ANESTHESIA & ANALGESIA IN REPTILES & AMPHIBIANS: A RESOURCE GUIDE

Animal Welfare Information Center (AWIC)
www.nal.usda.gov/awic/
Compiled by Elizabeth Tobey (Librarian), 2021
AWIC Resource Series No. 46
Anesthesia and Analgesia in Reptiles and Amphibians: A Resource Guide

Cover photo credit: “African Clawed Frog (Xenopus laevis)” by guppiecat is licensed under CC BY-NC-ND 2.0. All other photographs courtesy of Adode Stock Photos.

Description: Anesthesia and Analgesia in Reptiles and Amphibians: A Resource Guide is a bibliography of biomedical and veterinary literature on the use of anesthesia and analgesia in common reptile and amphibian species covering 2001 to 2021. It contains 361 citations. This bibliography updates A reference source for analgesia & analgesics in animals compiled by Dr. Richard L. Crawford (AWIC Series 2000-02) published in December 2000 and archived in the National Agricultural Library Digital Collections.

Dr. Crawford subdivided the previous bibliography into twenty sections organized by individual species or species groups. The bibliography covered most vertebrate and some invertebrate animals, including commonly-used laboratory species such as mice, rats, rabbits and other rodents, and primates. One section of the bibliography covered amphibians and reptiles. In the twenty years since Dr. Crawford published this bibliography, the number of publications on veterinary anesthesia and analgesia has increased greatly. Because of the large amount of literature, AWIC staff members decided to compile a series of bibliographies, each one covering a particular group of animals.

Scope: This guide covers peer-reviewed literature (articles in peer-reviewed journals, books, book chapters, and conference proceedings) on anesthesia and analgesia use in reptiles and amphibians published between 2001 and 2021. The following databases were searched:

- PubMed
- Web of Science (All Databases: Web of Science Core Collection as well as Biological Abstracts, BIOSIS Citation Index, Current Contents Connect, KCI-Korean Journal Database, Russian Science Citation Index, SciELO Citation Index, and Zoological Record)
- Scopus
- EBSCO platform databases (Agricola, CAB Abstracts, eBook Collection (EBSCOhost), Global Health, Zoological Record, Biological Abstracts, MEDLINE)

How to Use This Resource Guide:

The bibliography is divided into the following sections. You can navigate directly to each section by clicking on the headings in the Table of Contents:

- General (Reptiles and/or Amphibians): This section contains literature discussing anesthesia and analgesia for the two classes, reptiles and amphibians (all species), or covering more than one species.
- Alligators, Crocodiles, and Caimans: This section covers anesthesia/analgesia for reptiles of the order Loricata.
- Bearded dragons: This section provides citations on reptiles of the genus Pogona. The central bearded dragon (Pogona vitticeps) and other Pogona species are popular as pets.
• **Frogs**: Frogs and toads are amphibians belonging to the order Anura. This section features literature on frogs in the family Ranidae (known as “true frogs”) including northern leopard frog (*Rana pipiens*), American bullfrogs (*Lithobates catesbeianus*), White’s tree frogs (*Litoria caerulea*), map treefrog (*Hypsiboas geographicus*), and blue poison dart frogs (*Dendrobates tinctorius azureus*).

• **Frogs (Laboratory)**: All citations in this section cover anesthesia and analgesia of the African clawed frog (*Xenopus laevis*) which is probably the most prevalent amphibian used in biomedical research.

• **Iguanas**: This section contains bibliography on anesthesia and analgesia for the green iguana (*Iguana iguana*), a popular companion reptile species.

• **Lizards (multi-species)**: This section includes articles on anesthesia and analgesia for reptiles of the order Squamata excluding bearded dragons and green iguanas.

• **Salamanders and Newts**: This section of the resource guide contains articles on anesthetization of amphibians of the order Urodela, which includes newts and salamanders. Several citations discuss anesthesia for axolotls (*Ambystoma mexicanum*), a species of amphibian frequently used as a model in biomedical research especially for research on vertebrate development.

• **Snakes**: This section covers anesthesia of limbless reptiles of the suborder Serpentes, including sea snakes (*Hydrophiinae*), boas and pythons (*Boidae*) and garter snakes (*Thamnophis sirtalis*). Citations on ball pythons (*Python regius*) are the most numerous due to this species’ popularity as a companion animal.

• **Toads**: This section covers anesthesia for Anuran amphibians from the family Bufonidae, the “true toads” with a few citations on fire-bellied toads (*Bombina orientalis*). (Fire-bellied toads are actually frogs but are called toads due to the carbuncles on their backs).

• **Turtles and Tortoises (Terrestrial, Freshwater, and Sea)**: Includes citations on reptiles of the order Testudines. The red-eared slider turtle (*Trachemys scripta elegans*) is used as an animal model in spinal and nerve research. Land turtles and tortoises include eastern box turtles (*Terrapene carolina carolina*) and Galapagos tortoises (*Geochelone nigra*). There are also multiple citations about anesthesia for wild species of sea turtles such as the loggerhead (*Caretta caretta*), Kemp’s Ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and green (*Chelonia mydas*).

**Citation Order**: Citations are arranged in ascending order by the last name of the first author within each section of the bibliography.

**Keywords**: Each citation is followed by a series of selected keywords derived from the citation records of the database searched. Because this bibliography derives from multiple databases, keywords may vary in form since databases may use different controlled vocabularies and different indexing terms.

**Finding Full-Text of Articles**: You may check the National Agricultural Library’s (NAL) online catalog, AGRICOLA, to see which books and periodicals that the library has in its holdings. Some online periodicals in
NAL’s holdings are only available to USDA employees through the Digitop portal. Other articles are open access and may be downloaded for free. If you are not a USDA employee, check with your local or institutional library to see whether your library subscribes to these periodicals or can order them on interlibrary loan.

Information on how to request materials that are included in the National Agricultural Library (NAL)’s collections can be found on the Request Library Materials page. USDA employees can request books and articles through Document Delivery. All patrons are encouraged to explore local library resources first before contacting the National Agricultural Library. If you are not a USDA employee, you may visit the library during its hours of operation to request items from our circulation desk or read electronic articles on-site. You may also request items on interlibrary loan through your home library (check with your institutional, university, or public library’s loan office for further information).

Disclaimer: This research guide is for informational purposes only. If you are a researcher planning to use any of the anesthesia/analgesia drugs or methods mentioned in these citations on amphibians and reptiles, you should always consult a veterinarian.

Table of Contents

General (Reptiles and/or Amphibians) ......................................................................................................... 4
Alligators, Crocodiles, and Caimans ............................................................................................................ 16
Bearded Dragons......................................................................................................................................... 21
Frogs (multi-species)................................................................................................................................... 24
Frogs (Laboratory) (Xenopus laevis or African clawed frog) ...................................................................... 32
Iguanas ........................................................................................................................................................ 38
Lizards (multi-species)................................................................................................................................. 44
Salamanders and Newts ............................................................................................................................. 49
Snakes ......................................................................................................................................................... 52
Toads........................................................................................................................................................... 61
Turtles and Tortoises (Terrestrial, Freshwater, and Sea)............................................................................ 64
General (Reptiles and/or Amphibians)

88 citations

https://doi.org/10.1002/9781118792919.ch17

Keywords: Amphibians; analgesia; Eugenol; Isoflurane; Tricaine methanesulfonate


Keywords: Administration routes; anesthesia; anesthetics; Animal surgery and non-drug therapy; autopsy; lizards; mechanism of drug action; pain killers; pet animals; postmortem inspections; reptiles; Sauria; snakes; surgical techniques; Techniques and Methodology; Testudines; therapeutics; turtles; veterinary pharmacology and anaesthesiology; veterinary surgeons


Keywords: Acepromazine; alfadolone; anesthesia; anesthesia induction; anesthetic agent; atropine; barbituric acid derivative; cholinergic receptor blocking agent; diazepam; diprenorphine; etorphine; general anesthesia; glycopyrronium bromide; inhalation anesthesia; intubation; ketamine; lidocaine; lizard; local anesthesia; medetomidine; methoxital; midazolam; muscle relaxant agent; neuroleptic agent; opiate; phenothiazine derivative; premedication procaine; propofol; reptile; sedative agent; snake; suxamethonium; thiopental; tiletamine; tubocuraine chloride; xylazine; zolazepam

://ZOOREC:ZOOR13800014614

Keywords: Amphibians; Pain-associated behaviors; Pain management; reptiles


Keywords: Amphibians; Anesthetics; Benzocaine; Orajel

Keywords: Amphibians, Anesthesia, Benzocaine, MS-22, Orajel, Tricaine methanesulfonate


Keywords: Amphibians; analgesia; anesthesia; anesthetics; Animal surgery and non-drug therapy; bladder; celiotomy; cloaca; cystotomy; dermatologic surgical procedures; eye surgery; gastroscopy; intestines; lizards; minimally invasive surgery; ophthalmologic surgical procedures; orthopedics; ovariectomy; patient monitoring; pet animals; reptiles; Sauria; skin surgery; stomach; surgical drapes; testis; urinary ladder; veterinary pharmacology and anaesthesiology; visceral prolapse


Keywords: Amphibians; Analgesics/administration & dosage; anesthesia; anesthetics; anesthetics, local/administration and dosage; animal welfare; aquaculture; aquatic species; Fishes; Lidocaine/administration & dosage; LL82; MM120; pain killers; pain/drug therapy/veterinary; Reptiles; veterinary pharmacology and anaesthesiology


Keywords: Amphibian; analgesia; antibacterial; antifungal; pharmacology


Keywords: Anesthesia; anesthetics; animal surgery and non-drug therapy; animal welfare; crocodylia; laboratory animal science; lizards; reptiles; Sauria; snakes; testudines; turtles


Keywords: Amphibia; anesthesia; animal surgery and non-drug therapy; pain killers; pets and companion animals; reptiles


Keywords: Amphibia; Analgesia; Reptilia; Sedation
Eatwell, K. (2010). Options for analgesia and anaesthesia in reptiles. *In Practice, 32*(7), 306–311. [https://doi.org/10.1136/inp.c3917](https://doi.org/10.1136/inp.c3917)

**Keywords:** Anesthesia; analgesia; reptiles


**Keywords:** Chelonia; crocodiles; Crocodylia; lizards; pets and companion animals; lizards; reptiles; Sauria; snakes; Testudines; Veterinary pharmacology & anesthesiology


**Keywords:** Anesthesia; reptiles; surgery


**Keywords:** Aminobenzoates/pharmacology; Amphibians/*anatomy & histology/*physiology/*surgery; Anesthetics/*pharmacology; Euthanasia/methods; Skin Absorption/*physiology; Surgical Procedures; Operative/*veterinary


**Keywords:** Anesthesia; diagnostic imaging; general anesthesia; hypnotic sedative agent; hypnotics and sedatives; immobilization; magnetic resonance imaging; nuclear magnetic resonance imaging; organ; procedures; reptiles; risk factors


**Keywords:** CAT; computer assisted tomography; CT; diagnostic imaging; digital radiography; dyspnea; echography; emphysema; general anesthesia; image analysis; nuclear magnetic resonance imaging; pathology; pneumonia; respiratory system; respiratory tract diseases; review; snake; tooth radiography; urine retention


**Keywords:** Amphibian; Analgesia; Critical care; emergency medicine; fluid therapy; nutritional support
[https://doi.org/10.1053/j.jepm.2006.06.004](https://doi.org/10.1053/j.jepm.2006.06.004)

**Keywords:** Analgesia; NSAID; opioid; reptile; Reptilia


**Keywords:** Anesthesia/veterinary; lizards/physiology; monitoring; physiologic/veterinary; preanesthetic medication/veterinary; premedication; review; snakes/physiology; turtles/physiology


**Keywords:** Analgesia; meloxicam; reptiles


**Keywords:** Aquaculture (animals); lizards; pets and companion animals; reptiles; Sauria; snakes; Techniques and Methodology; Testudines; turtles; Veterinary pharmacology and anaesthesiology


**Keywords:** Anesthesia; reptiles


**Keywords:** Alligator; Alligatoridae; anesthesia induction; aquatic; atipamezole; butorphanol; Caiman; *Chrysemys picta; Clemmys guttata; Clemmys insculpta; Clemmys marmorata; Crocodylidae; diazepam; Emydoidea blandingii; isoflurane; ketamine; medetomidine; propofol; *Pseudemys concinna floridana; reptiles; Reptilia; Testudines; *Trachemys scripta elegans*; turtles


**Keywords:** Pain sensitivity; reptiles


**Keywords:** Pain; reptiles

**Keywords:** Alfaxalone; Alfaxan; anesthesia; anesthetics; drug action; injectable anesthetics, laws and regulations; lizards; mechanism of drug action; North America; OECD Countries; pets and companion animals; reptiles; rules; Sauria; snakes; Testudines; turtles; Veterinary pharmacology and anaesthesiology


**Keywords:** Anesthesia; amphibians; euthanasia; reptiles; freezing; hypothermia


**Keywords:** Lizards; pets and companion animals; reptiles; Sauria; snakes; Testudines; tortoises; Veterinary pharmacology and anaesthesiology


**Keywords:** Alligator; anesthesia; anesthesia complication; anesthesiological techniques; anesthetic agent; cause of death; lizard; reptiles; Reptilia; Serpentes; snake; Squamata; Testudines; turtle


**Keywords:** Amphibia; Amphibians/physiology; analgesia/veterinary; Pain/physiopathology/prevention & control/*veterinary; Reptiles/physiology; review


**Keywords:** Animal surgery and non-drug therapy; pets and companion animals; reptiles


**Keywords:** Anesthesia; drug action; inhaled anesthetics; injectable anesthetics; local anesthesia; mechanism of drug action; pain killers; pets and companion animals; reptiles; Veterinary pharmacology and anaesthesiology

Keywords: Analgesia; anesthesia; pain killers; pharmaceuticals; reptiles


Keywords: Amphibians; analgesia; Nociceptin


Keywords: Analgesia; animal surgery and non-drug therapy; Crocodylia; pain killers; pets and companion animals; reptiles; Reptilia; Sauria; snakes; Techniques and Methodology; Testudines; turtles; Veterinary pharmacology and anaesthesiology


Keywords: Anesthesia; lizards; pets and companion animals; reptiles; Sauria; sedation; Testudines; tortoises; turtles


