

# JBL

What - How - Why?

## How to Set up a terrarium

Care of lizards,  
turtles and spiders



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# 1 Introduction



technical equipment, diverse accessories and types of food along with the wealth of information on the needs of terrarium inhabitants available to beginners in well-stocked pet shops today has doubtlessly made a major contribution to the triumphant march of terrarium-keeping.

JBL's Research & Development Team is in charge of applying the bountiful findings on the habitats of terrarium animals gained from the JBL Research Expeditions to JBL's products and services. After the test phases are finished, terrarium keepers will be able to find the results on the JBL shelves in pet shops.

We urgently recommend obtaining detailed information on your future terrarium pets in a pet supply store and not simply buying a „cute little lizard with a mini terrarium“ only to find out later that, firstly, it's not a pet to pet and, secondly, it's going to grow to a length of 80 cm.

This booklet intends to give you some information, tips and ideas before you dive into this fascinating hobby.

## The fascination of terrariums

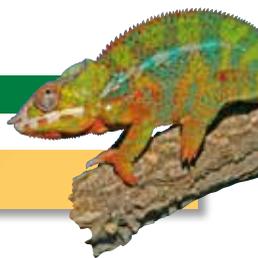
Terrarium-keeping has experienced an enormous boom in the past twenty years. In the midst of the increasing hustle and bustle of our world, an island of nature in their homes offers many people an opportunity to relax while watching their terrarium pets after a long day of work. For example, by losing themselves in a richly planted indoor jungle with a waterfall and a variety of creatures such as small anoles, day geckos and colourful small frogs. Observing the fascinating behaviour and interaction of these animals can be relaxing and entertaining at the same time.

The enormous selection of high-quality



*Surface temperature measurements in Costa Rica during the 2012 JBL Expedition*





## 2 Where are the animals from?

Most of the 3000 or so amphibian species and approx. 6000 reptile species come from tropical and subtropical latitudes. There are also many interesting terrarium animals in Europe, but they are almost all protected by law, making them unavailable for terrarium-keeping. As a result of increased breeding in captivity, the share of reptiles that have not been obtained from the wild is increasing markedly. This benefits the protection of the animals in addition to increasing our knowledge of numerous spe-

Relatively constant temperatures, high humidity and an absence of harsh light are the environmental conditions encountered by animals in the jungle. As almost all terrarium pets are cold-blooded, their body temperature depends fully on the temperature of their surroundings and the sun's rays. The animals keep their body temperature in the optimum range through specific forms of behaviour such as basking in the sun or seeking out cooler zones. Only then can their digestion and metabolism work effec-



*Dry rock biotope with wide local temperature variations*



*Agama sunning themselves in their habitat*



*A shady stream in the rainforest*

cies. Many of the 800 species of spiders are also finding an increasing number of fans and gradually losing their (undeserved) bad reputation. As a result, they are no longer considered creepy, and are viewed as fascinating instead!

It is always worth learning as much as possible about the natural habitats of your pets. The more detailed the information, the closer the conditions in the terrarium can resemble the natural environment. Desert animals only appear to live under hot conditions at first glance. Anyone who has been in the desert knows how it can get extremely cold night there and would will be sure to apply this experience to their terrarium. The situation in tropical rain forests is quite different:

tively and the animals display the behaviour typical of their species. This is an important consideration in reptile keeping.

In the following chapters, we would like to present two types of terrariums as examples to illustrate setting up a terrarium, the equipment used and care. One type is a desert terrarium with the corresponding extreme temperature conditions, and the other a rainforest environment, representing the „jungle behind glass“. As a variation on the rainforest terrarium, the paludarium or aqua-terrarium is mentioned, which can resemble an aquarium more closely or less closely.

### 3 The terrarium

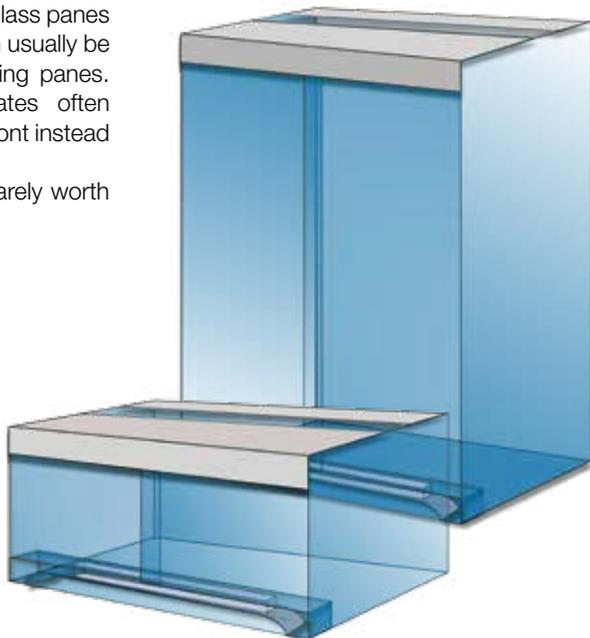
Nowadays, specialist retailers offer a wide range of terrariums, mostly with glass panes with silicone adhesive. These can usually be accessed from the front by sliding panes. Small terrariums for invertebrates often come with folding doors on the front instead of sliding panes of glass.

Building your own terrarium is barely worth the effort anymore nowadays.

#### Choosing the size and shape of your terrarium

The format, volume and technical equipment of the terrarium should be selected in accordance with the specific requirements of the species, the size of the animals and the range of movement required.

As a general rule, the larger, the better! The equipment should always correspond precisely to the volume of the tank, so that there are no immediate losses due to overheating in the event that the temperature control system fails. Suitable decorations should be used to structure the habitat to provide the animals with spots to retreat to without cluttering the terrarium or compromising hygiene. Of course, the floor of the terrarium is crucial for your bottom dwellers, while the height of the terrarium is important for your tree dwellers. A strict division of terrariums into a few standard types of terrariums doesn't make much sense due to the diverse needs and adaptations of the animals, especially not when considering that the boundaries between the different types are often blurred.





## Choosing the location for your terrarium

With only a few exceptions, any location within a house is actually suitable. However, you should make sure to choose a location where you can observe the animals comfortably from your favourite place. You should also be able to reach the terrarium for cleaning, feeding, etc. without going



through contortions!

Also make sure not to choose a location with a risk of overheating from sunlight such as a spot near a window. Attic flats which are very warm in the summer and barely cool off at night are not suited for keeping heat-sensitive species. Last, but not least, the weight-bearing capacity of the surface under the terrarium must also be taken into account.

## The climate in your terrarium

The climate in the terrarium is the most important factor for your animals' wellbe-

ing. The animals will only be able to display their full repertoire of behaviour and lead a healthy life if the typical climate of their immediate habitat is reproduced as closely as possible through the skilful selection of equipment.

The temperature (of the air and the floor/substrate and of local sites with high temperatures), lighting (duration, intensity and quality of light), the relative humidity and ventilation (air supply/removal) make up the most important climatic factors in a terrarium. As in the wild, the individual elements of climate influence each other and are subject to the changes occurring in the course of a day. The relative humidity normally decreases in parallel with an increase in the duration of operation of the lighting and heating equipment. This must be taken into account when selecting a terrarium. The individual climate parameters usually change quickly in a small-volume tank, so that they need to be optimised continually by the use of sophisticated control technology or repeated manual intervention. In large-volume tanks, the climatic factors change much more slowly and it is easier to create zones with different microclimates (zones of different temperatures and humidities) so the animals can seek out places with the climatic conditions they prefer any time.



