

# The **KINGSNAKE**

Extremely popular as captives, the kingsnake group has much to offer hobbyists.

by Gerold and Cindy Merker

**A**nimal ownership can be a big commitment. It is not one that should be taken lightly. There are many factors to consider regarding your needs and those of the animals. An animal that is not very demanding of your time generally is not one that returns a great deal of affection; however, that may be just right for your situation.

If you don't have a lot of spare time for cleaning up messes, don't want your furniture chewed, don't like a lot of noise or have allergies, consider an animal that is interesting, educational and colorful—the kingsnake. These animals adjust well to captivity and fit in with a busy lifestyle.

Kingsnakes (genus *Lampropeltis*) range from extreme southern Canada to northern South America. Over their range, they are represented by eight species and over 40 subspecies (Markel, 1990). As a group, they live in areas ranging from sea level to over 10,000 feet (Markel, 1990). Their range encompasses every imaginable habitat, from jungles to desert grasslands to mountains.

In very general terms, kingsnakes can be broken down into two groups: non-tri-colored and tri-colored kingsnakes. Markel (1990) separates kingsnakes into these two

groups: the *getulus* group (*getulus* and *calligaster*) and the *triangulum* group (all other species). These two groups are discerned by the presence (*triangulum*) or absence (*getulus*) of enlarged posterior maxillary teeth. Following is some very general information on all eight species of kingsnakes. The references cited are resources that could be used to further your knowledge of this

interesting group. Especially useful are Ron Markel's book, *Kingsnakes and Milk Snakes*, Robert Applegate's book, *The General Care and Maintenance of Milk Snakes*, and David Perlowin's book, *The General Care and Maintenance of Common Kingsnakes*.

The common kingsnake (*Lampropeltis getulus*) has the honor of being the largest-bodied kingsnake, both in length and mass. Many of the subspecies can reach over 5 feet in length. The smaller subspecies start off as hatchlings at less than 12 inches in overall length. They range from northern Mexico into the bottom half of the United States at elevations from sea level to 6,500 feet (Stebbins, 1992; Markel, 1990). Clutch size ranges from three eggs to over 20 eggs, at least in captivity. The group is represented by seven subspecies. One of the most interesting features of this group is the tremendous number of color morphs, especially in the California kingsnake (*L. g. californiae*). It seems that every year new phases of this subspecies are described, at least on private collector's price lists. Some examples include desert banded, desert striped, black bellied, banana kings, lavender kings and amelanistic (lacking black pigment). Zweifel (1981) demonstrated that the



**There are several pattern and color phases that occur with the California kingsnake. This juvenile is a striped albino.**

Zig Leszczynski



The eastern milk snake (*L. triangulum triangulum*) is one of the commonly kept *triangulum* subspecies in the United States.



Zig Leszczynski

**ON OVERLEAF:**  
Many people consider the California mountain kingsnake (*L. zonata*) to be the most beautiful of the tri-color kingsnakes.

Like other milk snakes, the Pueblan milk snake (*L. triangulum campbelli*) mimics the appearance of poisonous coral snakes. Remembering the axiom "Red touches yellow, kill a fellow; red touches black, venom lack" helps to differentiate between tri-color kingsnakes and coral snakes.



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The Sinaloan milk snake (*L. triangulum sinaloae*).







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Always popular with kingsnake enthusiasts, the California kingsnake (*L. getulus californiae*) has a beautiful exterior coupled with a friendly disposition.



Thurgess Cranston, animal courtesy of Eric Loza



Zig Leszczynski

Typical of kingsnakes, the Arizona mountain kingsnake (*L. pyromelana*) feeds on lizards and small mammals in the wild.

The "tangerine phase" of the Honduran milk snake (*L. triangulum hondurensis*) is extremely popular with breeders.