Keywords: Adverse reactions; anesthesia; anesthetics; drug action; pain killers; pets and companion animals; reptiles; veterinary pharmacology and anaesthesiology


Keywords: Alpha 2 adrenergic receptor stimulating agent; analgesic agent; anesthesia; anesthesiological techniques; anesthetic agent; butorphanol tartrate; fracture fixation; Fractures; Bone; isoflurane; ketamine; lidocaine; local anesthetic agent; medetomidine; opiate; pain; postoperative care; preoperative care; propofol; reptiles; Reptilia; review; species difference; surgical technique; telazol; Testudines; tiletamine; turtle; xylazine; zolazepam


Keywords: Amphibia; amphibians; anesthesia; anesthetic; anuran; monitoring; Syzygium aromaticum; urodelan

**Keywords:** Amphibians; analgesia; opioids; remifentanil


**Keywords:** Analgesia/veterinary; Analgesics/therapeutic use; Nociceptors/physiology; Pain/prevention & control/veterinary; Reptiles/physiology; review


**Keywords:** Analgesia; Anesthesia; cardiopulmonary physiology; monitoring; Perianesthetic support; reptiles; Reptilia


**Keywords:** Anatomy; anesthesia; anesthetic techniques; physiology; reptile; review


**Keywords:** Amphibian anesthesia; anesthetic drugs; reptile anesthesia; thermoregulation; veterinary analgesia


**Keywords:** Amphibians; analgesia; grass frog; opioid agonists; *Rana pipiens*


**Keywords:** American College of Laboratory Animal Medicine (ACLAM); anesthesia; analgesia; reptiles.

Keywords: American College of Laboratory Animal Medicine (ACLAM); amphibians; anesthesia; analgesia


Keywords: Aerophagia; agonists; *Alligator mississippiensis*; alpha 2 adrenergic receptor stimulating agent; analgesia/veterinary; bupivacaine; buprenorphine; butorphanol; carprofen; drug efficacy; electroneurology; fentanyl; hydromorphone; lidocaine; mepivacaine; methadone; morphine; mu opiate receptor; multimodal analgesia; nerve conduction; neurophysiology; neuroanatomy; opioid; pain; Pain managements/methods/veterinary; pethidine; Receptors; Opioid; mu; reptiles; review; signal transduction; spinal anesthesia; tapentadol; tramadol; *Trachemys scripta elegans*


Keywords: Anesthesia; anesthetics; animal surgery and non-drug therapy; Chelonia; Cheloniidae; crocodiles; Crocodylia; lizards; pain killers; reptiles; Sauria; snakes; South Asia; surgical techniques; Testudines; veterinary pharmacology and anaesthesiology


Keywords: Amphibia; amphibians; anesthesia; anuran; skin disease; wound care


Keywords: Amphibians; pain management; reptiles


Keywords: Amphibia; analgesia; analgesics; anesthesia; anesthetics; anesthetics, inhalation; butorphanol; drug use; hypothermia; injections; ketamine; monitoring, physiologic; pain; preanesthetic medication; propofol; reptiles; Reptilia

Keywords: Administration routes; adverse reactions; anesthesia; animal surgery and non-drug therapy; Chelonoidis; Chelonoidis nigra; Geochelone nigra; intrathecal anesthesia; pets and companion animals; phallectomy; reptiles; surgical techniques; Testudines; Testudinidae; veterinary pharmacology and anaesthesiology


Keywords: Amphibians; anesthesia; aquatic animals; reptiles; sedatives


Keywords: Alfaxalone; anesthesia; anesthetics; drug action; lizards; pets and companion animals; physiology and biochemistry (wild animals); preanesthetic medication; reptiles; Sauria; snakes; Testudines; turtles; veterinary pharmacology and anaesthesiology; zoo animals


Keywords: Anesthesia; reptiles


Keywords: Anesthetics; larval amphibians; leukocytes; trematode infections


Keywords: Amphibians; analgesia; reptiles


Keywords: Amphibia; anesthesia; Anura; drug action; frogs; pain killers; pets and companion animals; toads; veterinary pharmacology and anaesthesiology


Keywords: Anesthesia; anesthetics; pain killers; pets and companion animals; reptiles; Sauria; snakes; Testudines; turtles; veterinary pharmacology and anaesthesiology


Keywords: Anesthesia; anesthetics; Crocodylia; drug action; lizards; pain killers; pets and companion animals; reptiles: Sauria; snakes; Testudines; turtles; veterinary pharmacology and anaesthesiology


Keywords: Analgesia; analgesic; opioid; pain; reptile; Reptilia


Keywords: Anesthesia; anesthetic; reptile; Reptilia; sedation


Keywords: Analgesics; opioid; butorphanol; controlled clinical trial; cross-over studies; does response; drug effect; morphine; narcotic analgesic agent; pain; pain assessment; pain measurement; prospective study; randomized controlled trial; Reptilia; respiration; Testudines; time factors; Trachemys scripta; turtles


Keywords: Amphibians; anesthesia; anesthetic drugs; isoflurane; tricaine methanesulfonate


Keywords: Amphibia; amphibians/physiology; anesthesia/veterinary; Monitoring, physiologic/veterinary; review

**Keywords:** Amphibians; analgesia; Opioids; Opioid receptors


**Keywords:** Amphibians/physiology; central nervous system/physiology; narcotics/pharmacology; Pain genetics/metabolism/physiopathology; protein structure, tertiary/genetics; Receptors, Opioid/drug effects genetics/metabolism; Sequence homology, amino acid


**Keywords:** Acetic acid test; amphibia; amphibians/physiology; analgesia/veterinary; analgesic agent; analgesia/therapeutic use; opiate peptide; Opioid; Opioid peptides/physiology; Pain prevention & control/veterinary; *Rana pipiens*; review


**Keywords:** Amphibians; Nociceptin; spinal administration


**Keywords:** Anesthesia; anesthetics; animal surgery and non-drug therapy; drug action; pets and companion animals; reptiles; veterinary pharmacology and anesthesiology; zoo animals

**Keywords:** Adverse reactions; anesthesia; anesthetics; animal surgery and non-drug therapy; death rate; drug action; pets and companion animals; reptiles; veterinary pharmacology and anaesthesiology


**Keywords:** Amphibia; anesthesia; anesthetics; animal surgery and non-drug therapy; pets and companion animals; veterinary pharmacology and anaesthesiology; zoo animals


**Keywords:** Anesthesia; anesthetics; animal surgery and non-drug therapy; drug action; pets and companion animals; preanesthetic medication; reptiles; Sauria; snakes; Testudines; turtles; veterinary pharmacology and anaesthesiology


**Keywords:** Amphibia; amphibians/physiology; anesthesia; anesthesia, general/veterinary; animal euthanasia; ectotherm; endotherm; Euthanasia, animal; Hypothermia, induced/veterinary; reptiles/physiology


**Keywords:** Analgesia; analgesic agent; anesthesia; atropine; buprenorphine; butorphanol; carprofen; corticosteroid; diazepam; dyspnea; emergency medicine; emergency treatment; meloxicam; morphine; nonsteroid anti-inflammatory agent; opiate; pethidine; pralidoxime; Reptiles; Reptilia; review


**Keywords:** Amphibians; anesthesia; steroid levels

Alligators, Crocodiles, and Caimans

17 citations

American alligator (*Alligator mississippiensis*)

**Keywords:** Anesthesia; anesthetics; animal surgery and non-drug therapy; crocodiles; Crocodylia; Crocodylidae; Crocodylus; esophagus; reptiles; veterinary pharmacology and anaesthesiology


**Keywords:** Alligators and Crocodiles/anatomy & histology; crocodilians, Injections/methods/veterinary; Mandibular Nerve/anatomy & histology; Nerve Block/methods/veterinary; Nile crocodile; Tomography, X-Ray computed/veterinary


**Keywords:** Anesthetics/administration & dosage; Alligators and Crocodiles/anatomy & histology; Anesthesia/veterinary; Monitoring/Physiologic/veterinary; Restraint, Physical/veterinary


**Keywords:** Alligators; analgesia; crocodilians; restraint techniques; sedatives; tranquilizers


**Keywords:** Alligators and Crocodiles; Anesthesia Recovery Period; alligator; *Alligator mississippiensis*; Alligatoridae; Alligators and Crocodiles; anesthesia; Anesthesia Recovery Period; Anesthetics, Inhalation/administration & dosage; crocodilian; Crocodylia; Epinephrine; inhalation anesthetic agent; Injections, Intramuscular; intramuscular drug administration; Isoflurane/administration & dosage/pharmacology; recovery; reptiles; time factor; veterinary pharmacology and anaesthesiology
Keywords: Alligator; *Alligator mississippiensis*; Alligatoridae; Animal surgery and non-drug therapy; Crocodylia; reptiles; veterinary pharmacology and anaesthesiology; Zoo animals


Keywords: Adrenergic alpha-Agonists; alligator; *Alligator mississippiensis*; Alligatoridae; Alligators and Crocodiles; alpha adrenergic receptor blocking agent; alpha adrenergic receptor stimulating agent; American alligator; analgesic agent; Analgesics/Non-Narcotic; anesthesia; anesthesia recovery period; anesthetic agent; Anesthetics, Combined; Anesthetics, Dissociative; Atipamezole; breathing; drug antagonism; drug effect; electrocardiography; heart rate; imidazole; ketamine; Medetomidine; reflex; Respiration; Restraint, Physical


Keywords: Alligator; American alligator; *Alligator mississippiensis*; anesthesia; blood flow


Keywords: Adrenaline; cardiac filling; Crocodilian; Myocardial Contraction; Reptile; Alligators and Crocodiles/physiology; Anesthetics, Inhalation/pharmacology, Atrial Function/physiology; Cardiac Output/physiology; Epinephrine/pharmacology; Isoflurane/pharmacology

Malte, C. L., Bundgaard, J., Jensen, M. S., Bertelsen, M. F., & Wang, T. (2018). The effects of morphine on gas exchange, ventilation pattern and ventilatory responses to hypercapnia and hypoxia in dwarf caiman (*Paleosuchus palpebrosus*). *Comparative Biochemistry and

**Keywords:** Alligators and Crocodiles/physiology; Anesthesia/veterinary; anesthesia level; anesthetic agent; Anesthetics, Combined; Anesthetics, Inhalation/administration & dosage/pharmacology; atipamezole; breathing rate; crocodiles; crocodilian; Crocodylia; Crocodylidae; Crocodylus; *Crocodylus niloticus*; electrocardiogram; electromyography; eyelid reflex; general anesthesia; Hypnotics and Sedatives/administration & dosage/pharmacology; immobilization; implantation; inhalation anesthesia; ketamine/pharmacology; Medetomidine/administration & dosage/pharmacology; Nile crocodile; reptiles; sedation; Sevoflurane/administration & dosage/pharmacology; spirometry; Techniques and Methodology; temperature; veterinary pharmacology and anaesthesiology


**Keywords:** Alfaxalone; Alligators and Crocodiles; anesthetic agent; Anesthetics; Australian freshwater crocodile; *C. johnstoni*; controlled clinical trial; controlled study; crocodilian; Crocodylidae; *Crocodylus johnsoni*; *Crocodylus porosus*; cross-over studies; crossover procedure; Estuarine crocodile; immobilization; Infusions, Intravenous; intravenous drug administration; Pregnanediones; randomized controlled trial; temperature


Keywords: Adrenergic beta-1 Receptor Agonists/pharmacology; Alligators and Crocodiles/growth & development; Anaerobiosis; Cardiovascular System/drug effects/physiopathology; Crocodilian; Developmental programming; Hypoxia; Oxygen/metabolism; Phenotypic plasticity; Reptile; Receptors, Adrenergic, beta/metabolism


Keywords: Alligators and Crocodiles/physiology/surgery; anesthesia induction; anesthesiological procedure; anesthetic recovery; Anesthetics, Inhalation/administration * dosage; Atipamezole; balanced anesthesia; body temperature; crocodiles; crocodilian; Crocodylia; Crocodylidae; Crocodylus; Crocodylus niloticus; environmental temperature; heart rate; hypnotic sedative agent; Hypnotics and Sedatives/administration & dosage; intraoperative period; Medetomidine/administration & dosage; Monitoring/Physiologic/veterinary


Keywords: Anesthesia; Crocodiles; Nile crocodiles
Bearded Dragons

7 citations

Two bearded dragons (*Pogona vitticeps*)


**Keywords:** analgesia; Analgesics, Opioid; Lizards; Morphine; nociception; opioid; pain; Pain Measurement/methods/veterinary; Pain Threshold/physiology; Random Allocation; Reproducibility of Results; reptile

Keywords: Anesthesia/veterinary; Anesthetics, Local/administration & dosage/pharmacology; Injections/veterinary; intrathecal anesthesia; Lidocaine/administration & dosage/pharmacology; Lizards/physiology


Keywords: Anesthetics/administration & dosage/pharmacology; Anesthetics, Local/administration & dosage/pharmacology; chemical restraint, Cross-Over Studies; Injections, Intramuscular; Lidocaine/administration & dosage/pharmacology; lizard; local anesthetic; Pregnanediones/administration & dosage/*pharmacology; Random Allocation; reptile; sedation


Keywords: Cross-Over Studies; animal experiment; nonhuman; Article; controlled study; animal; metabolism; crossover procedure; Random Allocation; veterinary medicine; randomization; plasma (blood); analgesia; anesthesia; Anesthesia/*veterinary; pain killers; sedation; Injections, Subcutaneous; lizard; solid phase extraction; Pharmacology; high performance liquid chromatography; area under the curve; maximum plasma concentration; time to maximum plasma concentration; antinociception; subcutaneous drug administration; Analgesics, Opioid; narcotic analgesic agent; mean residence time; Anesthesia; Lizards; half life time; Half-Life; Hydromorphone/administration & dosage; hydromorphone; maximum concentration; Testudines; turtle; quadrupole mass spectrometry; pharmacokinetic parameters; LL882; Veterinary Pharmacology and Anaesthesiology; Physiology and Biochemistry (Wild Animals); YY400; VV730; Turtles; Animal Health and Hygiene (General); LL800; Trachemys scripta; Turtles/*metabolism; reptiles; reptile; Analgesics, Opioid/*pharmacokinetics; bearded dragon; Hydromorphone/administration & dosage/*pharmacokinetics; Lizards/*metabolism; opioid; red-eared slider; lizards; lethargy; Pogona vitticeps; Trachemys scripta elegans; elimination rate constant; Hydromorphone; Trachemys; Sauria; turtles; Agamidae; Emydidae; Pogona; terrapins; Hydromorphone/*pharmacokinetics