*Rock iguana in a terrarium*

## 4 Choosing the equipment for your terrarium

### Lighting

As cold-blooded animals, terrarium animals are far more dependent on light, i.e. the quality and intensity of light, than warm-blooded vertebrates. Activity, feeding, digestion or resting phases are influenced by the alternation of day and night, and especially by the intensity of light. Besides this, many terrarium animals associate light with heat and seek light places in the terrarium in order to „bask in the sun“. These considerations are especially important when choosing heating equipment for desert terrariums. There are differences in the yield and quality of light, depending on the light source used. Fluorescent tubes, for example, provide a lot of light with little heat production, whereas light bulbs convert a major share of the energy



*Bearded dragons sunbathing under a spotlight*

taken up into heat and only a small share into light. The question as to which quality of light is best suited for a specific terrarium is easy to answer if we take a look at nature: For millions of years, plants and animals have been adapting to what the sun sends down to the earth in a long evolutionary process. If we look at the spectrum of sunlight (meaning the part of solar radi-

ation that is visible to us), we recognise a very even distribution of all spectral colours. For this reason, lamps for terrariums should have a spectrum that is as close to being balanced and without gaps as possible. At the same time, all of the plants and animals will be able to exhibit their full natural brilliant colouring. Metal halide lamps (JBL L-U-W) are the top choice for animals requiring sunlight, ultraviolet light (i.e. diurnal animals) and heat. They offer a full spectrum that is sunlight simulating, including UV-A and B radiation, along with heat emission for the terrarium. Accordingly, the temperature in the terrarium decreases after the lamps are switched off, thereby simulating the desired night-time drop in temperature. The JBL L-U-W lamps are available in two different wattages and two versions, depending on whether the animals require a lot of UV (JBL ReptilDesert L-U-W) or less UV (JBL Reptil-Jungle L-U-W).

The fluorescent tubes sold by JBL are also so-called full-spectrum tubes which come in two different versions for terrariums: JBL SOLAR Reptil Sun and JBL SOLAR Reptil Jungle.

UV-light, specifically in the UV-A and UV-B ranges, also plays a significant role in terrarium lighting. Depending on their origin, terrarium animals require more UV light or less for their well-being. UV-B stimulates Vitamin D<sub>3</sub> synthesis from the Vitamin D<sub>2</sub> precursor. UV-A stimulates pigmentation. It is important to take into account that the glass absorbs around 50 % of the UV radiation, so that the lamps should always be installed inside the terrarium. The distance between the light source and the animal is another important factor: There is information direct-

ly on the lamp indicating how much radiation is emitted at which distance from the lamp. If the terrarium is high, the animals can get closer to their UV source if they are provided with something to climb up on. The following applies for animals that require UV: These animals will not stay healthy if fluorescent tubes are used, even if they emit UV radiation! It is imperative for a UV spot lamp or an L-U-W lamp to be mounted additionally. When using metal halide lamps, one must also bear in mind that they may/ can only be operated with special electronic ballasts (JBL TempSet Unit L-U-W).

**Tip:** The use of high-quality reflectors such as JBL SOLAR Reflect can double the light yield of all the light sources recommended here.



### Overview of JBL terrarium lights

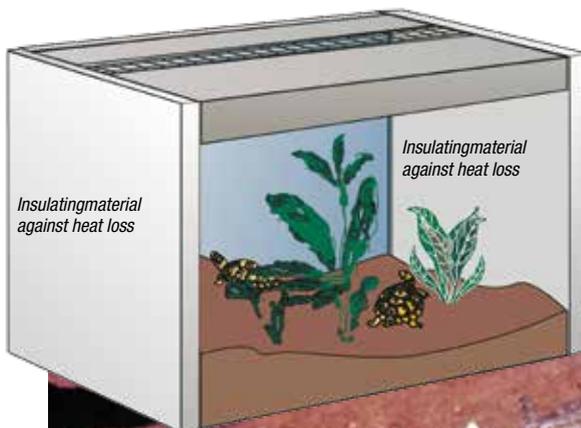
++ high + medium - zero

JBL Product	Type of lamp	Light	UV-A	UV-B	Heat
JBL ReptilJungle Daylight	Energy-saving lamp	++	-	-	-
JBL ReptilJungle UV 190	Energy-saving lamp	+	++	++	-
JBL ReptilJungle UV 310	Energy-saving lamp	+	++	++	-
JBL ReptilDesert Daylight	Energy-saving lamp	++	-	-	-
JBL ReptilDesert UV 300	Energy-saving lamp	+	++	++	-
JBL ReptilDesert UV 480	Energy-saving lamp	+	++	++	-
JBL SOLAR UV-Spot plus	UV-Spot-lamp	+	++	++	++
JBL ReptilJungle L-U-W Light	Metal halide lamp	++	++	++	++
JBL ReptilDesert L-U-W Light	Metal halide lamp	++	++	++	++
JBL ReptilDay	Halogen lamp	++	-	-	++
JBL ReptilSpot	Neodymium lamp	++	+	-	++
JBL SOLAR Reptil Sun T8	Fluorescent tube	+	++	++	-
JBL SOLAR Reptil Jungle T8	Fluorescent tube	+	+	+	-

## Heating

The heating in a terrarium should be dimensioned such that the animals will not be “roasted” in the event that the control technology fails. In other words, a small terrarium should not be equipped with an over-dimensional 100 watt heating cable with a controller, and instead, should have a small floor heater with only 15 or 7.5 W. The heating effect of the lighting must also be taken into account. As a result, when the lighting is turned off, the night-time drop in temperature occurs simultaneously.

**Tip:** The heat emission of a terrarium can be reduced – and savings in energy costs achieved as a result – by insulating the side panes with insulating material on the outside



to prevent heat loss. Foam pads such as the JBL Aqua-Pad under the bottom panel prevent heat emission and especially keep the bottom panel from bursting in case the supporting surface is uneven and there is no heating mat on the bottom. When placing a heating mat on the outside under the terrarium, though, it is imperative to follow the applicable instructions in order to ensure sufficient rear ventilation of the heating mat. The JBL floor heating mats (JBL TerraTemp) come with “feet” as spacers.

*A spiny-tailed iguana enjoying the warmth*



## Supply of water and moisture and water care

Aside from light and heat, the drinking water supply, relative humidity and the right moisture of the substrate are very important for the animals' well-being. This is because reptiles and, to a greater degree, thin-skinned amphibians are constantly losing water as a result of respiration, particularly through the skin. Especially amphibians almost exclusively take water up through the skin and barely drink at all, in contrast to other terrarium animals. Therefore, in addition to cleaning and refilling the water dish, daily care should also include misting (spraying) the inside of the terrarium with water regularly at least once in the morning. This also applies to desert terrariums. This is because there is often fog or dew in the morning hours in regions with high daytime temperatures and significant decreases in temperature at night which many animals use to meet their moisture needs through the water condensing on their body or on objects in their environment.