Zig Leszczynski



California kingsnake's polymorphic variation in color pattern is inherited in a simple Mendelian fashion. Other subspecies of the common kingsnake include the Florida kingsnake (*L. g. floridana*), eastern kingsnake (*L. g. getula*), speckled kingsnake (*L. g. holbrooki*), black kingsnake (*L. g. niger*), desert kingsnake (*L. g. splendida*) and the Sonoran black kingsnake (*L. g. nigrinus*). Common kingsnakes are especially notorious for being ophiophagous (snake eating), and they should be housed separately until you are ready to breed them. At this time, they should be introduced to each other under strict supervision.

A second species, *Lampropeltis calligaster*, commonly referred to as the prairie kingsnake, is represented by at least two subspecies, *L. c. calligaster*, and *L. c. rhombomaculata*. A third subspecies, *L. c. occipitolineata*, is known from only three specimens and is, thus, recognized as problematic (Markel, 1990). Prairie kingsnakes are found in the southeastern part of the United States from eastern Texas to Florida. They range in length from 10 inches as hatchlings to 50 inches as adults. One of the first amelanistic kingsnakes found in the wild was a prairie kingsnake. The mole snake, *L. c. rhombomaculata*, is slightly smaller and is found in the eastern part of the *calligaster* range. As a whole, this group is fairly easy to keep in captivity. Clutch size ranges from six to 17 eggs (Fitch, 1970, as cited in Markel, 1990).

The next six species are known collectively as tri-colored kingsnakes, or the *triangulum* complex (Markel, 1990).

The milk snake (*Lampropeltis triangulum*) has the distinction of being the most widely distributed kingsnake. Indeed, *Lampropeltis triangulum* is one of the most widely distributed snake species, occurring from southern Canada (48 degrees north) to Venezuela (four degrees south), a distance of approximately 3,600 miles (Williams, 1988; Markel, 1990).

As adults, milk snakes range in size from 15 inches to 60 inches. As hatchlings, they start out as small as 5 inches or as large as 15 inches, for some of the tropical or South American forms. Milk snakes show a marked preference for mammalian and reptilian prey,



**The Florida kingsnake (*L. g. floridana*) lacks the bold markings of the California king but has subtle beauty of its own.**

although diet varies greatly from subspecies to subspecies. Fitch (1970, as cited in Markel, 1990) states that clutch size varies from five to 16 eggs. All but one subspecies (*L. t. triangulum*) is a tri-colored snake, at least as hatchlings.

Much has been discussed regarding kingsnake mimicry, especially with the coral snakes of the genera *Micrurus* and *Micruroides* (Markel, 1990; Low, 1991; and others). This is especially true of the milk snake complex, which is often sympatric with at least one of the genera of coral snakes. The old axiom, "Red touches yellow, kill a fellow; red touches black, venom lack," works well in distinguishing between tri-colored kingsnakes and the venomous coral snakes, especially in the United States.

Commonly kept United States subspecies include the eastern milk snake (*L. t. triangulum*), red milk snake (*L. t. sypila*), scarlet kingsnake (*L. t. elapsoides*), Louisiana milk snake (*L. t. amaura*) and the Mexican milk snake (*L. t. annulata*). Commonly maintained Central American milk snakes include the Sinaloan milk snake (*L. t. sinaloae*), the Pueblan milk snake (*L. t. campbelli*) and the Honduran milk snake (*L. t. hondurensis*).

The problematic (Markel, 1990) species, *L. ruthveni*, commonly referred to as the Queretaro kingsnake, was at one time placed in the milk snake complex. Many authorities believe it should still be there. *Lampropeltis ruthveni* is a

Mexican species, occupying the Mexican Plateau in Michoacan, Queretaro, and Jalisco (Markel, 1990). A smaller species compared to some of the forms already mentioned, adults rarely exceed 36 inches. Captive reproduction of this form has been described by Young and Babcock (1991). They report a clutch size of five or six eggs. Interestingly, in their article, Young and Babcock described an amelanistic *L. ruthveni*, complete with photographs.

The Mexican kingsnake includes two species, *Lampropeltis mexicana* and *Lampropeltis alterna*.