Leopard frog (*Rana pipiens*)


**Keywords:** Aminobenzoates; anesthetic agent; Anesthetics; animal euthanasia; Anura; breathing rate; consciousness; death; dose response; Dose-Response Relationship; Drug; drug exposure; euthanasia; Euthanasia, Animal; heart beat; immersion; jumping; *Leptodactylus*; *Leptodactylus pentadactylus*; nociceptive stimulation; stimulus response; tricaine; Tricaine methanesulfonate

Keywords: Amphibia; Anura; frogs; Pharmacology; reptiles; Techniques and Methodology; veterinary pharmacology and anaesthesiology


Keywords: Ultrasound; Article; heart rate; animals; veterinary medicine; Gallus; birds; fowls; Galliformes; Gallus; Phasianidae; nociception; Isoflurane; isoflurane; anesthesia; intubation; Anesthesia; Anesthesia, Inhalation; inhalation anesthesia; Anesthetics, Inhalation; inhalation anesthetic agent; righting reflex; Amphibia; endangered species; tracer; LL882; Veterinary Pharmacology and Anaesthesiology; Farm and Horticultural Structures; NN300; Anesthetics, Inhalation/*pharmacology; Isoflurane/*pharmacology; Endangered Species; Anura; *Anura; Anesthesia, Inhalation/*veterinary; *Leptodactylus fallax; mountain chicken frog; frogs; ED50; positive end expiratory pressure


Keywords: Amphibia; Amphibian, Anesthesia; anesthesia induction; anesthesiological techniques; anesthetic potency; Anesthetics, Inhalation; animal experiment; Anura; controlled study; Desflurane; Dose-Response Relationship; Drug; drug exposure; drug potency; drug response; electrostimulation; Frog; general anesthesia; Halothane; immobilization; Isoflurane; nociceptive stimulation; *Rana pipiens*; Random Allocation

Barter, L. S., Mark, L. O., Smith, A. C., & Antognini, J. F. (2007). Isoflurane potency in the northern leopard frog *Rana pipiens* is similar to that in mammalian species and is unaffected by decerebration. *Veterinary Research Communications, 31*(6), 757–763. Scopus. [https://doi.org/10.1007/s11259-007-0077-5](https://doi.org/10.1007/s11259-007-0077-5)

Keywords: Amphibia; Amphibian; Anaesthetic potency; Anesthesia; anesthesia induction; anesthesia mechanism; anesthetic potency; Anesthetics, Inhalation; animal experiment; Anura; concentration response; controlled study; decerebration; dose response; drug efficacy; drug exposure; drug potency; drug response; electrostimulation; Frog; general anesthesia; Halothane; immobilization; Isoflurane; nociceptive stimulation; Pain Measurement; *Rana pipiens*; Random Allocation; species difference

Cakir, Y., & Strauch, S. M. (2005). Tricaine (MS-222) is a safe anesthetic compound compared to benzocaine and pentobarbital to induce anesthesia in leopard frogs (*Rana pipiens*). *Pharmacological Reports, 57*(4), 467–474.
Keywords: Anesthesia; Benzocaine; Pentobarbital; leopard frogs; MS-222; Rana pipiens; Tricaine


Keywords: Alfaxalone; Amphibia; anesthesia; anesthetics; Animal Surgery and Non-drug Therapy; Anura; frogs; Pets and Companion Animals; Phyllomedusa tomopterna; traumas; veterinary pharmacology and anaesthesiology


Keywords: Acoustic Stimulation; Aminobenzoates; Anesthesia/methods; Brain Stem/drug effects; Evoked Potentials, Auditory; Brain Stem/drug effects; Ranidae


Keywords: Anesthesia; anesthetic agent; Anesthetics; bradycardia; clinical trial; drug derivative; Etomidate; leopard frog; metomidate; metomidate hydrochloride; prolonged recovery; Rana pipiens


Keywords: Anesthesia; anesthesia reversal; ethanol; frog; hexadecanol; tadpole, temperature

Keywords: Amphibia; anesthesia; Anura; frogs; Hylidae; Litoria caerulea; Techniques and Methodology; veterinary pharmacology and anaesthesiology


Keywords: Amphibians; anesthetics; benzocaine; frogs; Orajel


Keywords: Anesthetics; frogs; general anesthetics; tadpoles


Keywords: Amphibia; amphibian anesthesia; anesthetics; Anura; cross-over studies; diagnostic techniques; drug action; frogs; heart rate; Hylidae; Litoria caerulea; mechanism of drug action; MS-222; Pets and Companion Animals; reflexes; sedation; sulfonates; surgery; tricaine methanesulfonate; veterinary pharmacology and anaesthesiology; White’s tree frogs


Keywords: Analgesia; Benzocaine/pharmacology; Compound action potential; Frog sciatic nerve; Nerve conduction; Propofol; Action Potentials/drug effects; Alcohols/pharmacology; Anesthetics, General/chemistry/pharmacology; Anesthetics, Local/pharmacology; Ketones/pharmacology; Phenols/chemistry/pharmacology; Ranidae; Sciatic Nerve/drug effects/physiology


Keywords: Aminobenzoates/pharmacology; Anesthetics/pharmacology; cardiac muscle; frogs; MS-222; Muscle Contraction/drug effects/physiology; Muscle, Skeletal/drug effects/physiology; nerve; Rana pipiens; Sciatic Nerve/drug effects/physiology; skeletal muscle

**Keywords:** Amphibians; Opioids


**Keywords:** Amphibians; anesthesia; Anurans; article; case report; clinical article; Kaloula; Magnetic resonance; nuclear magnetic resonance imaging; sonographer; sex determination sexual maturity; testis; ultrasonics; Ultrasonography; *Xenopus laevis*; zoos


**Keywords:** Amphibia; anesthesia; angiosperms; Aniba; Aniba rosaeodora; Animal and in-vitro Models for Pharmaceuticals; Anura; essential oil crops; Hylidae; Hypsiboas geographicus; Lamiales; Lauraceae; Laurales; Lippia; *Lippia alba*; *Lippia origanoides*; magnoliids; minor forest products; oil crops; plants; Verbenaceae


**Keywords:** Amphibians; Anesthetic agents; leukocytes; trematode infections


**Keywords:** Amphibia; anesthesia; Animal Physiology and Biochemistry (Excluding Nutrition); Anura; autopsy; frogs; infectious agents; *Leiopelma archeyi*; Leiopelmatidae; postmortem inspections; veterinary pharmacology and anaesthesiology; Zoo Animals

**Keywords:** Amphibia; anesthesia; anesthetic agent; Anesthetics; drug derivative; drug effect; Eugenol; Hylidae; Isoeugonel; Larva; *Litoria ewingii*; physiology; Ranidae; Southern brown tree frog; Tadpoles


**Keywords:** Amphibians; Opioid analgesia; Opioid receptors


**Keywords:** Analgesia; analgesic agent; Analgesics; Animals, Laboratory; Body Temperature; Disease Models, Animal; experimental animal; frog; methodology; Pain; *Rana pipiens*


**Keywords:** Amphibians; Frogs; Nociceptin; *Rana pipiens*


**Keywords:** Amphibia; Animal Surgery and Non-drug Therapy; Anura; frogs; veterinary pharmacology and anaesthesiology

Keywords: Amino amides; Amphibian; Analgesia; Anesthesia; Anesthesia, Local; local anesthesia, Systemic effects; Heart Rate/drug effects; Injections, Subcutaneous; Lidocaine/pharmacology; Nociception/drug effects; *Rana catesbeiana/physiology*; Respiratory Rate


Keywords: Alfaxalone; alfaxan; amphibians; anesthesia; Anesthetics/administration dosage/pharmacology; Cardiovascular System/drug effects; Hypnotics and Sedatives/administration & dosage/pharmacology; Infusions, Intra-Arterial/veterinary; Injections, Intramuscular/veterinary; Pilot Projects; Pregnanediones/administration & dosage/pharmacology; Propofol/administration & dosage/pharmacology; *Rana catesbeiana/physiology*

Blue poison dart frog (*Dendrobates azureus*)

**Keywords:** Adrenergic alpha-2 Receptor Antagonists/administration & dosage/pharmacology; Aging; alfaxalone; alfaxan; Amphibia; amphibian; analgesic agent; Analgesics/administration & dosage/pharmacology; anesthesia; anesthetic agent; anesthetic recovery; Anesthetics/administration & dosage/pharmacology; Antidotes/administration & dosage/pharmacology; Anura; anuran; atipamezole; blue poison dart frog; breathing rate; chemical restraint; combination drug therapy; conscious sedation; Controlled Study; Cross-Over Studies; crossover procedure; Dendrobates; Dendrobates tinctorius azureus; Dexmedetomidine/administration & dosage/pharmacology; Flumazenil/administration & dosage/pharmacology; frogs; gastric prolapse; heart rate; hypnotic sedative agent; Hypnotics and Sedatives/administration & dosage/pharmacology; Imidazoles; Ketamine/administration & dosage/pharmacology; Midazolam/administration & dosage/pharmacology; Pets and Companion Animals; Pregnanediones/administration & dosage/*pharmacology; prospective study; randomized controlled trial; recumbency; respiration depression righting reflex; sedate; tactile stimulation; vetaket; Veterinary pharmacology and anaesthesiology; von Frey test; Zoo Animals


**Keywords:** Alfaxalone, Amphibia, amphibian, , anesthesia, anesthetic agent, anesthetic recovery, Anura, anuran, apnea, Dendrobates, Dendrobates tinctorius azureus, Dendrobatidae, drug action, frogs, heart rate, juveniles, neuroactive steroid, Pets and Companion Animals; prospective studies, respiratory rate, sedation, subcutaneous injection, surgery, Veterinary pharmacology and anaesthesiology, von Frey test, Zoo Animals
Frogs (Laboratory) (*Xenopus laevis* or African clawed frog)

27 citations

![African clawed frogs (*Xenopus laevis*)](image)


**Keywords:** Aminobenzoic Acids; Anesthetics; animal experiment; Blood Flow Velocity; body weight; Coronary Circulation; Doppler echocardiography; Echocardiography; Electrocardiography; flow rate; Heart; Heart Conduction System; heart electrophysiology; heart function; Hemodynamics; Isoflurane; tricaine; two dimensional echocardiography; *Xenopus laevis*


**Keywords:** Amphibia; Animal Surgery and Non-drug Therapy; Anura; Laboratory Animal Science; Pipidae; veterinary pharmacology and anaesthesiology; *Xenopus laevis*

**Keywords:** Approximate entropy (ApEn); General anesthesia; Lateralization; Permutation entropy (PE); Thalamus; *Xenopus laevis*


**Keywords:** animals; Chordata; eukaryotes; vertebrates; anesthesia; anesthetics; drug action; mechanism of drug action; *Xenopus laevis*; Amphibia; *Xenopus*; LL882; Veterinary Pharmacology and Anaesthesiology; Aquaculture (Animals); MM120; alfaxalone; Anura; frogs; Pipidae


**Keywords:** Prospective Studies; Time Factors; *Body Weight; Xenopus laevis*; Amphibia; *Xenopus*; LL882; Veterinary Pharmacology and Anaesthesiology; Animal Physiology and Biochemistry (Excluding Nutrition); LL600; Animal Surgery and Non-drug Therapy; LL884; Anura; Anesthesia/methods/*veterinary; Reflex/drug effects.


**Keywords:** Dose-Response Relationship, Drug; Drug Administration Routes; Drug Evaluation, Preclinical; Toxicity Tests/methods; *Xenopus laevis*; Half-Life; Apoptosis/drug effects; Anesthetics/*toxicity; Eugenol/*toxicity; Kidney Tubules/drug effects/*pathology


**Keywords:** Review; xylazine; medical research; Animal Welfare; veterinary medicine; drug effect; buprenorphine; postoperative pain; Pain; postoperative analgesia; analgesic agent; Analgesia; fentanyl; morphine; butorphanol; dexmedetomidine; animal use; *Xenopus laevis*; animal care; drug safety; experimental animal welfare; lethality; codeine; pethidine; animal wellbeing.