Some species of animals e.g. chameleons prefer moving water. Young animals don't need more than the water drops that collect on leaves or objects after misting, whereas adult animals often require more. In this case, it is recommended to add a dripping system that supplies water over an extended period of time. This way, the animals can take up as much water as they need. The dripping water can be supplemented by occasionally adding vitamins (JBL TerraVit fluid). The pets can be offered moving water by putting in a waterfall, e.g. a ready-made model or room fountain, operated by JBL ProFlow Mini water pumps or by setting up a larger-sized waterfall operated by JBL ProFlow Maxi water pumps complete with a water reservoir on the

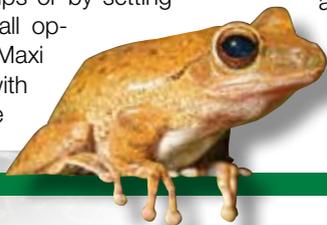


*Rain forest stream in northeastern Australia*

rear wall. In this case, though, it is important to assure consistent good quality of water. Besides this, the substrate of aqua terrariums must be cleaned regularly with a gravel cleaner such as the JBL AquaEx kit and the aquarium panes must be cleaned with glass cleaners such as the JBL Blanki kit. A weekly partial water change with around a third of the water volume should be done, similar to an aquarium. Without regular cleaning, a slew of bacteria which is very detrimental to the animals' health forms very quickly in the reservoir of the room fountain or waterfall which often contain but a few litres, and that in a terrarium climate that is generally warm to boot.

The water supplied in a terrarium requires certain measures of care in order to prevent a murky brew laden with bacteria which can endanger the animals' health from forming. Care is relatively simple with drinking vessels: They should be cleaned and refilled with fresh water daily.

When it comes to larger bodies of water in a terrarium, e.g. in combination with a waterfall, the care required is comparable





It is imperative to do a regular water change of approx. 30 % every 2 weeks. The changed water should then always be adapted to meet the animals' needs by using JBL Biotopol T.

If you are keeping turtles, it is urgently recommended to use a very powerful external filter (JBL CristalProfi e) due to the animals' enormous metabolism. In this case, a model with one number higher than that recommended for the corresponding water volume should always be selected. With its JBL EasyTurtle, JBL offers a product that effectively accelerates the degradation of the enormous excrements of the turtles, thereby preventing unpleasant odours. It contains specially bred cleansing bacteria which are bound on a mineral granule. This granule is simply sprinkled into the water part on the floor or integrated into the substrate.



to that for an aquarium. Please refer to the JBL brochures, „What - How - Why“, Nos. 1 and 2, which you will find on the JBL homepage in the download section of Freshwater Aquatics.

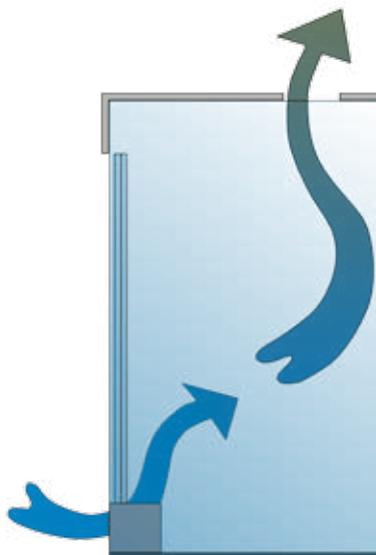
Briefly: After the water part has been filled with mains water, a water conditioner (JBL Biotopol T) that can render any chlorine harmless and absorb harmful substances such as heavy metals should be added. Internal and external filters from the JBL CristalProfi range can be used to filter the water. Internal filters such as JBL CristalProfi i 100 are suited for small water vessels of up to 100 litres. External filters from the JBL CristalProfi e range which are also designed to save energy are recommended for larger volumes of water.

*Air humidity measurement with the JBL TerraControl Hygrometer*



## Ventilation of the terrarium

The need for fresh air and all other climatic needs vary significantly in accordance with their origin. Nowadays, the terrarium is usually ventilated through two air screens mounted on different sides which prevent stuffy air from accumulating. Fitting a ventilation grid under the front panes has the advantage of keeping the view into the terrarium unobstructed. The air in a terrarium heats up from the heating mats or cable on the floor, the lighting and the radiators and then rises subsequently. Some of the warm air escapes through the ventilation grids, usually in the top of the terrarium, allowing fresh air to flow in through the grid under the front panes. The air circulation helps keep the panels and furnishings dry. If there is no ventilation in the lower third of a humid terrarium, stuffy congested air saturated with moisture forms quickly, causing the front panes to fog. This is why aquariums are only suited for keeping animals from dry regions (e.g. leopard geckos) and not for setting up a rain forest terrarium unless ventilation slits are placed near the floor subsequently. If di-



urnal reptiles such as tortoises are kept in aquariums, large ventilation surfaces in the cover must stay open as well. This leads to a high loss of heat and moisture, which is why aquariums can only be recommended without reservation for very few animals. In a terrarium, the optimum moisture can be achieved by increasing and decreasing the size of the ventilation openings. The heat does not escape as quickly and in as large amounts as from an open aquarium.

*Air screen in a terrarium. Vertical air screens have the advantage that the animals do not crawl around on them as much and run the risk of getting their claws stuck*

## 5 Types of terrariums

In the following, we would like to present two types of terrariums in detail – the desert terrarium and a rainforest terrarium – to illustrate the wide range of possible terrarium types. The paludarium or aqua-terrarium will also be mentioned as an interesting var-

iation of the rain forest climate-type terrarium. There are, of course, a whole range of conceivable combinations of climate types, which, though, cannot be dealt with in the space available here. Tips are given on sources of relevant information.



## 6 The desert terrarium



We humans generally think of the desert as a very hot habitat. When we take a closer look, though, we find that the habitats of reptiles in the desert are characterised by very high fluctuations in temperature, depending on where the animals are. At night, temperatures drop quite dramatically. Desert animals deliberately alternate between warm, sunny areas and cooler, shady places in their habitat in order to reach and maintain the temperature they need for metabolic processes and typical behaviour (courtship display, territorial battles, etc.).

It should be noted that desert animals in particular also need localised (!! ) places with temperatures of 50–60 °C in a terrarium, although they do not spend all day there. It goes without saying that the time spent under the source of heat is also influenced by the air temperature and wind movement in their natural habitat. In the spring when air temperatures are cool and the winds are strong, they often need to bask in the sun for extended lengths of time to reach their preferred temperature. In contrast, they avoid sunlight in the summer when the air

temperature is 38 °C and there is no wind in order to not overheat above their optimal temperature (from 35–42 °C in many desert species). Therefore, the irregular distribution of heat is a very important factor in heating a terrarium. The animals must always be able to move to cooler places when they have warmed up sufficiently. By the careful selection of technical equipment and their use (e.g. never cover the entire floor of a terrarium with a heating system), the terrarium keeper must ensure that climate gradients are created in the terrarium rather than a uniform sauna climate. Setting a temperature gradient in the terrarium is especially important in this context. No reptile can survive a core temperature of 48 °C.

A desert terrarium can be set up as follows: Any kind of sand is suitable as a floor covering. JBL offers red, yellow and white sand under the name of TerraSand. JBL TerraSand red is supplied damp and can be shaped while it is being spread. After drying, it hardens to a certain degree, thereby permitting burrowing animals to dig caves. Depending on the animals' needs, the ter-



*Girdled lizard**Thick tail scorpion**Dab lizard**Collared lizard**Rainbow lizard*

rarium can be structured with stone constructions with or without caves. Stone constructions should be glued together in the interest of the safety of the animals and the glass. This can be done by using non-toxic aquarium silicone such as JBL AquaSil. Weight may pose a problem with larger-sized stone constructions in a large terrarium. Stone imitations made of plastic which can be found in specialist shops are recommended in this case. Dry woods are also well suited as decorations in desert terrariums. Appropriate plants such as succulents or similar complete the picture. Cacti should only be in the form of imitates made of plastic due to the potential risk of injury. In general, live plants barely stand a chance of survival if there are larger-sized, physically active animal species in the terrarium. Plastic imitations which are available in specialist shops are also well suited in this setting.