Often beautiful, the San Luis Potosi kingsnake, *L. mexicana*, is a medium-sized (up to 3 feet long) kingsnake. It inhabits the dry pine-oak forest of San Luis Potosi (Markel, 1990). Another subspecies, *L. mexicana greeri*, is commonly referred to as the Durango mountain kingsnake. This is a montane form highly revered for its beauty. Applegate (1988) discusses the captive reproduction of this form. Clutch size averages six or seven eggs. The highly variable *L. mexicana thayeri* is commonly known as the Nuevo Leon kingsnake, or variable kingsnake. Milk snake forms, gray-banded kingsnake forms, and even melanistic forms exist in this subspecies, sometimes within the same clutch of eggs!

The gray-banded kingsnake, *L. alterna*, is one of the most popular forms of kingsnake kept in captivity. It occurs in North America in Texas and New Mexico down into northern Mexico. Two forms occur: the *alterna* phase, which has as many as 23 narrow black bands, with little or no red, alternating with 15 narrower black bands; and the Blair's phase, which has 12 to 15 wide red saddles bordered by black bands with white edges (Miller, 1979). The ground color of both forms can range from a light gray to almost black. One characteristic of this species is its



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extreme variability. Cranston (1991), Markel (1990), Murphy (1978) and others describe the captive breeding of this species. Clutch size ranges from three to 13 eggs, with an average of seven or eight. The hatchlings are approximately 10 inches at birth. Adults can approach almost 50 inches (Tennant, 1984), although slightly less than 36 inches is the average. In the wild, prey items tend toward other reptiles, especially lizards. Adults in captivity will usually eat mice; often hatchlings will only feed independently on lizards until they are larger.

Another beautiful species of kingsnake, the Sonoran mountain kingsnake (*L. pyromelana*) has a large following among herpetoculturists. This species is broken down into either four (Markel, 1990) or three subspecies (Stebbins, 1992). They range from Utah and Nevada into Arizona, and south into northern Mexico. Like many of the species already discussed, Sonoran mountain kingsnakes are a montane form. They range in size from 10 inches as hatchlings to approximately 40 inches as adults. Adults feed on lizards and rodents in the wild. In captivity, many specimens prefer to eat lizards, especially as hatchlings. Applegate (1988) and Cranston (1994) describe the captive propagation of this species. Small clutches (from three to eight eggs) are laid. To breed this animal, as well as most other forms of kingsnakes, winter cooling is a must (at around 50 to 55 degrees Fahrenheit).

The last species of kingsnake, the California mountain kingsnake (*L. zonata*), is described by many as the most beautiful tri-colored kingsnake (McGurty, 1987). Most taxonomists

break *L. zonata* down into seven subspecies. They occur in the mountain ranges of southern Washington, southern Oregon and California. At least two subspecies occur in northern Baja California. Elevations at which they occur range from sea level to around 9,000 feet (Stebbins, 1992). Klingenberg (1993) and McGurty (1987) describe the captive propagation of this species. Clutch size ranges from four to nine eggs. Adults feed on lizards, rodents and birds. Like the Sonoran mountain kingsnake, *L. zonata* ranges in size from less than 10 inches to 40 inches.

## Selecting Your Kingsnake

If you decide to buy a kingsnake, there are several decisions to make before stepping foot inside a pet shop or a reptile breeder's facility.

First, you must decide if you want a hatchling or an adult kingsnake. There are several advantages to each. Hatchlings, though often more difficult to get started, have a much better chance of being healthy. The baby is often captive-bred or hatched, a far superior animal in the long run. Also, a hatchling usually costs less. However, purchasing an adult allows you to start a captive-breeding program at least 18 months sooner than if you purchase a hatchling. Also, adult kingsnakes will be more likely to feed on domesticated mice, the preferred captive diet because of availability.