**Keywords:** Time Factors; Dose-Response Relationship, Drug; Area Under Curve; Pharmacology; Amphibia; *Xenopus laevis*; Half-Life; Anesthesia, General/veterinary; *Xenopus*; LL882; Veterinary Pharmacology and Anaesthesiology; Animal Physiology and Biochemistry (Excluding Nutrition); LL600; VV730; Anura; frogs; Anesthetics/pharmacokinetics/*pharmacology; Propofol/pharmacokinetics/*pharmacology; Pipidae


**Keywords:** Surgical technique; review; ketamine; egg; Animalia; research; nociception; pain; isoflurane; Animals, Laboratory; experimental animal; anesthesia; propofol; perception; Anesthetics; *Animals, Laboratory; Mammalia; Anesthesia; pentobarbital; drug megadose; tricaine; Eugenol; barbituric acid derivative; Amphibia; benzocaine; *Xenopus laevis/*physiology; oxygenation; anesthesia level; hormonal regulation; methoxyflurane; Frogs; Anura; MS-222; *Anesthesia; Aminobenzoates; *Anesthetics/administration & dosage; Pain Perception/*physiology; Benzocaine; halothane; Pain Perception; pain receptor; tiletamine; tiletamine plus zolazepam


**Keywords:** Time Factors; Surgery; Random Allocation; Dose-Response Relationship, Drug; Animalia; Administration, Topical; Heart Rate/drug effects; Drug Administration Routes; Area Under Curve; Injections, Subcutaneous/veterinary; Anesthesia; Eugenol; Amphibia; *Xenopus laevis/*physiology; Half-Life; Respiration/drug effects; *Xenopus*; LL882; Veterinary Pharmacology and Anaesthesiology; Frogs; Aquaculture (Animals); MM120; Animal Surgery and Non-drug Therapy; LL884; Anura; frogs; Anesthesia/methods/*veterinary; Anesthetics/*administration & dosage/pharmacokinetics; Eugenol/*administration & dosage/pharmacokinetics; Skin/drug effects/*metabolism; Pipidae


**Keywords:** Amphibians; anuran; Eugenol; frogs; Pain management; *Xenopus laevis*


**Keywords:** Anesthesia; frogs; *Xenopus laevis*


**Keywords:** Animal behavior; behavior; anesthesia; anesthetics; *Xenopus laevis*; Amphibia; pet animals; *Xenopus*; LL860; LL882; Non-Communicable Diseases and Injuries of Animals; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; Animal Reproduction and Embryology; LL250; Animal Behaviour; LL300; LL821; LL500; Aquaculture (Animals); MM120; Animal Anatomy and Morphology; LL400; Anura; frogs; Pipidae


**Keywords:** Computer Simulation; Animals; Molecular Structure; Drug Evaluation, Preclinical; Ligands; Receptors, GABA-A/*metabolism; Patch-Clamp Techniques; Allosteric Regulation/drug effects; Anesthetics/chemistry/*pharmacology; Benzodiazepines/*chemistry/pharmacology; Flumazenil/chemistry/pharmacology; *Xenopus laevis/*metabolism; *Xenopus Proteins/metabolism


**Keywords:** Anesthesia; Etomidate; frogs; tadpoles; *Xenopus laevis*


**Keywords:** Dose-Response Relationship, Drug; Larva; Action Potentials/drug effects; Neurons/*drug effects; *Xenopus laevis*; Electric Stimulation; *carbachol; *mechano-sensory; *muscarinic receptor; *rectification; *swimming; Atropine/pharmacology; Biotin/analogs & derivatives/metabolism; Carbachol/pharmacology; Cholinergic Agonists/*pharmacology; Muscarinic


**Keywords:** Anesthesia; frogs; tadpoles; Tricaine methanesulfonate (MS-222); *Xenopus laevis*

**Keywords:** Animal Welfare; Analgesics; Anesthesia/*veterinary; Anesthesia/methods; Pain Management; Amphibia; *Xenopus laevis*; Benzocaine/*pharmacology; Xenopus; LL810; LL882; Veterinary Pharmacology and Anaesthesiology; Anesthetics/administration & dosage/pharmacology; Anura; Aminobenzoates/*pharmacology; Anesthesia/methods/*veterinary; Aminobenzoates/administration & dosage/*pharmacology; Clonixin/administration & dosage/*pharmacology; Benzocaine/administration & dosage/*pharmacology; Etomidate/administration & dosage/*pharmacology; Anesthetics/pharmacology; Aminobenzoates/administration & dosage; Anesthetics/administration & dosage; Benzocaine/administration & dosage; Clonixin/*analogs & derivatives; Etomidate/*pharmacology; Anesthetics/pharmacology; Aminobenzoates/administration & dosage; Anesthetics/administration & dosage; Benzocaine/administration & dosage; Clonixin/*analogs & derivatives; Clonixin/administration & dosage; Clonixin/pharmacology; Etomidate/*pharmacology; Etomidate/administration & dosage; Pipidae


**Keywords:** African clawed frog; Analgesics; anesthesia; Butorphanol; Fentanyl; frogs; Tricaine methanesulfonate (MS-222); *Xenopus laevis*


**Keywords:** Surgery; animal experiment; animal model; animal tissue; nonhuman; Article; controlled study; animal; physiology; procedures; laparotomy; Models, Animal; adverse effects; evaluation study; animal behavior; drug effects; veterinary; Hot Temperature; heat; Hot Temperature/*adverse effects; skin


**Keywords:** animals; Chordata; eukaryotes; vertebrates; angiosperms; plants; Spermatophyta; *Xenopus laevis*; Amphibia; eudicots; Myrtaceae; Myrtales; *Xenopus*; HH400; Pesticides and Drugs (General); Aquatic Biology and Ecology; MM300; Syzygium; Syzygium aromaticum; Reproduction, Development and Life Cycle (Wild Animals); YY200; Anura; frogs; Toxicology and Poisoning (Wild Animals); YY900
Two green iguanas (*Iguana iguana*)


**Keywords:** Animal experiment; article; controlled study; clinical trial; Dose-Response Relationship, Drug; dose response; Isoflurane; anesthesia induction; isoflurane; sevoflurane; butorphanol; lizard; morbidity; drug distribution; Latin square design; ether derivative; Anesthetics, Inhalation; inhalation anesthetic agent; artificial ventilation; drug derivative; endotracheal intubation; electrostimulation; Reptilia; Iguana; desflurane; Iguanas; Methyl Ethers; Iguana; *Iguana iguana*; drug uptake; minimum lung alveolus concentration; atmospheric pressure

Keywords: Alfaxalone; Anaesthesia; Reptile; Reptilia; Iguana; Iguana


Keywords: Laboratory Animal Science; Antidotes/administration & dosage/pharmacology; Midazolam/administration & dosage/*pharmacology; *Iguanas; Flumazenil/administration & dosage/*pharmacology; Hypnotics and Sedatives/*pharmacology


Keywords: Article; nonhuman; controlled study; Isoflurane; anesthesia induction; isoflurane; sevoflurane; lizard; area under the curve; drug elimination; Latin square design; Anesthesia, Inhalation; Anesthetics, Inhalation; inhalation anesthetic agent; Half-Life; drug solubility; compartment model; anesthetic recovery; blood gas; desflurane; Iguanas; Methyl Ethers; Iguana iguana; drug uptake; minimum lung alveolus concentration


Keywords: Article; controlled study; clinical article; heart rate; veterinary medicine; anesthesia; software; room temperature; electrocardiography; ECG; cardiology; computer programs; coronary diseases; anesthesia level; Biological Resources (Animal); PP710; LL860; Non-Communicable Diseases and Injuries of Animals; LL070; Pets and Companion Animals; Diagnosis of Animal Diseases; LL886; reptiles; lizards; Heart frequency; Iguana; QRS complex; QRS interval; R wave; R wave amplitude; Reptile cardiology; Reptile electrocardiogram; Iguanidae; Iguana iguana; Sauria

Keywords: Cardiovascular; Telemetry; Anesthesia; Arterial blood pressure; Squamata; Iguana iguana; Oscillometric


Keywords: Prospective Studies; Single-Blind Method; animal experiment; article; controlled study; sodium chloride; drug effect; Hot Temperature; Injections, Intramuscular; quantitative analysis; analgesia; Pain Measurement; observational study; analgesic activity; Analgesics, Opioid; butorphanol tartrate; skin temperature; Reptilia; Iguana; Butorphanol; thermal stimulation; Iguanas; Iguana iguana; Nociceptive Pain; single blind procedure; temperature sense; visual field


Keywords: Isoflurane; Anesthesia; Squamata; Sevoflurane; Butorphanol; Iguana iguana


Keywords: Anesthesia; Isoflurane; Iguana iguana; reptiles


Keywords: Anesthetics; Atipamezole; Iguana iguana; Medetomidine; reptiles; Tiletamine; Zolazepam


Keywords: Anesthetics; Iguana iguana; Medetomidine; Reptiles; Tiletamine; Zolazepam

Keywords: Alfaxalone; anesthesia; Iguana iguana; reptiles


Keywords: Anesthesia; Iguana iguana; Propofol; reptiles


Keywords: Pesticides and Drugs; Control; anesthesia; anesthetics; clinical picture; communicable diseases; rehydration therapy; LL860; LL882; Non-Communicable Diseases and Injuries of Animals; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; HH300; HH405; Diagnosis of Animal Diseases; LL886; LL822; causal agents; etiology; Animal Surgery and Non-drug Therapy; LL884; reptiles; lizards; Iguana; Iguanidae; Iguana iguana; Sauria; kidney disorders; nephropathy; renal diseases


Keywords: Anesthesia; Iguana iguana; reptiles


Keywords: Article; veterinary medicine; monitoring; Isoflurane; anesthesia induction; isoflurane; oxygen; lizard; Anesthesia; Anaesthesia; Anesthetics, Dissociative; Heart Rate; endotracheal intubation; anesthetic recovery; Reptiles; Reptilia; Squamata; Iguana; Iguanas; tiletamine; Iguana iguana; anesthesiological techniques; GABA Modulators;


Keywords: Animal experiment; article; nonhuman; controlled study; isoflurane; lizard; inhalation anesthesia; butorphanol tartrate; lung ventilation; Squamata; Iguana; Iguana iguana; anesthesia mechanism; minimum lung alveolus concentration; Mycobacterium avium complex (MAC)

**Keywords:** Animal experiment; article; controlled study; isoflurane; lizard; drug safety; inhalation anesthesia; butorphanol tartrate; Squamata; *Iguana iguana*; minimum lung alveolus concentration; anesthesia complication; Mycobacterium avium complex (MAC); heart arrest


**Keywords:** Cross-Over Studies; Prospective Studies; animal experiment; article; controlled study; male; animal; blood pressure; Blood Pressure; femoral artery; physiology; female; prospective study; correlation analysis; sodium chloride; metabolism; crossover procedure; randomized controlled trial; clinical trial; heart rate; animal disease; blood sampling


**Keywords:** Computer assisted tomography; physiology; procedures; vascularization; clinical trial; anatomy and histology; Tomography, X-Ray Computed; liver; veterinary; Liver; echography; Ultrasonography; Anesthesia, General; general anesthesia; Contrast Media; contrast medium; Iguanas; Iguanidae


**Keywords:** Article; male; physiology; methodology; breathing; animal disease; drug effect; anesthesia; lizard; Anesthetics; oxygen consumption; orchidectomy; anesthetic agent; Anesthesia; Anesthesia, Inhalation; inhalation anesthesia; Orchidectomy; Respiration; Oxygen Consumption; endotracheal intubation; case report; Iguanas; Intubation, Intratracheal; MLCS; MLOWN

**Keywords:** Analgesia; Opioids; Reptiles; Reptilia; Squamata; Iguana; *Iguana iguana*; Induction time


**Keywords:** Analgesia; Ketoprofen; Pharmacokinetics; Mammalia; NSAID; Reptile; Reptilia; Squamata; Iguana iguana; Green iguana (*Iguana iguana*)


**Keywords:** Anesthesia; Iguana iguana; reptiles


**Keywords:** Anesthesia; *Iguana iguana*; reptiles; Tiletamine; Zolazepam
Lizards (multi-species)

16 citations

Tegu lizard (Salvator merianae)


Keywords: Ketamine; Dose-Response Relationship, Drug; Anesthesia/*veterinary; medetomidine; Drug Combinations; Anesthesia; Injections, Intramuscular/veterinary; Hypnotics and Sedatives/administration & dosage/*pharmacology; reptile; Lizards/*physiology; Anesthetics, Dissociative/administration & dosage/*pharmacology; Ketamine/administration & dosage/*pharmacology; Medetomidine/administration & dosage/*pharmacology; Salvator merianae

**Keywords:** LL860; LL882; Non-Communicable Diseases and Injuries of Animals; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; Animal Surgery and Non-drug Therapy; LL884; reptiles; snakes; lizards; Sauria; Chamaeleo; *Chamaeleo calyptratus*; Chamaeleonidae


**Keywords:** Adverse reactions; anesthesia; anesthetics; drug action; mechanism of drug action; administration routes; pain killers; preanesthetic medication; Anesthesia; Sedation; inhaled anesthetics; Other Wildlife Diseases; YY800; LL882; Veterinary Pharmacology and Anaesthesiology; Diagnosis of Animal Diseases; LL886; Animal Surgery and Non-drug Therapy; LL884; Snakes; reptiles; snakes; lizards; Squamates; Taxonomy; Sauria; parenteral injection


https://doi.org/10.1002/9781118792919.ch21

**Keywords:** Anesthesia; Lizards; Endotracheal intubation; Snakes; Inhalant anesthetics; Vascular access site


https://doi.org/10.1016/j.vaa.2017.12.004

**Keywords:** Drug Therapy, Combination; analgesia; benzodiazepine; Injections, Intramuscular/veterinary; Analgesics/administration & dosage/*pharmacology; Dexametomidine/administration & dosage/*pharmacology; Midazolam/administration & dosage/*pharmacology; Hypnotics and Sedatives/administration & dosage/*pharmacology; reptiles; *Lizards; Deep Sedation/methods/veterinary; Immobilization/methods/*veterinary; lizards; Pain Management/methods/*veterinary; α(2)-adrenergic agonist

Keywords: Techniques and Methodology; ZZ900; LL882; Veterinary Pharmacology and Anaesthesiology; Animal Health and Hygiene (General); LL800; reptiles; lizards; Sauria


Keywords: Anesthesia; case report; Lizards; Reptiles; Tegu lizards; *Tupinambis merianae*


Keywords: Cross-Over Studies; Drug Therapy, Combination; midazolam; sedation; dexmedetomidine; Injections, Subcutaneous/veterinary; alfaxalone; Hypnotics and Sedatives/*administration & dosage; *Lizards; *Dexmedetomidine/administration & dosage; *Midazolam/administration & dosage; *Pregnanediones/administration & dosage


Keywords: Fracture; Internal fixation; Article; male; fracture external fixation; femur fracture; open fracture; postoperative pain; meloxicam; postoperative analgesia; lizard; cefotaxime; Prolapse; callus; fracture healing; osteosynthesis; radius fracture; ulna fracture; *Varanus bengalensis*


Keywords: Cross-Over Studies; Random Allocation; Drug Combinations; Dexmedetomidine/administration & dosage/*pharmacology; Hypnotics and Sedatives/administration & dosage/*pharmacology; *Lizards; Anesthetics, Dissociative/administration & dosage/*pharmacology; Ketamine/administration & dosage/*pharmacology

**Keywords:** Random Allocation; anesthesia; Alfaxalone; Pregnanediones/administration & dosage/*pharmacology; Lizards/*physiology; Anesthetics/administration & dosage/*pharmacology; Ketamine/administration & dosage/*pharmacology; **Celestus warreni**; Haiti; Haitian giant galliwasp; ketamine hydrochloride


**Keywords:** Anesthesia; anesthetics; drug action; mechanism of drug action; inhaled anesthetics; LL882; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; alfaxalone; reptiles; lizards; *Pogona viticeps*; Sauria; Agamidae; *Pogona; Physignathus cocincinus*; *Pogona henrylawsoni*