## A terrarium for sun-loving tortoises

can principally be set up similar to a desert terrarium. However, the floor covering should NOT consist of sand. Tortoises need a large surface to move around. The floor surface should be covered with an approx. 2 cm thick layer of JBL TerraBark. A cover can be produced with a large bent piece of cork. Stones and



stone plates can be placed in the terrarium, but they must be without sharp edges. A heat lamp and a heat rock offer the required heat and are quickly recognised as a favourite spot. A drinking bowl (JBL ReptilBar) and a food bowl for vegetarian food should be provided in a sufficiently large size. Please refer to the relevant literature and/or consult a specialist retailer for further details.



## Light for the desert terrarium

The desert habitat is marked by its extreme amount of light. The ultraviolet light of the sun can reach the ground and the animals unchecked. Accordingly, desert animals need very bright light with a high concentration of ultraviolet light. The JBL SOLAR Reptil Sun fluorescent tube supplies 36 % UV-A and 8 % UV-B, the suitable intensive light for a flat desert terrarium. As fluorescent tubes with a high UV concentration only emit relatively little light in the visible range, a combination of full-spectrum tubes with a high concentration of visible light is urgently recommended. JBL SOLAR Reptil Jungle is the appropriate option here. It offers ample light of full-spectrum quality in the visible range with a low concentration of UV, namely 2 % UV-A and 0.5 % UV-B. A desert terrarium with a depth of approx. 50





2x JBL SOLAR Reptil Jungle



cm can by all means be provided with suitable lighting by using 1–2 JBL SOLAR Reptil Sun tubes and 2–3 JBL SOLAR Reptil Jungle tubes. It is imperative to mount the JBL SOLAR Reptil Sun inside the terrarium without having glass panes between the tubes and the animals blocking light. This is so the animals can effectively utilise the ultraviolet light. Otherwise, protection in the form of a wire screen can be mounted so the animals will not come into contact with the tube.

Metal halide lamps which also produce ultraviolet radiation and heat in addition to visible light, are even better than fluorescent lamps. JBL ReptilDesert L-U-W provides terrarium keepers with the best technical solution currently available for desert terrarium lighting that meets the natural needs of desert inhabitants.

Incidentally, invertebrates such as spiders and scorpions do not require any ultraviolet light, which can even be harmful to them. Here, JBL ReptilDesert or Jungle Daylight are the best option (energy-saving lamps without ultra-violet radiation).



## Heating in the desert terrarium

As already mentioned, desert animals associate heat with light, so that they automatically seek light spots to warm up. At the same time, a terrarium must also offer cool spots to where the animals can retreat after they have warmed up sufficiently. This is easier to do in a larger-sized terrarium than in a small one, which heats up completely within a relatively short period of time. Here is a suggestion for arranging heating means in a desert terrarium: Half of the floor can be covered with a JBL TerraTemp heating mat. The heating mat should never be placed in the middle. This is so the animals can retreat to the other half of the floor to find cooler temperatures. On the other hand, sun worshippers who like to burrow have the option

of retreating from the heat by burrowing.

A spot light (halogen light with a reflector) is installed on the side with the heating mat to provide both heat and the necessary light. Again, it should not be installed in the middle, but instead, facing the side panel. As an added benefit, spotlights with colour-corrected glass also provide very natural appearing light with good colour rendering properties. This arrangement creates different temperature zones from hot to temperate and unheated ground. These in turn permits the animals to seek different temperature zones at will, similar to their natural surroundings.



*Frilled-neck lizard*

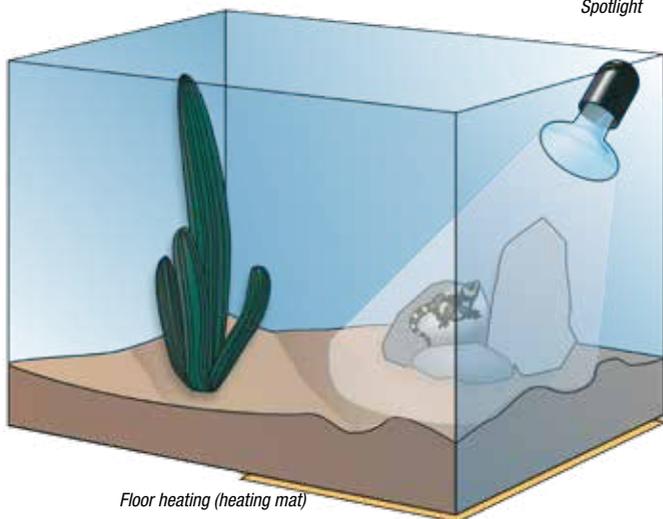


ly with JBL TempSet (heat-resistant fittings made of Space Shuttle material). Red light bulbs or weak LEDs serve as moderate lighting for observing the animals at night.



Crepuscular animals or nocturnal animals such as leopard geckos can find warming places on the JBL ReptiTemp heating stones, which ensure an even distribution of heat in the stone. The surface of the stone heats up to a moderate 30–45 °C. The JBL ReptiHeat Ceramic heat lamps with the appropriate wattage are well suited as a source of radiation heat if they are installed proper-

Spotlight



Floor heating (heating mat)



## 7 The rain forest terrarium



We automatically associate the term “rain forest terrarium” with a jungle behind glass along with high humidity or high temperatures that more or less remain constant. Our concept here does not deviate as much from reality as it does when it comes to desert terrariums. In reality, the characteristic climate factors of a rain forest terrarium comprise relatively high temperatures of 25–30 °C with mild cooling-off at night and relatively high humidity between 70 and 90 %. The level of the required humidity and temperature may vary from one species to the other. Obtaining corresponding information likewise forms a basis for successful reptile keeping that meets the individual needs of the species.

JBL TerraBasis or JBL TerraBark is ideally suited as a substrate.

Rainforest terrariums should be generously planted. Please inform yourself as to which plants are suited for the terrarium climate you have selected. For example, if you plan to keep animals with adhesive pads (e.g. day geckos), the leaves of the plants should have smooth surfaces. Otherwise, the animals will adhere to the glass panes most of the time instead. The weight of the animals should also be taken into consideration when selecting the plants. Plastic plants should be used if you have relatively heavy animals such as tree pythons, which would crush live plants. With the JBL TerraPlanta range, JBL offers a few attractive plastic variants for this purpose.

Water elements can also be integrated into the terrarium. In this case, it is important to make sure that the animals won't drown accidentally. The water should be kept shallow and have many places where the animals can easily get out. With some terrarium inhabitants, the terrarium shouldn't have any water elements whatsoever. Please consult your specialist dealer for further information. There is no need for a drinking bowl in a rain forest terrarium, as the animals cover their water needs with water droplets formed by the humidity. Water falls can also be integrated into the terrarium. Not only are they decorative, they also effectively increase the moisture in the air. For example, chameleons prefer moving water as their source of water.

All kinds of moisture-resistant branches or cork bark are suited as structuring elements in a rain forest terrarium. Wood roots sold for use in aquariums (e.g. JBL Mopani, Opuwa or Mangrove) are ideally suited, as they won't get damaged by moisture. Branches decorated with air plants (bromeliads) are an eye-catcher in any rain forest terrarium. The side panels and rear panel can also be included when setting up the terrarium. This may be done by gluing flat stones, plant elements made of coconut fibre or your own creations made of processed Styrofoam covered with a primer and paint to the panels later on. You can let your imagination run wild when setting up a rain forest terrarium. At the same time, though, you must always bear the animals' needs and requirements for easy cleaning in mind.

