



Common green iguana (photo by Tom Webber)

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The Trade in Live Reptiles: A Human Health Threat

INTRODUCTION

Salmonella gastroenteritis is the most common animal-associated illness in the United States. Contact with many types of animals can result in salmonellosis. However, reptiles have become a significant source of this illness due to the increasing popularity of reptiles as pets. According to the federal Centers for Disease Control and Prevention (CDC), each year approximately 93,000 reported cases of salmonellosis result from direct or indirect contact with reptiles or amphibians. Thousands of these cases require hospitalization, and at least 20 result in death. The CDC has warned that reptile-associated salmonellosis has become a significant health threat to the American public. These facts have not dissuaded the American public from bringing pet reptiles into their households. In fact, according to the American Pet Product Manufacturers Association (APPMA), reptile and amphibian ownership has shown a remarkable 44 percent increase since 1998. Currently, approximately nine million reptiles and amphibians are kept in approximately 3.9 million households.

ABOUT SALMONELLA

Salmonella bacteria consist of a group of approximately 2,000 different serotypes that reproduce in the digestive tract. Often mistaken for stomach flu, salmonellosis from any source can be fatal, particularly in young children. *Salmonella* infection causes fever, chills, nausea, bloody diarrhea, muscle aches, headaches and dehydration. Symptoms can last from 24 hours to 12 days. Mild cases may result in diarrhea, and it may take several months before bowel movements are entirely normal. Because many milder cases of salmonellosis are not properly diagnosed, the CDC estimates that the number of actual cases may be up to 20 times greater than the number of reported cases.

Young children, elderly persons and immunocompromised individuals are most susceptible to *Salmonella* bacteria because their immune systems are not equipped to tolerate the infection. In these persons, serious complications can result from *Salmonella* infection, including meningitis, sepsis, blood infections and death. A small percentage of persons who contract salmonellosis may develop Reiter's syndrome, which causes severe pain in joints, eye irritation and painful urination. Reiter's syndrome can last for months or even years and may lead to chronic arthritis. *Salmonella* septicemia is another possible complication associated with salmonellosis. This illness may affect nearly every system in the body. Many complications associated with *Salmonella* infection can result in long-term health problems such as postenteritis reactive arthritis and septic arthritis. Treating *Salmonella* infection with antibiotics will not prevent these illnesses from developing, especially in persons at increased risk of infection. Children are particularly susceptible to *Salmonella* infection due to their frequent hand-to-mouth contact. This puts them at risk for salmonellosis when handling a reptile or any animal. In New York state alone, one half of all reported reptile-associated salmonellosis cases between 1991 and 1996 occurred in infants under one year of age.



Bearded dragon (photo by Tom Webber)

Salmonella bacteria were first discovered in 1885 by Daniel E. Salmon. *Salmonella* infections have been diagnosed in humans for more than 100 years. However, it was not until 1944 that the first documented reptile related case of *Salmonella* was discovered, caused by a turtle. Within three years, many more reptiles were found to be carriers. Today it is known that all reptiles (turtles, lizards, snakes and crocodilians) whether wild or captive-bred, carry *Salmonella* bacteria. Amphibians also are suspected to be carriers of *Salmonella* bacteria. At least 36 serotypes of *Salmonella* bacteria have been isolated from reptiles, and dozens more are possibly associated with reptiles.

A number of rare *Salmonella* serotypes such as Java, Marina, Stanley, Poona and Chameleon are associated with reptiles and are increasingly isolated from humans. According to the CDC's *Salmonella* surveillance summary in 1998, salmonellosis cases involving the *S. marina* serotype, which caused the death of at least two infants in recent years, has increased in prevalence from two cases in 1989 to 47 in 1998. The *S. poona* serotype has increased from 199 cases in 1989 to 341 in 1998. Many salmonellosis cases involving infants result from parents failing to disinfect surfaces where reptiles have been or to properly

wash their hands after handling a pet reptile. Direct contact with a reptile is not necessary to contract salmonellosis. The bacteria may survive for up to two years in fecal matter and up to three months on any surface contacted by a reptile and may be transmitted to humans.