**Keywords:** Cross-Over Studies; *Lizards; Analgesics, Opioid/administration & dosage/*therapeutic use; Analgesics/*therapeutic use; Butorphanol/administration & dosage/*therapeutic use; Morphine/*therapeutic use


**Keywords:** Article; medical education; temperature; animal behavior; animal housing; blood sampling; feces analysis; veterinary medicine; animal food; diet supplementation; Animalia; species difference; animal husbandry; humidity; anesthesia induction; sedation; lizard; animal care; vein puncture; catheterization; illumination; species differentiation; eating habit; health care quality; species diversity; consultation; nursing; Squamata; radiodiagnosis

Keywords: Animal experiment; animal model; nonhuman; surgical technique; Article; controlled study; postoperative care; ketamine; physiology; female; procedures; Random Allocation; drug effect; randomization; analgesia; meloxicam; anesthesia induction; anesthesia; sedation; Injections, Subcutaneous; Anolis; dexmedetomidine; lizard; tribromoethanol; Anesthetics; injection site; subcutaneous drug administration; Pain Management; anesthetic agent; adverse event; general anesthesia; combination drug therapy; bromethol; respiration depression; Lizards; Anesthetics/*administration & dosage; hydromorphone; conscious sedation; Conscious Sedation; anesthetic recovery; polymyxin B; neomycin; anesthesia level; LL882; Veterinary Pharmacology and Anaesthesiology; alfaxalone; reptiles; *Injections, Subcutaneous; Conscious Sedation/*methods; Lizards/*physiology; Pain Management/*methods; alfaxan; Anolis sagrei; bacitracin zinc; coeliotomy; Sauria; Injections, Subcutaneous*; Dactyloidae


Keywords: Testudines; LL882; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; reptiles; lizards; Sauria; turtles
Salamanders and Newts

11 citations

Axolotl or Mexican salamander (*Ambystoma mexicanum*)


Keywords: Treatment Outcome; Anesthesia, General/*veterinary; Anesthetics/*administration & dosage; Immersion; Immobilization/veterinary; *Ambystoma mexicanum*; axolotl; *immersion anesthesia*; *MS222*; *tricaine methanesulfonate*; *Ambystoma mexicanum*/*injuries*/surgery; Aminobenzoates/*administration & dosage*; Endoscopy/*veterinary*; Foreign Bodies/surgery/*veterinary*

Keywords: Immobilization; article; controlled study; clinical article; heart rate; intramuscular drug administration; muscle; anesthesia; sedation; Alfaxalone; methods; Anesthesia; righting reflex; Monitoring; Amphibia; Pleurodeles; forelimb; Intramuscular; anesthesia level; Biological Resources (Animal); PP710; LL882; Veterinary Pharmacology and Anaesthesiology; Physiology and Biochemistry (Wild Animals); YY400; threatened species; alfaxalone; Amphibian; Caudata; Pleurodeles waltl; Salamandridae


Keywords: Ambystoma tigrinum nebulosum; Amphibians; Anesthetics; Benzocaine; Tricaine methanesulfonate (MS-222); Tiger salamanders


Keywords: Amphibians; Axolotl; Limb regeneration; Methods and protocols; salamanders


Keywords: Amphibians; anesthesia; animal behavior; animal identification; Desmognathus salamanders; Stress responses


Keywords: Amphibians; analgesia; Buprenorphine; Butorphanol; Eastern red-spotted newt; Notophthalmus viridescens

Keywords: Animals; Behavior, Animal; Laboratory Animal Science; Pain Measurement/methods/*veterinary; Pain/prevention & control/*veterinary; *Ambystoma mexicanum; Analgesia/methods; Analgesics/administration & dosage/pharmacology; Buprenorphine/administration & dosage/pharmacology; Butorphanol/administration & dosage/pharmacology; Pain Management/*veterinary


**Keywords:** Amphibians; anesthesia; salamanders; Tricaine methanesulfonate (MS-222)


**Keywords:** Amphibians; Anesthesia; salamanders


**Keywords:** Ambystoma tigrinum; amphibians; anesthesia; Clove oil; Propofol; Tiger salamanders


**Keywords:** Amphibians; anesthesia; salamanders; Tricaine methanesulfonate (MS-222)
Snakes

36 citations

Female ball python (*Python regius*) with firefly morph markings


**Keywords:** LL860; LL882; Non-Communicable Diseases and Injuries of Animals; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; Animal Surgery and Non-drug Therapy; LL884; reptiles; snakes; lizards; Sauria; *Chamaeleo*; *Chamaeleo calyptratus*; Chamaeleonidae


Keywords: Adverse reactions; anesthesia; anesthetics; drug action; mechanism of drug action; administration routes; pain killers; preanesthetic medication; Anesthesia; Sedation; inhaled anesthetics; Other Wildlife Diseases; YY800; LL882; Veterinary Pharmacology and Anaesthesiology; Diagnosis of Animal Diseases; LL886; Animal Surgery and Non-drug Therapy; LL884; Snakes; reptiles; snakes; lizards; Squamates; Taxonomy; Sauria; parenteral injection


Keywords: Anesthesia; Lizards; Endotracheal intubation; Snakes; Inhalant anesthetics; Vascular access site


Keywords: Anesthesia; reptiles; snakes; ventilation


Keywords: Time Factors; Temperature; Drug Administration Schedule; Behavior, Animal/*drug effects; Analgesics, Non-Narcotic/*pharmacology; Respiration/*drug effects; *Boidae; Dexmedetomidine/*pharmacology


Keywords: Pilot Projects; immobilization; animal experiment; Article; crossover procedure; pilot study; drug efficacy; heart rate; veterinary medicine; drug effect; chemotherapy; adverse reactions; analgesia; anesthesia; Heart Rate/drug effects; anesthetics; drug action; mechanism of drug action; clinical picture; dexmedetomidine; Drug Interactions; mean arterial pressure; Immobilization; anesthetic agent; Reflex, Righting; righting reflex; Heart Rate; Dexmedetomidine; drug administration route; drug interaction; LL882; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; Immobilization/veterinary; *Colubridae; alfaxalone; Anesthetics, Combined/*pharmacology; Dexmedetomidine/*pharmacology;


**Keywords:** Anesthesia; Ophidia; reptiles; restraint; snakes; Squamata.


**Keywords:** Anesthesia; snakes; surgery.


**Keywords:** Respiration; Oxygen/metabolism; *Ventilation; Blood Gas Analysis; Heart Rate/physiology; *Reptile; Boidae/*physiology; *Anesthesia; *Acid-base balance; *Isoflurane; *Python regius; *Respiration, Artificial; Anesthesia/*methods


**Keywords:** Behavior; feeding; nociception; pain; rodents; Pain Measurement; Feeding Behavior/*physiology; Pain/diagnosis/*veterinary; LL882; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; Animal Behaviour; LL300; Animal Nutrition (General); LL500; *Boidae: reptiles; snakes; reptile; Ball python (*Python regius*); Capsaicin/toxicity; Pythonidae; Python regius; Python


**Keywords:** Dose-Response Relationship, Drug; injection site; Injections, Intramuscular/veterinary; *Boidae: alfaxalone; snake; reptile; Anesthesia/methods/*veterinary; Anesthetics/*administration & dosage/pharmacology; Pregnanediones/*administration & dosage/pharmacology; gamma-aminobutyric acid-(A) agonist; injectable anaesthesia

**Keywords:** Immobilization; animal experiment; animal tissue; article; controlled study; ketamine; liver; Animalia; species difference; spleen; gastrointestinal disease; isoflurane; colon; anesthesia; medetomidine; oxygen; trachea; respiratory function; pneumonia; clinical feature; stomach; lung disease; assisted ventilation; snake; bronchoscopy; Boa constrictor; Pythonidae; Serpentes; air sac; drug dose regimen; gallbladder; gastrointestinal endoscopy; pancreas; *Phyton molurus bivittatus*; *Phyton regius*; *Python molurus*; *Python molurus bivittatus*; *Python regius*; stomatitis; tracheitis; zolletil


**Keywords:** Isoflurane; Anaesthesia; Fracture immobilization; Wolf snake

Karklus, A. A., Sladky, K. K., & Johnson, S. M. (2021). Respiratory and antinociceptive effects of dexmedetomidine and doxapram in ball pythons (*Python regius*). *American Journal of Veterinary Research, 82*(1), 11–21. [https://doi.org/10.2460/ajvr.82.1.11](https://doi.org/10.2460/ajvr.82.1.11)

**Keywords:** Respiration; *Boidae; *Dexmedetomidine/pharmacology; Analgesics/pharmacology; Doxapram/pharmacology


**Keywords:** Administration, Cutaneous; RNA, Messenger/metabolism; Respiration/drug effects; Analgesics, Opioid/*pharmacology; Turtles; *Boidae; Brain/*drug effects/metabolism; Fentanyl/blood/*pharmacology; Receptors, Opioid, mu/metabolism


**Keywords:** Cross-Over Studies; pharmacodynamics; sedation; *Boidae; Midazolam/administration & dosage/*pharmacology; Flumazenil/administration & dosage/*pharmacology; GABA Modulators/administration & dosage/*pharmacology;
Hypnotics and Sedatives/administration & dosage/*pharmacology; Muscle relaxation; paradoxical excitation; reptiles; snakes


Keywords: Injections, Intramuscular; midazolam; Area Under Curve; pharmacokinetics; benzodiazepine; Hypnotics and Sedatives; Half-Life; ball python; Boidae/*blood; Central Venous Catheters/veterinary; Midazolam/*analogs & derivatives/blood/metabolism/*pharmacokinetics; reptile; sedative


Keywords: Cross-Over Studies; Dose-Response Relationship, Drug; Drug Interactions; inhalation anesthesia; snake; reptile; sedative; Anesthetics, Inhalation/administration & dosage/*pharmacokinetics/pharmacology; blood gas; Boidae/*physiology; Hypnotics and Sedatives/administration & dosage/*pharmacokinetics/pharmacology; Isoflurane/administration & dosage/*pharmacokinetics/pharmacology; Midazolam/administration & dosage/*pharmacokinetics/pharmacology; minimum alveolar concentration; Nitrous Oxide/administration & dosage/*pharmacokinetics/pharmacology


Keywords: Electrocardiography; *Boidae/physiology; Atropine/pharmacology; *Autonomic nervous system; *Benzodiazepine; *Heart rate; *Midazolam; *Python molurus; Autonomic Nervous System/*drug effects/physiology; Bradycardia/chemically induced/physiopathology; Cardiovascular Agents/*pharmacology; GABA Modulators/pharmacology; Heart Rate/*drug effects/physiology; Heart/drug effects/physiology; Hypnotics and Sedatives/pharmacology; Midazolam/*pharmacology; Propranolol/pharmacology


https://doi.org/10.1371/journal.pone.0199339

**Keywords:** Injections, Intramuscular; Heart Rate/drug effects; Drug Administration Schedule; Drug Combinations; Respiration/drug effects; *Boidae; Midazolam/administration & dosage/*pharmacology; Immobilization/methods/*veterinary; Anesthetics, Dissociative/administration & dosage/pharmacology; Tiletamine/administration & dosage/*pharmacology; Zolazepam/administration & dosage/*pharmacology


**Keywords:** Article; animal behavior; animal housing; blood sampling; feces analysis; veterinary medicine; animal food; Animalia; species difference; animal husbandry; environmental temperature; humidity; anesthesia; obesity; animal care; dietary intake; illumination; urinalysis; blood cell count; feeding behavior; eating habit; gastrointestinal motility; anorexia; carnivore; snake; sex determination; Serpentes


**Keywords:** Chemotherapy; nociception; analgesia; anesthetics; pain killers; pet animals; exotic organisms; exotic species; introduced organisms; non-indigenous organisms; non-indigenous species; non-native organisms; non-native species; nonindigenous organisms; nonindigenous species; LL860; LL882; Non-Communicable Diseases and Injuries of Animals; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; NSAIDS; reptiles; snakes; exotics; pain management


**Keywords:** Anesthesia; Indian rat snakes; Isoflurane; *Ptyas mucosa*; snakes

Keywords: Chemotherapy; anesthesia; anesthetics; drug action; mechanism of drug action; pain killers; LL860; LL882; Non-Communicable Diseases and Injuries of Animals; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; reptiles; snakes


Keywords: Anesthesia; Methohexital sodium; recovery time; snakes


Keywords: Animal experiment; animal model; Article; controlled study; prospective study; randomized controlled trial; drug efficacy; heart rate; animals; veterinary medicine; monitoring; light dark cycle; analgesia; anesthesia; anesthetics; drug action; mechanism of drug action; pain killers; sedation; methods; drug screening; injection site; intubation; pets; tail; breathing rate; drug megadose; righting reflex; corn; physical examination; needlestick injury; standard deviation; cross-sectional study; freeze thawing; tongue; LL882; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; comparative effectiveness; alfaxalone; snake; reptiles; snakes; corn snake; escape behavior; mechanical stimulus test; *Pantherophis guttatus*; phase 2 clinical trial; tail length (animal); Colubridae; *Pantherophis*; respiratory rate


Keywords: Anesthesia; measurement; snakes


Keywords: Article; controlled study; clinical article; animals; drug effect; anesthesia; Anesthetics; anesthetic agent; Reflex, Righting; righting reflex; stimulus response; tactile stimulation; LL882; Veterinary Pharmacology and Anaesthesiology; alfaxalone; snake; Pregnanediones; reptiles; snakes; Colubridae; pregnanedione; *Thamnophis sirtalis*; *Thamnophis*

**Keywords:** Species Specificity; Phylogeny; Drug Resistance; Acetaminophen; Toxicity; Biotransformation; Mammalia; Toxicokinetics; *Phylogeny; Databases, Genetic; Acetaminophen/adverse effects/*metabolism/toxicity; Acetyltransferases/genetics/metabolism; Agkistrodon/genetics/physiology; Analgesics, Non-Narcotic/adverse effects/metabolism; Boidae/genetics/physiology; Colubridae/genetics/physiology; Crotalus/genetics/physiology; Environmental Pollutants/*metabolism/toxicity; Glucuronosyltransferase/genetics/metabolism; Glutathione Transferase/genetics/metabolism; Isoenzymes/genetics/metabolism; Liver/*enzymology; N-acetyltransferase; Reptilia; Reptilian Proteins/genetics/*metabolism; Snake; Snakes/genetics/*physiology; Sulfotransferases/genetics/metabolism; UDP-glucuronosyltransferase