*Dwarf day gecko**Dyeing poison frog**Boa Constrictor**Green iguana**Centipedes*

## The aquatic terrarium or paludarium

The aquatic terrarium or paludarium (lat. Palus = swamp) is basically a rain forest terrarium combined with an aquarium. Breathtaking landscapes with waterfalls and streams can be built in large paludarium. The typical care, furnishings and technical equipment required for an aquarium also apply for the aquatic section of the paludarium. This subject is dealt with in detail in the JBL how-to booklet, "Setting up an Aquarium".

### For turtles:

An aquarium with a large floor surface and low height is suitable. The depth of the water should correspond approximately to the length of the turtles' shell. Good quality of water can be achieved by filtering the water with an internal filter (JBL CristalProfi i) which can also be mounted inside the tank. Fresh tap water must be added to a water conditioner (JBL Biotopol T) which neutralises all of the

harmful substances in the tap water.

The aquatic section is often difficult to plant, because the turtles like to eat a lot of plants. The terrestrial section must be set up so the animals can climb up easily and provide enough space for all the animals at the same time. A terrestrial section can be made of cork, wood or rocks as well. A heat source should be mounted at a sufficient distance over the terrestrial part. Swamp plants are very well suited as decorations, even if the animals may nibble on the leaves occasionally. The water temperature of around 25 °C can be maintained constant by an automatic heating element (JBL ProTemp). One-third of the water in the aquatic turtle terrarium should be changed weekly. JBL Sansibar River or medium-grained quartz gravel are recommended as a substrate.





## Light for rain forest terrariums and aquatic terrariums

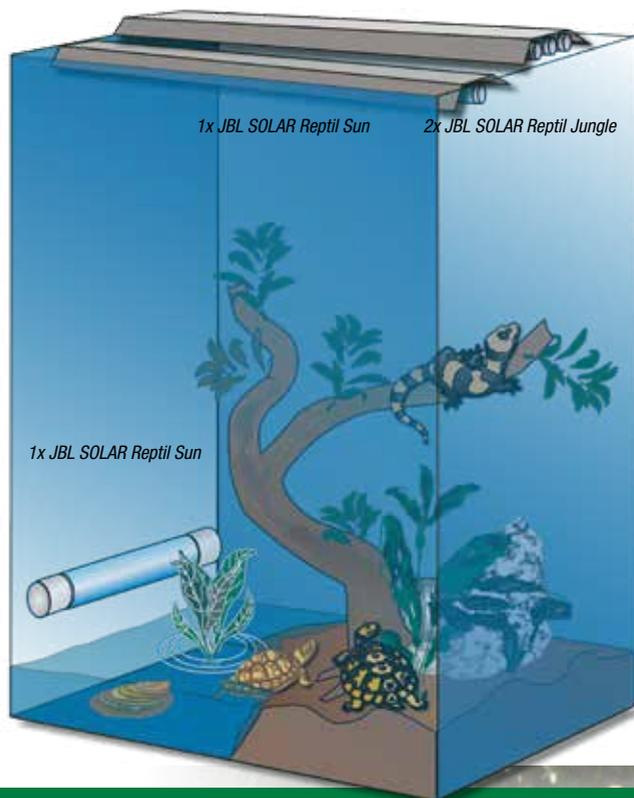
Sufficient light of full-spectrum quality, in particular, is needed for the numerous plants in a rain forest terrarium to grow.

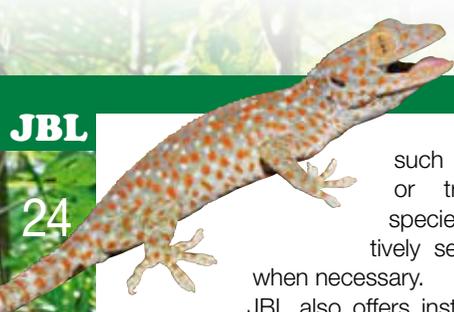
This can be achieved in an ideal manner by using a suitable number of JBL SOLAR ReptilJungle tubes. As the abundant vegetation in a rain forest blocks the sun's rays, animals from the rain forest, especially amphibians, only need a comparatively small amount of ultraviolet light. The small UV concentration of JBL SOLAR Reptil Jungle is ideally suited for this setting.

Metal halide lamps such as JBL ReptilJungle L-U-W provide the best lighting for a rain forest terrarium with diurnal animals which require ultra-violet light. They supply appropriate ultra-violet radiation and heat to meet the specific needs of the species in the terrarium in addition to a sunlight simulating full spectrum. Special electronic ballasts

(JBL TempSet Unit L-U-W) are imperative when using metal halide lamps.

Lighting options with higher ultra-violet concentrations (JBL ReptilJungle UV 310 or JBL ReptilJungle L-U-W 70 W) should always be selected for animals that live in more open areas of the rain forest or next to water,





such as turtles or tree-dwelling species which actively seek sunlight when necessary.

JBL also offers installation kits for lamps in terrariums with four different variations. As fittings are always mounted from the outside through the lid, there is also a version available with narrow Winsta connectors that fit through a small hole of 2.2 cm (JBL TempSet connect). A version with a joint (JBL TempSet angle) enables the installation of lamps that can be bent. UV-Spots, though, may not be bent and must always be mounted vertically. Always make sure to check an installation kit

for absolute heat resistance in order to prevent any danger of overheating/fire. The JBL TempSets are all made of genuine Space-Shuttle material which cannot be damaged by heat.

JBL's range includes the JBL TempProtect lamp shade with a protective screen to protect the animals and the terrarium keeper from painful contacts.

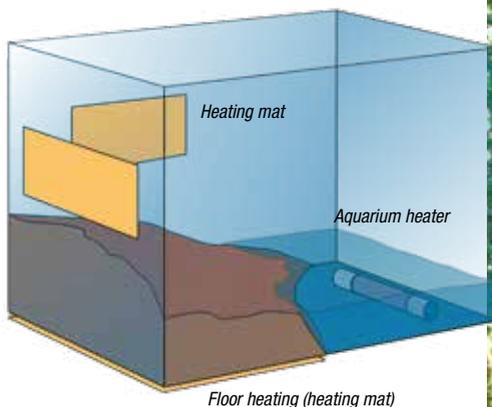


*Young basilisks*

## Heating in rain forest terrariums and aquatic terrariumsm

“Mild” floor heating systems such as JBL TerraTemp are ideal for maintaining a relatively constant temperature in a rain forest terrarium.

They cause tropical plants to develop so-called “warm” feet, which encourages growth. The lighting also helps to heat the rain forest terrarium from above. In larger-sized terrariums, there is also the option of placing additional heating pads on the outside of lateral surfaces which are not already covered by decorations from the inside if the desired temperature has not been reached. If larger-sized aquatic sections with or without a waterfall are integrated in the terrarium, an aquarium heating element (JBL ProTemp s) is highly recommended in the aquatic section. If turtles or other tropical sun worshippers are being kept, a spotlight should also be installed as a light heat source for basking in the sun on the terrestrial land section.