REPTILES AND *SALMONELLA*

Reptiles do not routinely become ill from *Salmonella* bacteria. *Salmonella* are a naturally occurring bacteria in the gut of all healthy reptiles and are frequently shed in reptile excrement. Reptiles may acquire *Salmonella* bacteria from direct contact with other reptiles or contaminated reptile feces. In fact, many hatchling reptiles instinctively eat reptile feces to help establish this normal intestinal flora.



Juvenile red-eared slider (photo by John White)

According to the veterinary guidelines of the Association of Reptilian and Amphibian Veterinarians (ARAV), eliminating *Salmonella* in reptiles through the use of antibiotics has proven unsuccessful because *Salmonella* bacteria simply re-emerge in the animal. The use of antibiotics may also encourage the development of antibiotic-resistant *Salmonella* strains, which could have negative consequences to treatment of salmonellosis in humans. Attempting to ‘disinfect’ reptiles through persistent washing of the animal also is futile as they may shed intestinal bacteria at any time. Under the incorrect assumption that reptiles can be cleansed of *Salmonella* bacteria, reptiles have been scrubbed with harsh abrasive cleansers and brushes, causing infected skin and shell abrasions that have resulted in permanent damage. Reptiles have also been soaked in ammonia or alcohol, resulting in severe chemical burns and, in many cases, death. The ARAV also notes that attempts to raise *Salmonella*-free reptiles have been unsuccessful. The CDC has warned that there is no way to ensure that a reptile is “*Salmonella*-free”.



Oriental water dragon (photo by Tom Webber)



Rescued red-eared slider. The turtle had been soaked in ammonia by its owner, causing permanent damage from chemical burns through all layers of shell down to the skin. (photo by Tom Webber)

KEEPING REPTILES AS PETS AND SALMONELLOSIS

The increase in the number of *Salmonella* infections is directly related to an increase in the number of households with pet reptiles. Between 1970 and 1975, approximately 250,000 cases of reptile-associated salmonellosis in children and infants were reported to the CDC. The CDC demonstrated that this increase was mainly the result of the growing popularity of keeping hatchling turtles (“baby turtles”) as pets. At the time, the quarter-sized turtles (red-eared sliders), sold along with a small bowl and plastic palm tree, were widely available. In response to these illnesses and concerns expressed by the Association of State and Territorial Epidemiologists, the Food and Drug Administration (FDA) in 1976 banned the sale of any turtle with a shell less than four inches in length. In the years immediately following the ban, there was a 77 percent decrease in the annual number of reported reptile-associated salmonellosis cases.

The number of reptile-associated salmonellosis cases began to rise again in 1984 when the number of pet reptiles began to increase. In 1995 the number of reptile-associated salmonellosis cases was estimated at about 50,000 annually. At that point, the CDC initiated a public education campaign, in conjunction with the pet industry and state health departments, aimed at reptile owners and pet store clientele, warning them about the health risk of reptile-associated salmonellosis. Surveys done at the time by the CDC indicated that practitioners and veterinarians were not fully aware of the risk from *Salmonella* bacteria that pet reptiles pose to pet owners. Special efforts were made to inform these groups of the health risks.

Despite these public education efforts and media coverage, reptile-associated salmonellosis cases increased from the estimated 50,000 annual cases reported in 1995 to 93,000 annual cases reported in 1999, with the majority of these cases occurring in children under five years of age.

THE CDC PUBLIC ADVISORY

A 1999 CDC advisory on reptile-associated salmonellosis was issued in response to the increase in the number of cases being reported to state health departments. Several of these cases involved the death of young children as well as pre-natal infections in pregnant women that resulted in spontaneous

abortion. The 1999 CDC advisory on reptile-associated salmonellosis made recommendations on proper hygienic measures the public should take to prevent *Salmonella*

infection from reptiles and advised that certain persons have no contact with reptiles. (See box)