**Keywords:** Article; feces analysis; intestine mucosa; anesthesia; peritonitis; suturing method; recumbency; echography; radiography; anesthetic recovery; snake; aspiration cytology; colon intussusception; ileostomy; intestine surgery; mesentery; *Pituophis melanoleucus*; wound dehiscence


**Keywords:** Cross-Over Studies; Prospective Studies; Random Allocation; Boidae/*physiology; Anesthesia/methods/*veterinary; Anesthetics/*administration & dosage/pharmacology; Injections, Subcutaneous/methods/veterinary; Pregnanediones/*administration & dosage/pharmacology


**Keywords:** Cross-Over Studies; Dexmedetomidine; *Boidae/physiology; Conscious Sedation/methods/*veterinary; Hypnotics and Sedatives/*administration & dosage; Midazolam; Pregnanediones
Toads

13 citations

Cane or Giant marine toad (*Bufo marinus*)


**Keywords:** Prospective Studies; Pilot Projects; controlled study; animal; procedures; prospective study; comparative study; pilot study; randomized controlled trial; veterinary; anesthesia; Alfaxalone; dexmedetomidine; anesthetic agent; Anesthesia; Anaesthesia; Dexmedetomidine; alfaxalone; Pregnanediones; Anura; Anesthetics, Combined; pregnanedione; Immersion technique; Toads


**Keywords:** Physiology; procedures; adverse effects; Dose-Response Relationship, Drug; dose response; nociception; anaesthesia; anesthesia; immersion; Anesthetics; anesthetic agent; Anesthesia; etomidate; Immersion; Anura; Etomidate; immersion technique; toads


**Keywords:** Stress; Ketamine; Anaesthesia; *Syzygium aromaticum*; Anura; MS222; *Bufo marinus*; Cane toads; Clove-oil


**Keywords:** Anesthesia; Amphibia; LL860; LL882; Non-Communicable Diseases and Injuries of Animals; Veterinary Pharmacology and Anaesthesiology; Animal Health and Hygiene (General); LL800; reptiles


**Keywords:** Amphibians; anesthesia; *Bufo marinus*; cane toads; post-surgical recovery


**Keywords:** Amphibians; anesthesia; Flunixin meglumine; Marine toads; *Rhinella marina*


**Keywords:** Time Factors; animal experiment; article; Administration, Topical; motor activity; Air; sevoflurane; Anesthetics; recumbency; Reflex, Righting; righting reflex; anesthetic recovery; Anura; *Bufo marinus*; Dosage Forms; Methyl Ethers


Keywords: Pilot Projects; Time Factors; ketamine; Dose-Response Relationship, Drug; Sex Factors; Injections, Intramuscular; diazepam; Anesthetics; Anesthesia Recovery Period; Testudines; LL882; Veterinary Pharmacology and Anaesthesiology; Physiology and Biochemistry (Wild Animals); YY400; Turtles; Aquaculture (Animals); Aquatic Biology and Ecology; MM120; MM300; Anesthetics/administration & dosage/pharmacology; reptiles; Acepromazine/*administration & dosage/pharmacology; Diazepam/*administration & dosage/pharmacology; Ketamine/*administration & dosage/pharmacology; Mauremys caspica; Xylazine/*administration & dosage/pharmacology; turtles; Geoemydidae; Mauremys

**Keywords:** Cheloniidae; Testudines; Biological Resources (Animal); PP710; LL882; Veterinary Pharmacology and Anaesthesiology; LL080; Zoo Animals; Testudinidae; reptiles; Chelonia; tortoises; *Testudo; Testudo graeca*


**Keywords:** Testudines; LL860; LL882; Non-Communicable Diseases and Injuries of Animals; Veterinary Pharmacology and Anaesthesiology; Diagnosis of Animal Diseases; LL886; Animal Surgery and Non-drug Therapy; LL884; Testudinidae; reptiles; tortoises; *Testudo; Testudo horsfieldii*


**Keywords:** Analgesia; oral administration route; Red-eared slide turtles; reptiles; subcutaneous administration route; Tramadol


**Keywords:** Cross-Over Studies; resuscitation; Article; animal; physiology; crossover procedure; animals; Random Allocation; randomization; Isoflurane; isoflurane; vein puncture; Anesthesia; Anesthetics, Inhalation; inhalation anesthetic agent; echocardiography; recovery; Anesthesia Recovery Period; anesthetic recovery; Recovery; Cheloniidae; Testudines; turtle; LL882; Veterinary Pharmacology and Anaesthesiology; Turtles; Aquatic Biology and Ecology; MM300; *Caretta caretta*; Turtles/*physiology; alfaxalone; Pregnanediones; reptiles; Anesthetics, Inhalation/administration & dosage/*pharmacology; epinephrine; Epinephrine/administration & dosage/*pharmacology; inhalant; Isoflurane/administration & dosage/*pharmacology; Pregnanediones/administration & dosage/pharmacology; sea turtle; Sympathomimetics/administration & dosage/*pharmacology; pregnanedione; adrenergic receptor stimulating agent; cervicobrachial neuralgia; Epinephrine; gas analysis; heart septum defect; Inhalant; Sea turtle; Sympathomimetics; turtles

Keywords: Anesthesia; reptiles; tortoises; turtles


Keywords: Developing Countries; America; Latin America; Threshold Countries; South America; Community of Portuguese Language Countries; Testudines; LL882; Veterinary Pharmacology and Anaesthesiology; reptiles; turtles; Chelidae; Phrynops; Phrynops geoffroanus


Keywords: Anesthesia; fluid therapy; intraosseous administration route; reptiles; tortoises


Keywords: Animal experiment; priority journal; Article; controlled study; procedures; metabolism; Developed Countries; OECD Countries; America; blood; blood sampling; veterinary medicine; APEC countries; Injections, Intramuscular; intramuscular drug administration; analgesia; analgesic agent; Analgesics; Analgesia; single drug dose; Pharmacology; North America; USA; high performance liquid chromatography; Chromatography, High Pressure Liquid; pharmacokinetics; drug half life; ketorolac; Kеторолаци; half life time; Half-Life; Injections, Intramuscular/veterinary; Testudines; turtle; volume of distribution; Techniques and Methodology; ZZ900; LL860; LL882; Non-Communicable Diseases and Injuries of Animals; Veterinary Pharmacology and Anaesthesiology; Southern States of USA; Animal Physiology and Biochemistry (Excluding Nutrition); LL600; Appalachian States of USA; HH000; Pathogen, Pest, Parasite and Weed Management (General); VV730; Turtles; South Atlantic States of USA; Turtles/blood/*metabolism; Analgesics/administration & dosage/blood/*pharmacokinetics; reptiles; Analgesia/methods/veterinary; Chromatography, High Pressure Liquid/veterinary; Kеторолаци/administration & dosage/blood/*pharmacokinetics; Terrapene carolina carolina; triceps brachii muscle; Terrapene; turtles; Emydidae; Terrapene carolina

Keywords: Animal experiment; Article; controlled study; ketamine; comparative study; heart rate; Developed Countries; OECD Countries; America; veterinary medicine; APEC countries; anesthesia; anesthetics; morphine; dexametomidine; North America; USA; clinical protocol; United States of America; acupuncure; Anesthesia, Inhalation; inhalation anesthesia; Anesthetics, Inhalation; inhalation anesthetic agent; motor performance; abscess; atipamezole; Anesthesia Recovery Period; North Carolina; anesthetic recovery; Cheloniidae; Testudines; turtle; electrostimulation; LL882; Veterinary Pharmacology and Anaesthesiology; Non-drug Therapy and Prophylaxis of Humans; VV710; Southern States of USA; Appalachian States of USA; LL822; Protozoan, Helminth, Mollusc and Arthropod Parasites of Animals; Turtles; Anesthetics, Inhalation/administration & dosage; limb movement; South Atlantic States of USA; reptiles; Anesthesia, Inhalation/veterinary; *Acupuncture; *Acupuncture Points; *anesthesia; *Anesthesia Recovery Period; *eastern box turtle; *GV-1; *GV-26; *Turtles; Abscess/veterinary; Electroacupuncture/veterinary; eastern box turtle; Doppler flowmetry; Terrapene carolina carolina; Abscess; Acupuncture; acupuncture point; Acupuncture Points; aural abscess; electroacupuncture; Electroacupuncture; governing vessel 1; governing vessel 26; governor vessel; GV-1; GV-26; Terrapene; turtles; injectable anesthetics; Emydidae; terrapins; Terrapene carolina


Keywords: Animal experiment; article; surgical technique; ketamine; drug efficacy; anesthesia induction; anesthesia; medetomidine; sevoflurane; hemodynamics; drug safety; clinical protocol; atipamezole; Cheloniidae; Testudines; turtle; Caretta caretta; anesthesiological techniques


Keywords: Parasitosis; parasitic diseases; parasitic infestations; dermatoses; aquatic species; anesthesia; surgical techniques; trauma; therapeutics; livestock husbandry; orthopedics; diarrhea; ulceration; Testudines; dyspnea; Biological Resources (Animal); PP710; LL860; Non-Communicable Diseases and Injuries of Animals; LL823; Veterinary Pests, Vectors and Intermediate Hosts; LL821; Prion, Viral, Bacterial and Fungal Pathogens of Animals; Diagnosis of Animal Diseases; LL886; LL822; Protozoan, Helminth, Mollusc and Arthropod Parasites of Animals; scouring; Aquatic Biology and Ecology; MM300; Animal Surgery and Non-drug Therapy; LL884; reptiles; turtles; tortoises; Chelidae; fresh water animals; fresh-water animals; glue ear; inappetence; lipins

**Keywords:** Article; controlled study; metabolism; randomized controlled trial; blood; veterinary medicine; Injections, Intramuscular; intramuscular drug administration; sensitivity and specificity; analgesic agent; Analgesics; single drug dose; Injections, Intravenous; intravenous drug administration; high performance liquid chromatography; elimination half-life; pharmacokinetics; limit of quantitation; validation process; drug bioavailability; bioavailability; drug absorption; drug half life; mean residence time; limit of detection; measurement accuracy; Injections, Intramuscular/veterinary; water quality; turtle; pharmacokinetic parameters; signal noise ratio; Turtles; tolfenamic acid; Turtles/*metabolism; Analgesics/blood/*pharmacokinetics; Injections, Intravenous/veterinary; ortho-Aminobenzoates/blood/*pharmacokinetics; red-eared slider turtles; anthranilic acid derivative; ortho-Aminobenzoates; mean absorption time; tolfine; *Trachemys scripta elegans*


**Keywords:** Animal experiment; animal model; article; treatment outcome; controlled study; oxygen therapy; ketamine; prospective study; heart rate; veterinary medicine; drug effect; body temperature; carbon dioxide; anesthesia; medetomidine; oxygen; hypotension; jugular vein; carotid artery; diastolic blood pressure; mean arterial pressure; systolic blood pressure; arterial pressure; atipamezole; anesthetic recovery; Testudines; turtle; assisted ventilation; hypoxemia; diagnostic procedure; Testudinidae; blood oxygen tension; *Gopherus*; blood pH; blood carbon dioxide tension; blood vessel catheterization; cardiopulmonary insufficiency; hypercapnia; hypoventilation


**Keywords:** Pesticides and Drugs; Control; viruses; DNA Viruses; dsDNA Viruses; Cheloniidae; Testudines; Techniques and Methodology; ZZ900; HH405; Prion, Viral, Bacterial and Fungal Pathogens of Humans; VV210; Human Physiology and Biochemistry; VV050; Aquatic Biology and Ecology; MM300; Animal Surgery and Non-drug Therapy; LL884; *Chelonia mydas*; reptiles; *Chelonia*; turtles; Aquatic Sciences (General); MM000; Papillomaviridae


**Keywords:** Article; inguinal region;; behavior; Developing Countries; America; Latin America; Threshold Countries; veterinary medicine; hindlimb; Brazil; South America; lidocaine; Lidocaine; Anesthetics, Local/*administration & dosage; convalescence; Community of Portuguese Language Countries; Anesthetics, Local; local anesthetic agent; sensory nerve; Animals, Wild; wild animal; veterinary surgery; nerve block; forelimb; Cheloniidae; Testudines; turtle; case report; Skin Neoplasms; skin tumor; Biological Resources (Animal); Other Wildlife Diseases; PP710; YY800; LL882; Veterinary Pharmacology and Anaesthesiology; Diagnosis of Animal Diseases; LL886; Turtles; Aquatic Biology and Ecology; MM300; Animal Surgery and Non-drug Therapy; LL884; limb movement; Anesthesia, Spinal/*veterinary; Animals, Wild/surgery; Chelonia mydas; fibropapillomatosis; green turtle; Lidocaine/*administration & dosage; Papilloma/surgery/*veterinary; Skin Neoplasms/surgery/*veterinary; spinal anesthesia;
Turtles/*surgery; reptiles; *Chelonia; Anesthesia, Spinal; carapace; fibroma; habitat; head movement; motor nerve; nerve fiber; papilloma; Papilloma; skin papilloma; turtles


**Keywords:** Anesthesia; opioids; pharmacokinetics/pharmacodynamics; red-eared slider turtles; reptiles; Tapentadol


**Keywords:** Intramuscular administration route; pharmacokinetics/pharmacodynamics; *Trachemys scripta*; Tramadol; yellow-bellied slider turtles


**Keywords:** Cross-Over Studies; controlled study; physiology; crossover procedure; randomized controlled trial; veterinary; Isoflurane; isoflurane; acupuncture; Anesthesia; Anesthesia, Inhalation; inhalation anesthesia; Anesthetics, Inhalation; inhalation anesthetic agent; Electric Stimulation; Anesthesia Recovery Period; anesthetic recovery; Testudines; turtle; electrostimulation; Techniques and Methodology; ZZ900; LL860; LL882; Non-Communicable Diseases and Injuries of Animals; Veterinary Pharmacology and Anaesthesiology; Animal Nutrition (General); LL500; Turtles; Farm and Horticultural Structures; NN300; reptiles; epinephrine; Acupuncture Points; GV-26; Epinephrine; *Chelydra serpentina*; common snapping turtle; recovery.; turtles; *Chelydra*; Chelydridae