*The animals don't become active until the temperature is right*

## 8 Feeding the terrarium animals

In order to keep terrarium pets healthy, it is vital that they are fed in accordance with the needs of the particular species. This is the only way to avoid deficiencies e.g. rickets or illnesses caused by malnutrition (fatty liver, renal gout). It is important to know the natural eating habits of the animals in order to provide a balanced diet. In a terrarium, many omnivores or opportunists especially like to eat types of food which they would rarely find in the wild, or only at certain times of the year. For example, some herbivores will also eat live food. If terrarium pets are given fully atyp-



*Egg snake eating a quail egg*

ical food, for example, toast bread soaked in milk, cooked pasta, minced meat or cat food, a surprising number are certain to greedily devour this. However, not everything that the terrarium animals like to eat is good for their health. The reason why large common iguana do not eat cat food in the rainforest is not that the tins are hard to open, but simply because there is none there. Simply giving the animals their favourite food (he just loves to eat it) for convenience or out of excessive care is the wrong way to feed.

### How often should the animals be fed?

There is no simple general answer to this question. The amount of food to give per meal and the intervals between feeds can vary widely according to the species. Of course, young animals usually need to be fed daily in the first few weeks, whereas adults only have to be fed 2-3 times a week. Depending on their age, snakes only need food at very long intervals, whereas the small colourful tree-climbing frogs (*Dendrobatidae*) develop serious problems after only a few days without food. The amount of food given should also be suitable for the pet. Many animals eat ahead so-to-speak so they will be ready for the annual dry season in their natural habitat when food becomes scarce. Of course, they are not aware that there will be no food shortage in the terrarium and, as a result, do not stop eating ahead when their owner constantly feeds them too generously. This is why desert animals are at a far greater risk of developing fatty degeneration than rainforest animals. Overfed animals become sluggish, their sex organs may become fatty, leading to sterility, or they may even die from organ failure, e.g. when their liver stops functioning because too much fat has been stored.

### Food for carnivores

Most terrarium animals are “animal eaters”, so-called because they eat whole, live animals. As they are “programmed” to particular stimuli, such as the movement of the live food or, in the case of snakes, the warmth of the small mammal or bird serving as the



*Blue-tongued skinks love live food*

victim, they can rarely be trained to accept substitute food, with few exceptions. Snakes can often be successfully brought to accept dead prey if it is warmed to 37–40 °C (micro-wave) before being offered as food.

Nowadays, specialist pet shops offer a wide range of live food animals e.g. small mammals, grasshoppers, cockroaches, crickets, house crickets, flies, fruit flies, springtails, worms, mosquito larvae, wax worms or crustaceans. Compared with the vast range available in the wild, this is still a very moderate selection. To avoid deficiency symptoms, the type of food animals purchased should be changed frequently instead of buying just one kind. Last, but not least, the food animals that are purchased should be improved by feeding with high-grade food prior to being fed to your terrarium pets. This can be done by feeding them up with high-grade

food mixtures such as JBL TerraCrick, bran, herbs, fruit, vegetables and minerals, which significantly improves their nutritional value. Caution: You can NOT recognise the nutritional value of food animals from the outside! Namely, the herbs, minerals and dietary fibres which a cricket eats shortly before being fed, are indirectly eaten along with the “stuffed” insect by a carnivore which would normally not give vegetarian food a second glance. For those who don't want to touch the food animals or risk getting bitten by their terrarium pets when they bite their prey can use a pair of long pincers (JBL P1 and P2 AquaTerra Tools) to offer the live feed.

In summer, the menu offered to insect eaters can be improved and broadened to include meadow plankton which you can gather yourself. Of course, these should not be picked from areas with intensive agricultural cultivation using herbicides or similar. Likewise, protected species should be released if caught. Obtaining prior permission from the property owner may prevent trouble.

**Tip:** If, despite careful handling, a food cricket should escape, any free-roaming „creepy crawlies“ can easily be caught by non-toxic means such as a glue sheet or a baited trap, JBL LimCollect.



*A green tree python devouring a rat*



*Some carnivores also like green food*





## Food for turtles

Most pond turtles and other turtles are omnivorous, usually with a preference for anything “animal”. Fish and any kind of aquatic creature are among the favourite prey. Now and then, a dead fish is devoured. Turtles also like to eat some aquatic plants and other “greenery”. In contrast to most other terrarium animals, pond turtles and other turtles also eat “dead food” and can therefore readily be fed with dry food. JBL sells the widest range of turtle food that is specially formulated to meet the specific needs of turtles in terms of nutrition and physiology and even takes account of the animals’ sizes. Dried fish and crustaceans, along with algae, are the main ingredients.

JBL Turtle Food, a mixture of freshwater shrimp, other crustaceans and insects, is the classic amongst the food products. JBL Agil, a food in the form of floating sticks, and JBL Tortil, food tablets which sink in water, add variety to the diet. JBL Energil was specially developed for large, fully-grown pond turtles. It contains whole dried fish and crustaceans that turtles are unable to swallow in one piece, which encourages their natural feeding habits. And finally, there are JBL Rugil and JBL Pro-Baby for smaller turtles and baby turtles.

## Food for vegetarians

Pets which are solely or primarily vegetarian, e.g. common iguana, chuckwallas or European tortoises, can also be fed with meadow plants (such as dandelion, clover, ribwort plantain), various salad plants and sprouting seeds, chopped vegetables or dried herb mixtures, straw and Lucerne pellets in a terrarium. JBL offers three high-



*Tortoises and iguanas eating meadow herbs*

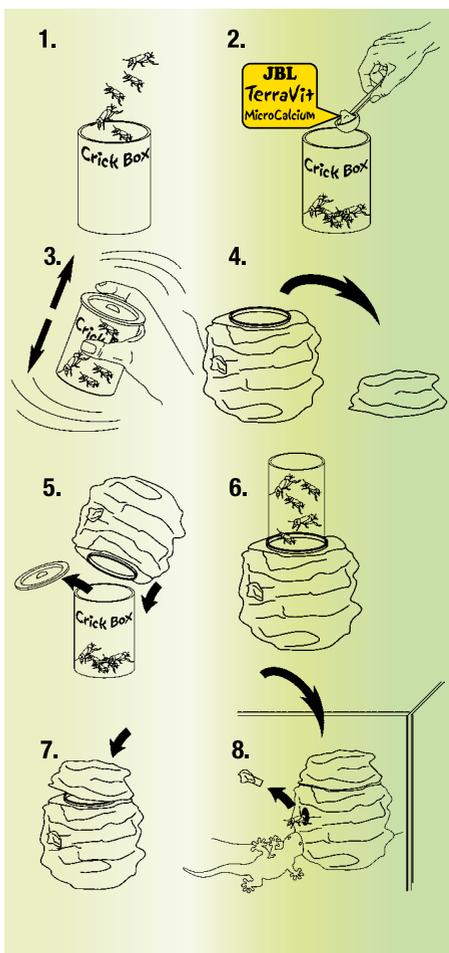
grade readymade foods for vegetarian terrarium pets, JBL IGUVERT for iguana and JBL AGIVERT and JBL Herbil for tortoises. These foods intentionally contain only vegetable ingredients with a high fibre content and only little protein. Spiny-tailed lizards can also be fed various seeds, e.g. from the bird food shelves. As a rule, animals which are distinctly plant-eating need low-protein food that is rich in fibre and high in roughage to remain healthy.



first weeks). Vitamins such as JBL Tortoise Sun can be administered with the food. This can be done by dripping a few drops on the food sticks, making sure to observe the dosage instructions, and then waiting until they have been absorbed. When giving any vitamins, it is always important to follow the dosage instructions, as an overdose (hypervitaminosis) causes organ damage.