A second consideration is which species of kingsnake you want to purchase. There are advantages to both major groups that should be considered before you make the purchase. Although breathtakingly beautiful, the

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## The desert kingsnake (*L. g. splendida*)



Zig Leaczynski

"mountain kingsnake," or tri-colored group, is invariably more difficult to get started than the common kingsnake group. With few exceptions, such as hatchling speckled kingsnakes, common kingsnake babies and adults will be larger. Look at the species accounts and references cited in this paper, and study the accompanying photographs, *before* making this decision.

Now you are ready to complete the most important aspect of this venture—the purchase of an animal.

Before you commit to buying an animal, size up the store and the personnel. You can evaluate a facility in one whiff. If it smells of vomitus, ammonia or other stench, turn around and leave!

A problem with some pet stores is a lack of knowledge about maintenance of reptiles. Rest (or unrest) assured, most dirty pet stores have not taken adequate care of your potential purchase. When a pet store passes the "initial reaction" test, ask questions of the personnel in charge of the herptiles. If

these people seem knowledgeable about their wards, their store is probably a good place from which to purchase your kingsnake. Follow this same criteria when purchasing an animal from a reptile speciality shop or a private breeder. These facilities may have exceptionally knowledgeable people, but their husbandry may be poor. Very smelly snakerooms indicate poor husbandry and, often, unhealthy snakes. Clean facilities with little odor usually indicate well cared-for animals.

Look at the animal you are interested in buying. Is the snake alert? Are there mites crawling around on the snake's body or in the water dish? A good simple test to determine general health is to delicately pinch a fold of skin on the dorsal surface behind a snake's head. If the skin stays folded when you release the pinch, the animal is dehydrated, indicating a potential health problem. Ask to see the feeding records to check how often and on what prey items the animal has been feeding. Once you are satisfied with the care given and you are happy with the price of the animal, bring out the wallet!

(A final note: It is crucial that you know the rules and regulations of keeping snakes in your respective state. Many species are protected. For example, in California, one person is only allowed to have one California mountain kingsnake in possession [when collected with a *fishing* license]. In Arizona, people are allowed to have two Sonoran mountain kingsnakes in possession [when collected with a *hunting* license]. Make sure you know your state's regulations before you commit to keeping a kingsnake—either wild-caught or captive-bred—in captivity.)

### Caging

A very important variable to the health of your new purchase will be the animal's enclosure. There are a few important questions to ask yourself. Is the cage escape proof? Is the size adequate for your pet kingsnake? Does the design allow for hiding areas for the snake? Finally, does the cage's design allow for thermal gradients from which the animal can thermoregulate to carry out its life processes?

The first consideration was learned the hard way while one of the authors

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(Gerold) was attending his undergraduate university. A cage was purchased to house a spectacular desert-phase California kingsnake. The cage, although remarkable in its sophisticated appearance, had the tiniest of openings, which the snake soon discovered. Upon returning from class, the author heard a bone-chilling scream emanating from the seventh floor of his dorm. The scream belonged to Hazel (no relation to the Shirley Booth character), the cleaning woman for the entire dorm. She had discovered the escapee in the stairwell just outside the author's dorm room. The snake was quickly recovered (rescued?) before Hazel's blood pressure fell to a lower level, and the cage was discarded. With today's technology, an escape-proof cage is readily available.

The size of the cage is also an important consideration. Perlowin (1992) suggests using Rubbermaid 2-quart containers for hatchling kingsnakes. Yearlings and small adults can be housed in a standard 10-gallon aquarium custom fitted with an escape-proof lid. Adult kingsnakes, especially common kingsnakes, can survive in 10-gallon aquaria, but Pelowin suggests using larger sizes, such as 29-gallon aquaria, for that purpose. The smaller tri-colored kingsnakes will thrive in the smaller cages and will do fine as adults in 10-gallon escape-proof aquaria.