**Keywords:** Anesthesia; Home’s hingeback tortoise; reptiles


**Keywords:** Article; ketamine; physiology; heart rate; Random Allocation; Dose-Response Relationship, Drug; animal disease; dose response; drug effect; randomization; Injections,
Intramuscular; intramuscular drug administration; analgesic agent; anesthesia; medetomidine; Analgesics, Non-Narcotic; Ketamine; anesthetic agent; Anesthesia; Anesthetics, Dissociative; Heart Rate; atipamezole; Muscle, Skeletal; skeletal muscle; endotracheal intubation; turtle; Turtles; Medetomidine; imidazole derivative; Imidazoles; Intubation, Intratracheal; Adrenergic alpha-Agonists; alpha adrenergic receptor stimulating agent


**Keywords:** Cross-Over Studies; Random Allocation; Electrocardiography; Magnetic Resonance Imaging; Heart/*physiology; Cheloniidae; Testudines; Techniques and Methodology; ZZ900; LL882; Veterinary Pharmacology and Anaesthesiology; Animal Physiology and Biochemistry (Excluding Nutrition); LL600; Diagnosis of Animal Diseases; LL886; reptiles; Anesthesia, Inhalation/*veterinary; *Turtles; Adjuvants, Anesthesia/administration & dosage; Anesthetics, Inhalation/*administration & dosage/blood; Atropine/administration & dosage; Isoflurane/*administration & dosage/blood; Pulmonary Artery/physiology; Pulmonary Circulation/physiology; tortoises


**Keywords:** Surgery; procedures; veterinary; Injections, Intramuscular; intramuscular drug administration; anesthesia; medetomidine; Alfaxalone; Anesthetics; anesthetic agent; Anesthesia; Anaesthesia; Hypnotics and Sedatives; turtle; Turtles; Chelonian; alfaxalone; Pregnanediones; Anesthetics, Combined; hypnotic sedative agent; Medetomidine; pregnanediolene; Tortoise; *Agrionemys horsfieldii*


**Keywords:** Anesthesia; restraint; reptiles; sea turtles


**Keywords:** Anesthesia; *Dermochelys coriacea*; field anesthesia; leatherback sea turtles; reptiles


**Keywords:** Article; ketamine; physiology; clinical trial; Environment; animal disease; Drug Therapy, Combination; environment; anesthesia; midazolam; sedation; dexmedetomidine; Ketamine; Anesthetics; anesthetic agent; Anesthesia; drug combination; Hypnotics and Sedatives; Evoked Potentials, Auditory; Dexmedetomidine; turtle; Turtles; Midazolam; hypnotic sedative agent; auditory evoked potential; *Dermochelys coriacea*; evoked auditory response; leatherback sea turtle

Loggerhead sea turtles (*Caretta caretta*)


**Keywords:** Medicine; veterinary medicine; gastrointestinal system; hematology; analgesia; ketoprofen; analgesics; wildlife; risk; pharmacokinetics; Drug Administration Schedule; chemical species; blood platelets; musculoskeletal system; zoos; *Caretta caretta*; Anti-Inflammatory Agents, Non-Steroidal/administration & dosage/adverse effects/*therapeutic use; Ketoprofen/administration & dosage/adverse effects/*therapeutic use; Thrombelastography; Turtles/*blood; kidneys

Keywords: Cross-Over Studies; animal experiment; nonhuman; Article; controlled study; animal; metabolism; crossover procedure; Random Allocation; veterinary medicine; randomization; plasma (blood); analgesia; anesthesia; Anesthesia/*veterinary; pain killers; sedation; Injections, Subcutaneous; lizard; solid phase extraction; Pharmacology; high performance liquid chromatography; area under the curve; maximum plasma concentration; time to maximum plasma concentration; antinociception; subcutaneous drug administration; Analgesics, Opioid; narcotic analgesic agent; mean residence time; Anesthesia; Lizards; half life time; Half-Life; Hydromorphone/administration & dosage; hydromorphone; maximum concentration; Testudines; turtle; quadrupole mass spectrometry; pharmacokinetic parameters; LL882; Veterinary Pharmacology and Anaesthesiology; Physiology and Biochemistry (Wild Animals); YY400; VV730; Turtles; Animal Health and Hygiene (General); LL800; Trachemys scripta; Turtles/*metabolism; reptiles; reptile; Analgesics, Opioid/*pharmacokinetics; bearded dragon; Hydromorphone/administration & dosage/*pharmacokinetics; Lizards/*metabolism; opioid; red-eared slider; lizards; lethargy; Pogona vitticeps; Trachemys scripta elegans; elimination rate constant; Hydromorphone; Trachemys; Sauria; turtles; Agamidae; Emydidae; Pogona; terrapins; Hydromorphone/*pharmacokinetics


Keywords: Article; male; methodology; Random Allocation; animal disease; Animalia; randomization; postoperative complication; Postoperative Complications; local anesthesia; Anesthesia, General; general anesthesia; Anesthesia Recovery Period; laparoscopy; anesthetic recovery; Testudines; turtle; Sex Determination (Analysis); Turtles; sex determination; Anesthesia, Local; Cuora flavomarginata; Laparoscopy; Murraya exotica; Terrapene


Keywords: Surgery; cattle; medicine; inflammation; histology; models; anesthesia; collagen; turtle; carapace; Trachemys scripta elegans; turtles; bone morphogenetic protein; bone morphogenetic proteins; granulation tissue; osteonecrosis

Keywords: Analgesia; opioids; reptiles; respiration; turtles


Keywords: Prospective Studies; Treatment Outcome; Time Factors; animal experiment; article; ketamine; prospective study; Dose-Response Relationship, Drug; dose response; Injections, Intramuscular; anesthesia induction; medetomidine; propofol; Safety; Immobilization; Animals, Wild; Heart Rate; atipamezole; endotracheal intubation; Neuromuscular Blockade; neuromuscular blocking; neuromuscular blocking agent; Neuromuscular Nondepolarizing Agents; Testudines; turtle; Turtles; Blinking; tiletamine; Terrapene; suxamethonium; zolazepam; Androstanols; atracurium; gallamine; glycopyrronium bromide; heart arrhythmia; Intubation, Intratracheal; neostigmine; pancuronium; rocuronium; *Terrapene carolina major*


Keywords: Animal Welfare; Cold Temperature; Euthanasia, Animal; *Animal welfare; Turtles/*physiology; *MS222; Hypothermia, Induced/*veterinary; Anesthesia/methods/*veterinary; *Anesthesia; *AVMA guidelines; *Reflex pathways; *Reptiles


Keywords: United States; death; article; surgical technique; treatment outcome; autopsy; postoperative care; clinical examination; general anesthesia; vision; visual system examination; cataract; Testudines; turtle; *Caretta caretta*; ophthalmoscopy; biomicroscopy; cachexia; dying; phacoemulsification; slit lamp


Keywords: Asia; Commonwealth of Nations; Developing Countries; South Asia; anesthesia; Testudines; invasive organisms; invasives; LL860; Non-Communicable Diseases and Injuries of Animals; Animal Surgery and Non-drug Therapy; LL884; reptiles; esophagus; *Lissemys*; *Lissemys punctata*; Trionychidae; turtles


**Keywords:** Testudines; LL882; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; Non-drug Therapy and Prophylaxis of Humans; VV710; Animal Nutrition (General); LL500; CC700; Professions: Practice and Service; Animal Health and Hygiene (General); LL800; *Trachemys scripta*; reptiles; Trachemys; turtles; Emydidae


**Keywords:** Treatment Outcome; article; treatment outcome; ketamine; physiology; methodology; animal disease; medetomidine; Ketamine; hybridization; Hybridization, Genetic; environmental protection; anesthetic agent; Anesthetics, Dissociative; ovariectomy; Ovariectomy; Hypnotics and Sedatives; Conservation of Natural Resources; turtle; Turtles; Testudinidae; hypnotic sedative agent; Medetomidine; *Geochelone nigra*; Extinction, Biological; species extinction

Knotek, Z. (2014). Alfaxalone as an induction agent for anaesthesia in terrapins and tortoises. *Veterinary Record*, 175(13), 327. Scopus. [https://doi.org/10.1136/vr.102486](https://doi.org/10.1136/vr.102486)

**Keywords:** Treatment Outcome; procedures; veterinary; Anesthetics; anesthetic agent; Anesthesia; turtle; Turtles; alfaxalone; Pregnanediones; pregnanedione; Preanesthetic Medication; premedication


**Keywords:** Aquatic species; plasma (blood); adverse reactions; meloxicam; pain killers; Pharmacology; Cheloniidae; Testudines; LL882; Veterinary Pharmacology and Anaesthesiology; Pathogens, Parasites and Infectious Diseases (Wild Animals); Physiology and Biochemistry (Wild Animals); YY000; YY400; YY700; Zoology of Wild Animals (Vertebrates and Invertebrates) (General); VV730; medicines; pharmaceuticals;Aquatic Biology and Ecology; MM300; NSAIDS; *Caretta caretta*; marine species; reptiles; Caretta; turtles; antiinflammatory drugs; Toxicology and Poisoning (Wild Animals); YY900


Galapagos tortoise (*Geochelone nigra*)


Keywords: Animal experiment; animal model; animal tissue; Article; controlled study; sodium chloride; animal behavior; hindlimb; calcium; nociception; neuropathic pain; alcohol; analgesic agent; sample size; formaldehyde; animal care; hyperalgesia; vocalization; formalin test; drug dose comparison; defecation; micturition; amitriptyline; Testudines; LL882; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; capsaicin; hot plate test; Testudinidae; *amitryptyline hydrochloride; *antinociception; *capsaicin test; *formalin test; *hot plate test; *hyperalgesia; reptiles; tortoise; amitriptyline hydrochloride; capsaicin test; colecalciferol; hindlimb withdrawal; nociceptive behavior; paw withdrawal threshold; speke hinge back tortoise; stopwatch; *Kinixys; *Kinixys spekii; tortoises


Keywords: Testudines; Techniques and Methodology; ZZ900; LL882; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; reptiles; turtles; tortoises

**Keywords:** Cross-Over Studies; Time Factors; time; article; controlled study; crossover procedure; randomized controlled trial; clinical trial; Dose-Response Relationship, Drug; animal disease; dose response; Hot Temperature; heat; controlled clinical trial; pain; buprenorphine; Pain; Buprenorphine; Analgesia; Antinociception; hydromorphone; turtle; Turtles; *Trachemys scripta elegans*; Hydromorphone; Red-eared-slider turtle


**Keywords:** Anesthesia; anesthetics; pet animals; Testudines; zoonotic infections; exotic organisms; exotic species; introduced organisms; non-indigenous organisms; non-indigenous species; non-native organisms; non-native species; nonindigenous organisms; nonindigenous species; LL860; LL882; Non-Communicable Diseases and Injuries of Animals; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; Animal Reproduction and Embryology; LL250; Animal Behaviour; LL300; LL821; causal agents; etiology; LL500; Aquaculture (Animals); MM120; Animal Anatomy and Morphology; LL400; reptiles; Trionychidae; turtles; *Apalone; Apalone spinifera*


**Keywords:** Anesthesia; analgesia; euthanasia; reptiles; tortoises; turtles


**Keywords:** Pesticides and Drugs; feces; Control; chemotherapy; anesthesia; mercy killing; intubation; Testudines; rehydration therapy; LL860; LL882; Non-Communicable Diseases and Injuries of Animals; Veterinary Pharmacology and Anaesthesiology; HH405; LL821; Prion, Viral, Bacterial and Fungal Pathogens of Animals; Diagnosis of Animal Diseases; LL886; LL822; Protozoan, Helminth, Mollusc and Arthropod Parasites of Animals; Animal Genetics and Breeding; LL240; Animal Surgery and Non-drug Therapy; LL884; reptiles; turtles; tortoises; inappetence


**Keywords:** Anesthesia; biological samples; Gopher tortoises; protocols; reptiles; safety

Keywords: Dissection; cadaver; analgesia; anesthesia; brachial plexus; local anesthesia; nerve tissue; plexus; brachial plexus block; eastern box turtle; methylene blue; Terrapene carolina; aqueous solutions; freeze-thaw cycles


Keywords: Treatment Outcome; Hemodynamics; treatment outcome; computer assisted tomography; animal; ketamine; heart rate; veterinary medicine; drug effect; morphine; propofol; hemodynamics; dexmedetomidine; tidal volume; Letter; Anesthesia, General; general anesthesia; artificial ventilation; Doppler ultrasonography; end tidal carbon dioxide tension; Hemodynamics/*drug effects; turtle; case report; Turtles; Respiration, Artificial; Turtles/*surgery; sea turtle; Anesthesia, General/adverse effects/*veterinary; Intestinal Obstruction/surgery/*veterinary; Respiration, Artificial/adverse effects/*veterinary; anaestamine; colonoscopy; desflurane; Intestinal Obstruction; intestine obstruction; morphine sulfate; propoflo plus


Keywords: Animal experiment; article; treatment outcome; ketamine; Animalia; anesthesia induction; fish; Testudines; turtle; foreign body; mouth cavity


Keywords: Pilot Projects; Species Specificity; meloxicam; anesthesia; anesthetics; drug action; mechanism of drug action; Area Under Curve; Injections, Subcutaneous/veterinary; Half-Life; Cheloniidae; Lepidochelys; Lepidochelys kempii; Testudines; LL882; Veterinary Pharmacology and Anaesthesiology; Aquatic Biology and Ecology; MM300; Caretta caretta; Anti-Inflammatory Agents, Non-Steroidal/admistration & dosage/blood/*pharmacokinetics; Meloxicam/admistration & dosage/blood/*pharmacokinetics; Turtles/blood/*metabolism; Chelonia mydas; reptiles; Chelonia; Caretta; turtles

**Keywords:** Cross-Over Studies; statistics; crossover procedure; clinical trial; blood; aquatic species; plasma (blood); adverse reactions; pain; Analgesia; pain killers; Statistics as Topic; tramadol; analogs and derivatives; Pharmacology; Analgesics, Opioid; narcotic analgesic agent; half life time; Half-Life; Cheloniidae; Testudines; turtle; LL882; Veterinary Pharmacology and Anaesthesiology; Animal Physiology and Biochemistry (Excluding Nutrition); LL600; VV730; Turtles; Aquatic Biology and Ecology; MM300; *Caretta caretta*; marine species; reptiles; opioid; Tramadol; *Caretta*; O-demethyltramadol; turtles