## Vitamins and minerals

When food animals are purchased, they should always be coated with powder consisting of the right vitamin-mineral mixture for the age of the pet before they are fed. A vitamin-mineral mixture such as JBL TerraVit powder can be placed in a suitable container e.g. the JBL CrickBox and the desired amount of food animals added. Next, shake the whole mixture hard until the food animals are fully “breaded” with the mixture. Then, they can be fed to the terrarium animals. Young animals in the growth phase still need more vitamins such as JBL TerraVit powder than adult animals, which can be fed food animals that are only coated with calcium e.g. JBL MicroCalcium every so often. In addition, a few drops of a fluid vitamin solution e.g. JBL TerraVit fluid can be mixed into the drinking water to prevent deficiency symptoms. If certain animals such as snakes are only fed thawed food animals, it is recommended to supplement the vitamin content of the food by squeezing some vitamin drops such as JBL TerraVit fluid into the thawed food animals shortly before they are fed, as vitamins are gradually destroyed when food is kept frozen for a long period of time. JBL Tortoise Sun Terra is specially formulated for tortoises. It is mixed into the animals’ drinking water or bath water (young tortoises should by all means be bathed once a week in the



## 9 Terrarium care

### Cleaning

Of course, the time spent daily cleaning a terrarium primarily depends on the type of and number of animals being kept. Snakes that only need to be fed every 2-3 weeks or single animals generally produce far less dirt than animals that need to be fed daily or large groups, such as the hundreds of young frogs which need to be reared when breeding frogs. A terrarium should not be overloaded with decorative objects to the point of confusion and the fittings and decorations should be practical and removable so that a terrarium can be kept clean with no trouble. The growth on the glass panes of aquarium tanks for aquatic amphibians e.g. axolotl or clawed frogs can be removed by algae magnets, JBL Floaty, or door handle cleaners, JBL Aqua-T-Handy, similar to a fish aquarium. JBL's microfibre cloth (& sponge), JBL WishWash T, is very effective here, as it doesn't spread dirt and instead removes it. Dried food remains and excrement in dry terrariums can be vacuumed easily or collected with a pair of pincers such as JBL AquaTerra Tool and tongs such as JBL CombiFix. In wetland terrariums, they usually have to be "spooned out" with some surrounding substrate. Excrement sticking to decorative objects can usually be removed with a brush under hot water. The glass panes should not be cleaned with aggressive chemicals, as residues can cause poisoning. A brush, sponges, blade cleaners and luke-warm water will do to remove any stubborn dirt. Unsightly limescale rings should be removed with gentle "biological" cleaners such as JBL Bio-Clean T glass cleaner. Only a few minutes cleaning each day are adequate to guaran-



*JBL WishWash*



*JBL Clean T*



*JBL Spongi*

tee proper hygienic conditions for your pets in their terrarium or aquarium. If cleaning is put off too long, the terrarium or aquarium may have to be emptied completely and refilled, and there may even be unnecessary losses.

The usual cleaning procedure for aquariums should be followed for larger-sized water tanks, both with and without a waterfall in a rainforest terrarium: See the "What – Why – How 1 and 2" JBL brochures.

## Useful utensils

Pincers like JBL AquaTerra Tool or tongs like JBL CombiFix can be used to remove excrement remains, dead food animals or other items you do not wish to touch with your bare hands.

Nets such as the JBL fish net are convenient for catching agile animals in the water or terrarium, or even in a room, without harming them.

Thermometers such as the JBL Digital Thermometer and hygrometers are used to check the climate values in a terrarium.

Objects can be disinfected using 70 % alcohol. The object to be cleaned should be completely immersed in the alcohol and left to soak for at least 5 minutes. Nets can also be soaked in a bucket containing JBL Desinfekt.

Terrarium locks, i.e. JBL TerraSafe, can be positioned between the sliding panes to prevent any unauthorised persons, such as small children or even animals, from opening the terrarium. The JBL ShiRo magnetic terrarium lock which does not require a key and uses several locking plates is very practical. A single magnet can be used to open and close multiple terrariums.



JBL CombiFix



JBL TerraControl Solar



JBL AquaTerra Tool P1



JBL ShiRo



## 10 Health

Terrarium pets can also become ill. For one, newly acquired pets may be infected with germs or parasites. Oftentimes, diseases only break out some time after the animals have been purchased, as changes of habitat are stressful. If climatic conditions in a new terrarium are not optimum, this may also weaken the immune system and cause a shift in balance between the host and the germs, leading to an outbreak of disease. If the pets show any external signs of change, or any noticeable changes in behaviour, a vet with experience in herpetology must be consulted without delay. As different germs or parasites can produce similar symptoms, clear diagnosis of the cause of the disease can only be made after precise tests have been carried out. Tests also indicate the resistance of the germs, so that the most effective medicine can be prescribed for the treatment. In general, the sooner treatment is started, the better the chances of a cure. Once a pet's reserves have been exhausted or its physical decline has reached an advanced stage, even major efforts to restore the animal's strength will no longer help.



### Selecting the animals

Pets should be examined carefully before purchase in order to keep the risk of disease down to an absolute minimum. The following points should be kept in mind:

- **Checking the mouth:**  
The mouth should be closed and free of foam or slimy films.
- **Checking the eyes:**  
Shedding should be complete, the eyes should not be too deep in the sockets.
- **Checking the skin:**  
Check for wounds, boils and other irregularities.
- **Checking the feet:**  
Check the toes and feet of lizards for unshed skin which can cause constrictions.
- **Checking the shell of a turtle:**  
Only very young turtles should have soft shells.
- **Checking nutritional condition:**  
The skin should not have too many folds and the ribs or vertebrae should not be too prominent.
- **Checking a spider:**  
It should have all 8 legs. Whitish, fungus-like areas on the body are suspicious, whereas a "bald patch" on the abdomen presents no problem.

## Quarantine

Accordingly, new pets should be kept in a quarantine tank with optimal nutritional and climatic conditions first and observed for a while. During this quarantine period, samples of excrement should be taken (at intervals of several days) and submitted to a veterinarian or a veterinary clinic for examination, as it is always better to take precautions than to treat diseased animals, especially if one has a number of other pets already. If pathogens or parasites are found in the faecal matter, the dosage instructions and duration of medical treatment prescribed by the veterinarian must be adhered to carefully. Namely, the slogan “more is better” often leads to the loss of pets as a result of organ failure, while insufficient doses and premature discontinuation of the treatment causes the pathogens to become resistant.



*Kingsnake*

*Who's there?*



# 11 Product overview

☪ Suited for desert terrariums  
 ☪ Suited for rainforest terrariums

## Food for tortoises & turtles in swamps



**JBL Turtle Food**  
 Main food for all water turtles



**JBL Agil**  
 Food sticks for turtles



**JBL Gammarus**  
 Clean gammarus crustaceans



**JBL Energil**  
 Whole fish and shrimps, in a natural state



**JBL Tortil**  
 Food tablets for turtles



**JBL Calcil**  
 Mineral food sticks for turtles



**JBL ProBaby**  
 Special food for young turtles



**JBL Rugil**  
 Food sticks for small turtles



## Food for tortoises



**JBL Herbil**  
 Organic green food for tortoises



**JBL Agivert**  
 Pure vegetable food sticks for tortoises



**Food for lizards**



**JBL Iguvert**

Complete food for iguanas and other plant-eating reptiles



**Vitamins/Minerals**



**JBL Turtle Sun Aqua**

Multivitamin preparation for turtles



**JBL Tortoise Sun Terra**

Multivitamin preparation for tortoises



**JBL TerraVit Powder**

Multivitamins and trace elements in powder for terrarium animals



**JBL TerraVit fluid**

Liquid multivitamin for terrarium animals



**JBL MicroCalcium**

Calcium powder to sprinkle on feeder insects



**JBL TerraCrick**

Food for crickets and other feeder insects



**JBL CrickBox**

Shaker container to sprinkle powder on feeder insects



**Care products**



**JBL Biotopol T**

Water conditioner for the terrarium



**JBL Tortoise Shine**

Cares for the shell and controls parasites



**Care products**



**JBL EasyTurtle**  
Removes unpleasant odors in turtle terrariums



**JBL TerraGel**  
Do-it-yourself water gel for terrarium animals



**Lighting**



**JBL SOLAR UV-Spot plus**  
UV spotlight with daylight spectrum



**Lighting**



**JBL ReptiSpot Neodym**  
Neodymium spotlight for the terrarium



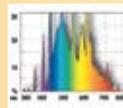
**JBL ReptiDay Halogen**  
Halogen Spotlight for the terrarium