Other enclosures are also useful for kingsnake husbandry, especially when keeping larger numbers of animals. The 2-quart Rubbermaid containers can be kept in a shoe or sweater box rack. Some kingsnake breeders build cages with a simulated subterranean microhabitat in the form of a drawer under the cage. The snake has access to the drawer via a hole in the bottom of the cage (Applegate, 1993). Chris Mattison (1991) has an entire section devoted to detailed descriptions of many of these specialized enclosures in his book *A-Z of Snake Keeping*. Neodesha plastics makes several cages that are attractive and totally functional for keeping adult kingsnakes. An interesting commercially available cage that utilizes a subterranean drawer is the Herpatat Modular Cage (Merker and Mackin, 1987). The authors have used this type of cage since 1985 with the smaller



The speckled kingsnake (*L. g. holbrooki*) is another subspecies of the common kingsnake.

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As can be seen from these photographs, the gray-banded kingsnake (*L. alterna*) is extremely variable.

(150 grams or less) mountain kingsnakes with tremendous success.

An important consideration in cage design is the implementation of a hide area. A simple cardboard box that can be discarded when soiled is workable as a hide area. Plastic dens are more elaborate and, hence, costlier, but work great by affording the snake some added feeling of security. Many enclosures have a hide area intrinsic in the cage design. Whatever you use, a hide area is important for the more nervous, harder-to-get-feeding kingsnakes. Many kingsnakes, including some individuals of the common kingsnake, need

to have this added security. Remarkable turn arounds in feeding behavior have been noted by the authors after placing hide boxes in cages.

An enclosure will work only if adequate steps are taken to set up thermal gradients inside the cage so that the kingsnake can thermoregulate. Many under-cage heaters are manufactured. Some are good, others are not. For large numbers of captives, heat tape routed into the shelves toward the back or front of the shelf works nicely. You can heat one or two cages using many of the products available in pet stores. Feel the heat source to make sure it isn't

too hot. We recommend under-cage heaters rather than placing heat sources inside of the cages. Fogel (1993) describes in detail many of the heaters that can be implemented in your cage design to successfully create thermal gradients.

### Other Cage Accommodations

There are many types of substrates used in kingsnake cages. Most people use some form of wood shaving. These are relatively inexpensive and are easy to remove once soiled. White pine shavings and aspen shavings are examples of the most commonly used bed-

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ding of this sort. Avoid cedar shavings at all cost due to their deleterious effects on the snakes' respiratory systems and general good health. Paper (newsprint, butcher paper), although not as aesthetically pleasing, is easy to remove for cleaning and is inexpensive. There are several other commercially available substrates that also work well in kingsnake enclosures.

### Temperature

A thermal gradient is extremely important to the health of your kingsnake. Your snake must have the correct temperature made available to it for proper digestion, secretion of chemicals, ecdysis (shedding) and reproductive conditioning. Failure to provide these much-needed temperatures will result in an unhealthy snake. Problems, such as regurgitation (Mader, 1991), poor reproductive success (Miller, 1979), egg retention (Mader, 1992), loss of appetite and stress (DeNardo, 1990), have been attributed to a poor thermal regimen for captive reptiles.

The easiest way to create a thermal gradient is to heat one side of the cage with one of the aforementioned heaters. In general, tropical tri-colored kingsnakes and the common kingsnake should be kept slightly warmer than the montane kingsnakes. The authors keep their common kingsnakes and tri-colors from warmer regions at a background temperature of 68 degrees Fahrenheit during the spring, summer and fall months. The

heated end of the enclosure allows the animal to maintain a body temperature of up to 85 degrees Fahrenheit. The montane kingsnakes have a thermal gradient from 68 degrees Fahrenheit to 79 degrees Fahrenheit.

During brumation, or winter cooling, all of our kingsnakes are maintained at 50 degrees Fahrenheit to 58 degrees Fahrenheit for approximately 10 weeks. For the safety of your kingsnake, it is important to withhold

**The Durango mountain kingsnake (*L. mexicana greeri*) is a montane form highly revered for its beauty.**



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The prairie kingsnake (*L. calligaster*) is one of the two species (*getulus* is the other) that is not included in the tri-color group.

food at least two weeks prior to, and during, the cooling period. This allows the snake to void any remaining food before it is put into a situation where it can no longer digest its food. The purpose of this cooling period is to allow for gonadal recrudescence (when the animals are rewarmed) and to give us a much-needed rest! This cooling period is essential if you want to breed your kingsnake. Another benefit of the

cooling period is that when animals are again warmed, they often have the best feeding response of the year. Animals that were hesitant to feed during the prior fall may feed remarkably well during the spring after the winter brumation period.