CDC Recommendations Regarding Reptiles

- **Reptiles should be kept out of eating and food preparation areas.**
- **Reptiles should not be allowed to roam freely through the home.**
- **Persons should always thoroughly wash hands with soap and water after handling reptiles or reptile cages.**
- **Pet store owners, veterinarians, and pediatricians should educate reptile owners and potential reptile owners of the risk of reptile-associated salmonellosis.**
- **Reptiles should not be kept in daycare centers.**
- **Persons at increased risk of infection, i.e., children under 5 years of age, the elderly, immunocompromised persons, and pregnant women should avoid contact with reptiles.**
- **Reptiles should be kept out of households where children under one year of age live. Expectant parents should remove pet reptiles before the infant arrives.**

POINT OF SALE WARNINGS

Pet stores continue to sell reptiles to members of the public without informing them of the health risks involved. Pet store personnel are often ignorant of the fact that all reptiles carry *Salmonella* bacteria and may transmit it to humans. They may also be reluctant to disclose this information on the grounds that it may dissuade customers, in particular parents, from bringing a reptile into their home.



Chameleon (photo by H. Vannoy Davis)

To ensure that consumers are informed of the health risks involved in reptile ownership, several states, including Maryland and Kansas, require that warnings on reptile-associated salmonellosis be given to all customers purchasing a reptile. Illinois is the most recent state to adopt such measures, after 60 cases of reptile-associated salmonellosis were reported in 1999. California, Connecticut, and Michigan require pet shops to distribute information on reptile-associated salmonellosis to any customer who purchases a pet turtle (but not other types of reptiles). Although not related to the sale of reptiles as pets, it is of interest to note that several other states including Arizona, Minnesota, and Wyoming have banned reptiles from daycare centers and long-term care facilities because of concerns regarding *Salmonella* infection.

PUBLIC CONTACT WITH REPTILES

Despite the recent warnings issued by the CDC and state health departments about the threat of reptile-related salmonellosis, public events are held that allow and even encourage the public, and in particular children, to have contact with reptiles and amphibians. Turtle races and frog-jumping contests, often held at fairs and as fund-raisers in many places across the country, encourage children to collect wild reptiles for participation in these events. During such events, children haphazardly handle reptiles, and there may not be supervision to ensure that the CDC sanitary guidelines are followed. Reptiles also are frequently given away as prizes at fair events with no mention of the human health risks. Such events present many opportunities for children to become infected with reptile-associated salmonellosis.



Young children handle a turtle at a turtle race. (HSUS photo)

OTHER POTENTIAL HAZARDS ASSOCIATED WITH REPTILES

Many reptiles that are kept as pets, such as boa constrictors, pythons and iguanas, have the potential to seriously injure their owners, or other people if they escape. The American Veterinary Medical Association opposes the ownership of reptiles and amphibians that are considered inherently dangerous to humans. Children in particular are at risk for attacks by dangerous pets, including reptiles, because their smaller size means that they may be seen as potential prey.



Smooth-fronted caiman (photo by John White)

Each year there are many tragic cases wherein a pet snake escaped from its enclosure and bit someone or suffocated a child or an adult. Common green iguanas, one of the most popular pet reptiles today, may reach a length of more than six feet, can be quite aggressive, and may cause severe injuries to humans from bites and scratches.



Boa constrictor (photo by John H. Tashjian)

CONCLUSION

Children should not be entrusted with the responsibility of following proper hygienic or personal safety measures around a reptile because failure to do so could mean serious illness, injury, or even death. The American public, and in particular parents, need to be aware of the health risks posed by keeping pet reptiles. Reptiles are uniquely difficult in terms of ensuring their proper care and preventing the human illnesses or injuries that can be caused by them. Pet store personnel cannot be relied upon for correct information on reptile-associated salmonellosis or any other hazard that may accompany a pet reptile. It is advisable to consult with a family physician, pediatrician, veterinarian or state health department before bringing a reptile into your household. To avoid injury or illness to you, members of your family and anyone entering your home, please carefully consider the health risks involved in keeping a reptile before choosing one as a pet.

For additional information see the HSUS report, *Reptiles as Pets: An Examination of the Trade in Live Reptiles in the United States*.

For further information on keeping reptiles as pets:

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Promoting the Protection of All Animals.

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For further information on reptile-associated salmonellosis:

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