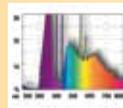
**Lighting – Solar Light Tubes T8**



**JBL SOLAR ReptiJungle T8**  
Special terrarium fluorescent tube for rainforest reptiles



**JBL SOLAR ReptiSun T8**  
Special terrarium fluorescent tubes for desert animals



**Lighting – Energy-saving lamps**



**JBL ReptiDesert**  
Energy-saving lamp for desert terrariums, three different versions available



**JBL ReptiJungle**  
Energy-saving lamp for rainforest terrariums, three different versions available



**Lighting – L-U-W**

**JBL ReptilDesert L-U-W Light**

L-U-W sun lamp for desert terrariums



**JBL ReptilJungle L-U-W Light**

L-U-W solar lamp for rain-forest terrariums



**Lighting – Accessories**

**JBL TempSet basic**

Installation kit for lamps in terrariums



**JBL TempSet angle**

Jointed installation kit for lamps in terrariums



**JBL TempSet connect**

Installation kit with a connector for metal halide



**JBL TempSet angle+connect**

Installation kit with a joint and connector for lamps in terrariums



**JBL TempSet Unit L-U-W**

Installation kit for metal halide L-U-W lights in terrariums



**Heating**

**JBL ReptilHeat**

Ceramic heat radiator (dimmer radiator) for the terrarium



**JBL TempProtect**

Lamp shade with protective screen



**JBL TerraTemp**

Heater mat for the terrarium



**JBL ReptilTemp**

Heating stone for the terrarium



**Accessories – miscellaneous**



**JBL FeedingRock**  
Dispensing stone for live feeder insects



**JBL ReptilBar**  
Natural-looking food and water containers



**JBL TerraControl**  
Thermometer & hygrometer



**JBL TerraControl Solar**  
Solar-powered thermometer & hygrometer



**JBL NoBang**  
Door stops for terrarium glass panes



**JBL TerraSafe**  
Keylock for terrarium panes



**JBL Shiro**  
Magnetic terrarium lock without a key



**Accessories – cleaning**



**JBL WishWash (T)**  
Innovative terrarium cleaning cloth + sponge



**JBL Clean T**  
Glass cleaner for terrarium glass



**JBL Spongi**  
Aquarium cleaning sponge



### Accessories decoration



#### JBL TerraPlanta Amazonischer Philodendron

Plastic hanging plants for  
the terrarium



#### JBL TerraPlanta Cannabis

Plastic hanging plants for  
the terrarium



#### JBL TerraPlanta Casuarina

Plastic hanging plants for  
the terrarium



#### JBL TerraPlanta Congo Efeu

Plastic hanging plants for  
the terrarium



#### JBL TerraPlanta Madagassischer Bambus

Plastic hanging plants for  
the terrarium



#### JBL Cork Bark

Tunnel-shaped bark as  
decoration



#### JBL AquaSil transparent

Silicon for the aquarium  
and terrarium



**Materials for the bottom of the terrarium**



**JBL TerraBasis**

Indian python/regal python, corn snake, pilot black snake, Arizona king snake, water agama, mountain dragon, anolis, common iguana, garter snake, tortoise, tree frog, toad, dart frog, red-bellied toad, hairy mygalomorph, emperor scorpion, Madagascar gecko, chameleon



**JBL TerraCoco**

Giant boa and python species, large monitor species, large water agama, large common iguana



**JBL TerraCoco Compact**

Dry as for TerraCoco, wet as for TerraBasis



**JBL TerraCoco Humus**

Indian python/regal python, corn snake, pilot black snake, Arizona king snake, water agama, mountain dragon, anolis, common iguana, garter snake, tortoise, tree frog, toad, dart frog, red-bellied toad, hairy mygalomorph, emperor scorpion, Madagascar gecko, chameleon



**JBL TerraWood**

Giant boa and python species, large monitor species, large teju, large water agama, large common iguana



## Materials for the bottom of the terrarium



### JBL TerraSand – white

Bearded dragon, leopard lizard, rubber snake and Turkish sand boa, horned toad, common agama, desert iguana, spiny lizard, ridge-tailed monitor, mastigure, rainbow curly-tailed lizard, desert scorpion



### JBL TerraSand – yellow; red

Bearded dragon, leopard lizard, rubber snake and turkish sand boa, horned toad, common agama, desert iguana, spiny lizard, ridge-tailed monitor, mastigure, rainbow curly-tailed lizard, desert scorpion



### JBL TerraBark – pinion bark 2-10 mm

Indian python/regal python, corn snake, pilot black snake, Arizona king snake, water agama, mountain dragon, anolis, common iguana, garter snake, tortoise, tree frog, toad, dart frog, red-bellied toad, hairy mygalomorph, emperor scorpion, Madagascar gecko, chameleon



### JBL TerraBark – pinion bark 10-20 mm

Arizona king snake, water agama, mountain dragon, anolis, common iguana, garter snake, tortoise, tree frog, toad, dart frog, red-bellied toad, hairy mygalomorph, emperor scorpion, Madagascar gecko, chameleon

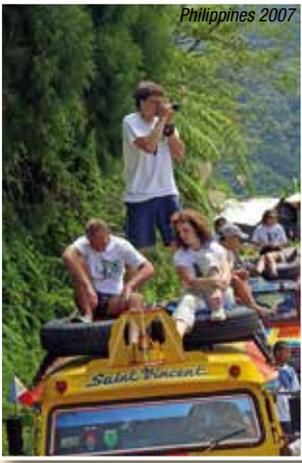


### JBL TerraBark – pinion bark 20-30 mm

Boas, pythons, water agamas, monitors, common iguanas and large tortoises



# Impressions from JBL Expeditions & Workshops



Philippines 2007



Tanzania 2010



Costa Rica 2012



Brasil 2009



Mexico 2012



Galapagos 2012

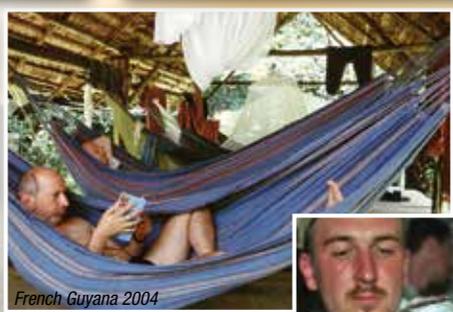


Philippines 2007



French Guyana 2004





# JBL

You can obtain more information on  
terrariums on the JBL homepage at

[www.JBL.de](http://www.JBL.de)

or directly from your specialist shop.

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[www.jbl.de](http://www.jbl.de)