### Feeding

Once your kingsnake has settled into its new home, start feeding the animal. In the wild, many kingsnakes eat

a wide variety of food items, including lizards, rodents, birds and even other snakes. Under captive conditions, it is advisable to feed only domesticated mice. Domestic mice are readily available in most pet stores, or they can be bred with ease. Another advantage is that a domestic mouse will not introduce as many parasites as does wild kingsnake food.

Because kingsnakes eat other snakes, we advise housing your kingsnakes individually to prevent any mishaps. A hatchling kingsnake will feed at least once a week on appropriately sized pink mice. An interesting idea by Love (1993) suggests utilizing frozen-thawed pink mice because of their ease in digesting. This is thought to correlate to a more rapid growth rate in young snakes. Adult kingsnakes can be fed larger mice. Try to feed several smaller-sized mice rather than one huge retiring breeder mouse, reducing the risk of regurgitation. If you want your hatchling to grow rapidly, increase the number of feedings from one per week to two or three small feedings per

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week. Adults should be fed enough to maintain a nice plump look *without* outward signs of obesity, such as a lumpy appearance, especially toward the back half of the animal.

Often, especially with baby kingsnakes, an animal will refuse to eat. There are several alternatives for dealing with problem feeders. Applegate (1993) outlines a regimen that suggests using a lizard-scented pinkie (alive first, then dead) to entice the reluctant captive to feed. If these attempts are met with failure, Applegate suggests that the pinkie's brain be exposed to elicit a feeding response by the snake. The final options are to force-feed the captive with either a whole pink mouse or use a pinkie pump that macerates the pink mouse into a fluid and then forces this mixture down the snake's gullet. Stein (1991) suggests using an entire adult mouse tail and forcing this into the snake's stomach. The advantage of the mouse tail is that it has a serpentine shape, is fairly easy to force-feed and is readily digestible. The disadvantage is that it does not have all the nutrients of an entire pink mouse.

Force feeding should only be considered once the cage setup has been re-examined for adequate environmental characteristics. Remember to feed your hatchling regularly. If it has not fed within three to four weeks and your cage setup is adequate, intervention in the form of force-feeding and, possibly, a trip to the veterinarian, is in order.

### Handling Your Kingsnake

If you are considering handling your captive, ask yourself if it is really vital to do so. Most reptiles do best if they are disturbed as little as possible. Handling your captive may stress the animal. This is especially important right after your animal has fed. Mader (1991) suggests that handling after a meal is one of the major contributors to regurgitation, especially in healthy snakes.

Kingsnakes vary greatly in their tractability. Some (usually common kingsnakes) are much more docile, and hence more easily handled than others (some forms of the milk snakes). Obviously, if you need to clean the animal's enclosure, some handling is required. The authors utilize standard

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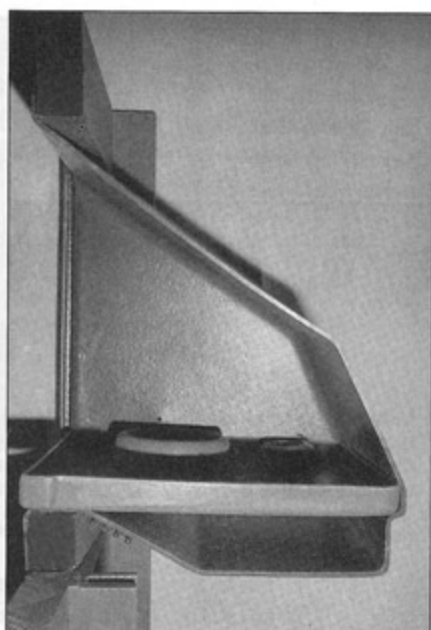
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**Herpatat cages work well for kingsnakes (left). These cages utilize subterranean drawers (right) that the snakes use.**

