, palm fronds, agaves, rocky outcrops and human habitations. It is said not to hibernate regularly. Crepuscular and nocturnal, the adult geckos may reach a length of 10 cm. They are slender, with tubercles on the back and tail. The specimen in my photograph was seen in Mallorca in late November, 1994. It was immature, measuring only about 6 cm in length. I was lucky to find it under a boulder beside the road in the Sierra del Nord because I did not come across other reptiles so late in the year.

Fast, agile, and an excellent climber, *H. turcicus* feeds mainly on insects and spiders. It utters a mournful, mewling cry. At least five types of call have been identified, from which both the age and sex of the individual making them can be distinguished. One or more clutches of spheroid eggs are laid in June and hatch in July. Measuring 10-12 x 9-10 mm, they have marbled white shells and are hidden in sand or amongst rocks. The incubation period is about 45 days at 32°C and 90-100 days at 25°C. The young are about 4 cm long at birth.



Plate 1. *Hemidactylus turcicus*, seen on Mallorca, November 1994.

BRITISH HERPETOLOGICAL SOCIETY

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The British Herpetological Society seeks to promote all forms of interest in amphibians and reptiles, including the keeping and breeding of animals in captivity, conservation of wild populations, education of the general public concerning the importance of amphibians and reptiles, and scientific research into all aspects of their biology. The Society encourages membership from all age groups and from all countries of the world, and publicises its work through meetings and a range of publications.

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