**Keywords:** Anesthesia; sperm; Testudines; Techniques and Methodology; ZZ900; Meat Produce; QQ030; reptiles; turtles; testicles


**Keywords:** Anesthetics; Lidocaine hydrochloride-sodium bicarbonate; Pelodiscus sinensis; reptiles; soft-shelled turtle


**Keywords:** Cross-Over Studies; Treatment Outcome; controlled study; physiology; crossover procedure; randomized controlled trial; heart rate; Dose-Response Relationship, Drug; drug effects; dose response; Heart Rate/drug effects; Anesthetics, Intravenous; intravenous anesthetic agent; Animals, Wild; wild animal; Heart Rate; Wild/physiology; turtle; Turtles; Turtles/*physiology; alfaxalone; Pregnanediones; Pregnanediones/administration & dosage/*pharmacology; Anesthetics, Intravenous/administration & dosage/*pharmacology; pregnanedione

Keywords: Developed Countries; Europe; European Union Countries; Mediterranean Region; OECD Countries; Italy; Southern Europe; Cheloniidae; Testudines; Biological Resources (Animal); Other Wildlife Diseases; PP710; YY800; LL882; Veterinary Pharmacology and Anaesthesiology; Diagnosis of Animal Diseases; LL886; Aquatic Biology and Ecology; MM300; Animal Surgery and Non-drug Therapy; LL884; Caretta caretta; reptiles; Caretta; turtles


Keywords: Animal tissue; surgical technique; Article; computer assisted tomography; male; ketamine; female; veterinary medicine; image analysis; propofol; Radiography; lung parenchyma; Anatomy; breathing rate; lower respiratory tract; palpation; radiography; veterinary clinic; anesthetic recovery; thorax radiography; auscultation; Respiratory system; tortoise; animal structures; bronchoscopy; Chelonians; Chelonoids carbonaria; Computed tomographic; epiglottis; Lower respiratory tract; lung volume; Red-foot tortoise; thyroid cartilage; Wildlife animals


Keywords: Anesthesia; Geoffroy’s side-necked turtle; Midazolam; Phrynops geoffroanus Schweigger; Propofol; Testudines; turtles


Keywords: Article; animal disease; propofol; Injections; Anesthetics, Intravenous; intravenous anesthetic agent; Fatal Outcome; Propofol; turtle; case report; Turtles; fatality; Gopherus; Gopherus polyphemus


Keywords: Animal experiment; priority journal; Article; controlled study; blood; blood sampling; Injections, Intramuscular; intramuscular drug administration; analgesic agent; Analgesics; blood analysis; Analgesics/administration & dosage; Area Under Curve; Injections, Intravenous; intravenous drug administration; mathematical model; area under
the curve; drug blood level; pharmacokinetics; validation process; drug bioavailability; drug elimination; drug half life; half life time; Half-Life; liquid chromatography-mass spectrometry; turtle; LC-MS/MS; pharmacokinetic parameters; Turtles; Turtles/*blood; Analgesics/administration & dosage/blood/*/pharmacokinetics; green sea turtles; ortho-Aminobenzoates/administration & dosage/blood/*/pharmacokinetics; tolfenamic acid; anthranilic acid derivative; Chelonia; drug binding; noncompartment model; ortho-Aminobenzoates; vetoquinol lure; Analgesics/*/pharmacokinetics; Analgesics/blood; ortho-Aminobenzoates/*/pharmacokinetics; ortho-Aminobenzoates/administration & dosage; ortho-Aminobenzoates/blood


Keywords: Reproducibility of Results; Random Allocation; Area Under Curve; Protein Binding; Biological Availability; pharmacokinetics; Thailand; Half-Life; Injections, Intramuscular/veterinary; Endangered Species; Anti-Inflammatory Agents, Non-Steroidal/administration & dosage/blood/*/pharmacokinetics; ortho-Aminobenzoates/administration & dosage/blood/*/pharmacokinetics; tolfenamic acid; Administration, Intravenous/veterinary; Chromatography, Liquid/veterinary; Hawksbill turtle; nonsteroidal anti-inflammatory drugs; Tandem Mass Spectrometry/veterinary; Turtles/*/metabolism


Keywords: Treatment Outcome; article; treatment outcome; physiology; lidocaine; Lidocaine; environmental protection; Anesthetics, Local; local anesthetic agent; Conservation of Natural Resources; turtle; Ecuador; Turtles; Testudinidae; Genitalia, Male; Geochelone nigra; male genital system


Keywords: Developed Countries; Europe; European Union Countries; OECD Countries; Western Europe; Commonwealth of Nations; Developing Countries; ACP Countries; Africa; Africa South of Sahara; Francophone Africa; UK; British Isles; Testudinidae; Biological Resources (Animal); PP710; LL882; Veterinary Pharmacology and Anaesthesiology; Animal Reproduction and Embryology; LL250; East Africa; Least

**Keywords:** Anesthesia; ether; West African hinge-backed tortoise; *Kinixys erosa*; tortoises; Thiopentone sodium


**Keywords:** Anesthesia; comparative study; Ketamine; Medetomidine; Propofol; red-eared slider turtles; reptiles; Sevoflurane; *Trachemys scripta elegans*; turtles


**Keywords:** Prospective Studies; Article; ketamine; prospective study; drug efficacy; heart rate; temperature; materials; potassium; blood sampling; hematocrit; veterinary medicine; Injections, Intramuscular; intramuscular drug administration; experimental design; calcium; biochemistry; anesthesia; Anesthesia/*veterinary; intramuscular injection; blood gases; medetomidine; glucose; tramadol; Ketamine; drug safety; biochemical analysis; carbon; breathing rate; anesthetic agent; Anesthesia; anesthesiological procedure; blood gas analysis; apnea; atipamezole; protocols; duration; Injections, Intramuscular/veterinary; eyelid reflex; water quality; drug administration route; chloride; urea nitrogen blood level; Cheloniidae; Testudines; turtle; hatchling; LL882; Veterinary Pharmacology and Anaesthesiology; water temperature; Turtles; Aquatic Biology and Ecology; MM300; bicarbonate blood level; *Chelonia mydas*; reptiles; Anesthetics, Combined; Medetomidine; *Chelonia*; anion gap; atipamezole; blood oxygen tension; green sea turtle; Tramadol; cloaca; turtles; Ketamine*; Tramadol*; Turtles*; respiratory rate; prospective studies; reflexes; depth of anesthesia


**Keywords:** Anesthesia; Turtles; Chelonians; Injectable anesthetic drugs; Physical restraint

Keywords: Anesthesia; red-eared slider turtles; reptiles; *Trachemys scripta*; turtles


Keywords: Cross-Over Studies; animal experiment; article; controlled study; male; female; sodium chloride; drug effect; Hot Temperature; hindlimb; withdrawal reflex; Sodium Chloride; antinociception; Analgesics, Opioid; stimulus response; Testudines; turtle; Turtles; *Trachemys scripta*; mu opiate receptor; Receptors, Opioid, mu; thermal stimulation; Nociceptors; 3,4 dichloro n methyl n [2 (1 pyrrolidinyl)cyclohexyl]benzeneacetamide; Benzeneacetamides; delta opiate receptor; Enkephalin, Ala(2)-MePhe(4)-Gly(5)-; Enkephalin, D-Penicillamine (2,5)-; Enkephalin, Leucine-2-Alanine; enkephalin[2 dextro alanine 4 methylphenylalanine 5 glycine]; enkephalin[2 dextro alanine 5 dextro leucine]; enkephalin[2,5 dextro penicillamine]; kappa opiate receptor; n methyl n [7 (1 pyrrolidinyl) 1 oxaspiro[4.5]dec 8 yl]benzeneacetamide; naltrindole; Pyrrolidines


Keywords: Developed Countries; Europe; European Union Countries; Mediterranean Region; OECD Countries; America; Pesticides and Drugs; Control; APEC countries; North America; USA; Italy; Southern Europe; Cheloniidae; Testudines; LL882; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; Gulf States of USA; Southern States of USA; HH405; LL821; Prion, Viral, Bacterial and Fungal Pathogens of Animals; East South Central States of USA; Animal Health and Hygiene (General); LL800; Animal Surgery and Non-drug Therapy; LL884; *Trachemys scripta*; South Atlantic States of USA; reptiles; Pseudemys; Trachemys; turtles; Emydidae; Delta States of USA; *Graptemys*; *Graptemys pseudogeographica*; *Pseudemys nelsoni*; Southeastern States of USA


Keywords: Testudines; LL860; LL882; Non-Communicable Diseases and Injuries of Animals; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; Animal Surgery and Non-drug Therapy; LL884; reptiles; turtles

Keywords: Anesthesia; female genital system; Testudines; LL882; Veterinary Pharmacology and Anaesthesiology; Animal Reproduction and Embryology; LL250; Nutrition Related Disorders and Therapeutic Nutrition; VV130; Testudinidae; reptiles; tortoises; inappetence; fallopian tube; salpinges; uterine tubes; Geochelone; Geochelone elegans


Keywords: Asia; Commonwealth of Nations; Developing Countries; India; South Asia; Uttaranchal; pain killers; clinical picture; Testudines; Biological Resources (Animal); Other Wildlife Diseases; PP710; YY800; Diagnosis of Animal Diseases; LL886; Animal Surgery and Non-drug Therapy; LL884; reptiles; turtles; Geoemydidae; Pangshura; Pangshura tentoria; Pangshura tentoria circumpatata; penile prolapse


Keywords: Ketoprofen; Pharmacology; pharmacokinetics; Injections, Intramuscular/veterinary; Cheloniidae; Testudines; LL882; Veterinary Pharmacology and Anaesthesiology; Human Physiology and Biochemistry; VV050; VV730; Aquatic Biology and Ecology; MM300; Caretta caretta; Turtles/*metabolism; reptiles; Injections, Intravenous/veterinary; Anti-Inflammatory Agents, Non-Steroidal/administration & dosage/*pharmacokinetics; Drug Administration Schedule/veterinary; Ketoprofen/administration & dosage/*pharmacokinetics; loggerhead; nonsteroidal anti-inflammatory; Caretta; turtles


Keywords: Testudines; LL882; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; reptiles; lizards; Sauria; turtles

Keywords: Developing Countries; America; Latin America; Threshold Countries; South America; anesthesia; anesthetics; clinical picture; surgical techniques; therapeutics; Testudines; LL860; LL882; Non-Communicable Diseases and Injuries of Animals; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; Diagnosis of Animal Diseases; LL886; Animal Surgery and Non-drug Therapy; LL884; Testudinidae; reptiles; tortoises; Chelonoidis; Chelonoidis chilensis

https://doi.org/10.2298/vetgl181208005v

Keywords: Anesthesia; Isoflurane; red-eared slider turtles; reptiles; Trachemys scripta elegans


Keywords: Surgery; Article; follow up; Asia; Commonwealth of Nations; Developing Countries; India; South Asia; anesthesia; clinical picture; general anesthesia; Eye; eyeball; abscess; pet animals; Testudines; Biological Resources (Animal); exotic organisms; exotic species; introduced organisms; non-indigenous organisms; non-indigenous species; non-native organisms; non-native species; nonindigenous organisms; nonindigenous species; PP710; LL860; Non-Communicable Diseases and Injuries of Animals; LL070; Pets and Companion Animals; Diagnosis of Animal Diseases; LL886; Animal Surgery and Non-drug Therapy; LL884; Testudinidae; recurrence of disease; relapses; reptiles; tortoise; Abscess; bulbar conjunctiva; eye swelling; Tortoise; tortoises; exotic pets; Geochelone; Geochelone elegans; Indian Punjab


Keywords: Anesthesia; anesthetics; drug action; mechanism of drug action; pain killers; high performance liquid chromatography; Testudines; LL882; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; Trachemys scripta; reptiles; tapentadol; Trachemys; turtles; Emydidae; Trachemys scripta scripta


Keywords: Fracture Fixation; article; fracture fixation; injury; fracture; Fractures, Bone; methodology; bone; animal disease; instrumentation; analgesia; Analgesia; Radiography;
Bone and Bones; radiography; Testudines; turtle; antibiotic prophylaxis; Turtles; Antibiotic Prophylaxis


Keywords: Physiology; Anatomy; Analgesic techniques; Chelonian species; Preanesthetic assessment


Keywords: Animal experiment; animal model; article; priority journal; controlled study; animal behavior; Dose-Response Relationship, Drug; drug effect; nociception; analgesia; pain; Pain; Pain Measurement; morphine; Vertebrata; formaldehyde; pethidine; Analgesics, Opioid; Morphine; naloxone; Narcotic Antagonists; defecation; micturition; turtle; Turtles; Testudinidae; Meperidine; Naloxone


Keywords: Surgery; animal experiment; animal model; animal tissue; Article; computer assisted tomography; controlled study; rehabilitation care; ketamine; clinical evaluation; antimicrobial therapy; cytology; phosphorus; calcium; anemia; meloxicam; single drug dose; histopathology; immunohistochemistry; sodium; sevoflurane; butorphanol; glucose; dexmedetomidine; tramadol; bladder; ampicillin; uric acid; immunoreactivity; biochemical analysis; echography;


Keywords: Anesthesia; local anesthesia; Cheloniidae; Testudines; LL860; LL882; Non-Communicable Diseases and Injuries of Animals; Veterinary Pharmacology and Anaesthesiology; sight; Caretta caretta; reptiles; Caretta; turtles; eye cornea


Keywords: Reptile; Blood gases; Cardiac output; Chelonian; CT scan; Lung function


Keywords: Sampling techniques; anesthetics; pet animals; Testudines; exotic organisms; exotic species; introduced organisms; non-indigenous organisms; non-indigenous species; non-native organisms; non-native species; nonindigenous organisms; nonindigenous species; LL882; Veterinary Pharmacology and Anaesthesiology; LL070; Pets and Companion Animals; Diagnosis of Animal Diseases; LL886; reptiles; turtles; tortoises

Indian star tortoise (Geochelone elegans)