cages, which keeps the amount of snake handling to a minimum. By having a clean cage already set up, we simply put the snake in a clean enclosure in the cage rack, and then clean and sterilize the soiled cage. If you must handle the animal, provide enough

support for the entire animal *without* letting the snake feel restrained. The kingsnake will be much happier if it is allowed to move about in your hands (albeit under control). If your captive exhibits aggressive behavior, you may want to restrain the animal behind its

neck to prevent a nip.

The worst possible reason for handling your kingsnake is to create an effect. If you want to scare someone who is afraid of snakes, *please* do not do this with a live animal. This is not only potentially harmful to the captive



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animal, but it puts all snakekeepers in a bad light.

### Captive Propagation

Captive propagation of kingsnakes has been extensively outlined elsewhere (Markel, 1990; Perlowin, 1992; Applegate, 1993; and many others). One of the most important parameters to successful kingsnake propagation is a winter cooling (brumation) period. Most kingsnakes will not breed without such a cooling period. This cool-down allows reproductive tissue to "recycle" itself to ensure the proper development of sperm and eggs. The cooling period should last from early December through late February or early March. A temperature of below 59 degrees Fahrenheit is recommended (Perlowin, 1992; Applegate, 1993; Cranston, 1991). These animals will tolerate temperatures dipping into the mid to high 40s. The one exception may be the more tropical tri-colored milk snakes, which may not need such drastically reduced temperatures.

There are other important considerations to successful captive propagation. Is there at least one male and one female? Is the female kingsnake of adequate weight to produce eggs (weighing up to 35 percent of her mass)? Are the adults really adults that are big enough to reproduce? Though these factors seem obvious, they may be overlooked, and reproductive success for that year will be kept at a minimum.

After following these guidelines, breeding kingsnakes will become a real possibility. During spring, introduce the male and female kingsnakes. The breeding response usually occurs following the female's first shed. Males will follow females around the cage until the female lifts up her tail, indicating her receptiveness. Actual copulation lasts from five minutes (in the mountain kingsnake group) to a whopping 43 hours in the common kingsnakes (we observed this only once in Sonoran black kingsnakes)!



Dick Bartlett

This hatchling is an albino, striped *L. c. calligaster*.



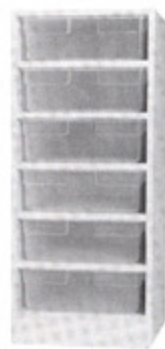
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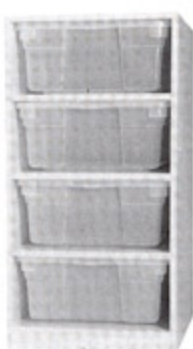
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**The mole kingsnake (*L. c. rhombomaculata*) is slightly smaller than the nominate race. It occurs in the eastern portion of the calligaster range.**

After breeding, the female should be allowed to feed as much as she likes to ensure adequate energy stores for a costly (in terms of energy) event. Without exception, the gravid female kingsnake will undergo a pre-egg-laying shed five to 17 days (average nine days) before she actually lays her eggs. Once this shed occurs, a nest box (a Tupperware container with damp sphagnum moss) should be placed inside the cage. This container should allow the female to place her entire body inside without being too cramped. Invariably, the female will lay her eggs inside the nest box instead of alternative nesting sites such as the water bowl, as long as the substrate is kept damp.

Once they have been laid, incubate the eggs away from the mother in containers with damp (not wet) vermiculite, perlite or peat moss/sand mixtures. The eggs should be kept at approximately 80 degrees Fahrenheit and will hatch after 60 to 85 days, depending on the kingsnake species. Once the egg has pipped, the neonate will remain inside of the egg for 24 hours while it absorbs its yolk sac. Seven to 15 days after they hatch, the baby kingsnake will shed. Then, and only then, should a first-time meal of a pink mouse or lizard be fed.

### Health Concerns

There are many types of ailments that a kingsnake may suffer from in captivity. Remember that the vast majority of kingsnake health problems can be avoided with proper husbandry. Basically, we will discuss the more common kingsnake ailments, including

endoparasites, ectoparasites, respiratory infections and intestinal infections.

Our first word of advice is that you seek an exotic animal veterinarian's help with diagnosis and treatment of your ailing kingsnake. These professionals have up-to-date information on how to best treat your animal's problem.

A wild-caught kingsnake is often infested with nematode worms inside the animal's intestines. The snake may eat like a horse but never gain weight. A fecal analysis will show if nematodes are the culprit. A variety of drugs can rid your snake of these endoparasites, although the drug of choice seems to be fenbendazole (Panacur) at a dose of 25 mg/kg, given three times at 10 days apart (Klingenberg, 1993).

Other possible endoparasites include tapeworms. A second major group of internal parasites are the protozoans. Common invaders of the reptilian gastrointestinal tracts include amoebas, flagellates and coccidia. The first two can be treated with metronidazole (Flagyl) at a dosage of no greater than 40 mg/kg given orally once every two weeks until the symptoms subside or a negative fecal examination is made (Klingenberg, 1993). The latter can be treated with sulfadimethoxime (Albon) at a dosage of 50 mg/kg daily for at least three days (Klingenberg, 1993). Dale DeNardo (pers. comm.) recommends using trimethoprim-sulfa (Septra) at 30 mg/kg daily orally for three to five days. This latter regimen has been utilized by the authors on two occasions to successfully reduce the coccidia in two wild-caught snakes.

Equally insidious are the ectopara-

sites, especially mites. How many times we have had to deal with an outbreak of these parasites! Frequently, a new purchase or a breeding loan arrives with these unwelcome pests. Check all new arrivals very carefully for these small arthropods. Mites look like small dark spheres moving about at a leisurely pace on your animal. Various treatments have been discussed elsewhere (Mader and Palazzolo, 1993; Klingenberg, 1993). The treatment of choice is the removal of mites by poisoning (non-oil-based Pyrethrin or synthetic Pyrethrin). A very important consideration is complete disinfection of the snake's cage. A soapy/bleach solution will completely sanitize the cage and, hopefully, will get rid of both adult mites and eggs. This latter step is crucial in controlling a mite situation.

Snakes are not exempt from bacterial infections. The two most common manifestations of bacterial infections are mouth rot (infectious stomatitis) and gastrointestinal disturbances. Mader (1993) describes common reptilian bacteria and their significance in regard to reptiles. The first step toward successful therapy for reducing harmful bacterial infection is to reexamine the snake's enclosure to ensure the animal's environmental requirements are being met. Treatment with an antibiotic regimen is in order for severe cases. These procedures are best carried out together with a veterinarian who has had special training with exotic animal diseases.

### Final Thoughts

If you become the proud owner of a kingsnake, remember that you may be making a long-term commitment. If you attend to the basic needs of your kingsnake (cleanliness, heat, food, water and security), and become familiar enough with its behaviors and general condition to recognize a medical problem, your snake can easily live over 20 years. However, this time can be so enjoyable that the years fly past, and, at least in our house, the whole family is rewarded beyond expectations.

### Acknowledgements

As with any paper written, knowledge is gleaned from the work of many. It is our belief that learning proper hus-



bandry techniques for captive animals is vital to their long-term security in the wild, as well as in captivity. To all the people who share their knowledge through written work or personal communication, we are indebted. We are especially indebted to our parents, Gerold and Adelheid Merker, and Richard and Jean Allured. Through their understanding, they nurtured our interest in reptiles as children. Only because of this have we been able to develop our shared interest in the welfare of all animals.

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**After following some guidelines, breeding kingsnakes becomes a real possibility. Here, Eastern kingsnakes are shown hatching.**