Reptile anatomy:

I. Some general characteristics:

Are completely terrestrial (or can be).

Some species never go near the water

Found in almost all habitats (including marine) except areas with extreme cold.

Generally most diverse in warmer climates.

II. Integumentary system:

In general, this is much better than in amphibians

Have much more keratin in the skin

Although the basic organization of skin is the same, the epidermis (stratum corneum) is much thicker.

Same basic four layers as found in amphibians.

Scales develop from the epidermis and cover most or all of the body.

Some scales can be modified into structures such as scutes or shields, etc.

(Fish scales (and amphibian scales) are not epidermal)

Not all turtles have scales:

softshells, leatherback

*Dermatemys* has very thin scutes that can be easily lost.

(Central American River turtle)

Scales may be smooth, keeled (have a ridge), or beaded (in *Heloderma*)

Osteoderms

In crocodiles, turtles and some lizards.

Bony plates that lie in the dermis underneath the skin.

Most highly modified in turtles, where these osteoderms fuse to form the shell.

Not as many glands as in amphibians, but do have some:

musk glands:

secrete smelly substances, usually to repel predators

found in turtles (e.g., stinkpots (*Sternotherus odoratus*)), and a few snakes

in turtles generally found near the bridge (bone connecting carapace with plastron).

in snakes may be near the cloaca

also glands to produce pheromones:

sex attractants

location varies with the animal (see picture in text).

Color:

Essentially similar to amphibians

Ecdysis:

Under hormonal control

Lizards and snakes:

New skin grows at the surface of the germinative layer.

When it's almost ready, old skin starts to separate and is shed.

Lizards loose skin in large strips.

Will eat their skin (including parasites that are attached to skin).

Snakes (obviously) loose their skin in one large piece.

Crocodiles:

Skin is shed in pieces (a bit here, a bit there) as scales grow.

Turtles:

Scutes may be shed or kept.

In species where scutes are kept, older scutes often form a pyramid type stack on top of the newest (and largest) scute.

III. Skeletal system:

Skeleton is considerably more ossified than in amphibians.

Skull is generally bone, but parts of the septa in the nasal passages and between the eyes remain cartilage.

Skull

Three main skull types:

Anapsid, synapsid, diapsid (see notes on origin)

skull can be further subdivided based on these three basic types.

Skull articulates with the vertebral column using only a single occipital condyle.

Lower jaw:

Dentary attached to upper jaw via quadrate bone. Can be of two types);

1) solid (turtles, crocs)

2) loosely attached or separated - lizards and snakes

(snakes can obviously separate jaw from cranium to swallow large prey).

Upper jaw is fused to rest of skull.

Teeth found only on dentary, maxilla and premaxilla (mandible).

Occasionally also on palatine and/or pterygoid (some lizards).

Turtles don't have teeth (though they may have a serrated jaw).

Vertebral column

Axis is found in reptiles - allows for head rotation

(Neck is much better developed)

Atlas articulates with skull (through the single occipital condyle)

Same basic types of vertebrae found in reptiles (amphicoelus, opistocoelus, procoelus) and are again diagnostic for classification.

Ribs connect to sternum except in snakes (which have lost the sternum).

In turtles, the plastron develops from the sternum (the carapace develops from the vertebral column and the dorsal side of the ribs).

Reptiles have 2 sacral vertebrae

Pectoral and pelvic girdles:

If pectoral girdle is present it's fermisternal (i.e., less flexible).

Pectoral girdle is attached to skeleton through the sternum.

In general, the pectoral girdle shows a reduction in the number of bones and a trend towards more fusion.

Of course, it's missing completely in snakes and some legless lizards

Pelvic girdle

Shows basic elements: ilium, ischium, pubis

Except in most snakes, traces of the pelvic girdle is found in all reptiles

Still visible in some boas and some other groups (e.g. Leptotyphlops)

These “spurs” are used by some males in courtship

Also found in some limbless lizards

Genus *Bipes* (Mexican mole lizard) has front legs only.

Belongs to the Amphisbaenids or worm lizards, most of which are legless.

In turtles, limb girdles are inside the shell (and therefore inside the rib cage!)

Limbs:

Not too different from what we're used to. Basic bones like humerus, radius, ulna etc. are all there.

Trend is to shift limbs to angle down more (animal is carried more by the limbs - doesn't have to drag belly along ground).

Comment: we'll talk about snake movement later.

Toes:

If present, usually 5 front, 5 rear, though some reptiles may have lost a digit.

Regeneration:

Many lizards can regrow their tail.

tail “autotomy” - breaking off the tail for defensive reasons.

tail is often innervated with nerves which cause it to twitch violently (attracting the attention of the predator).

caudal vertebrae have a fracture zone where tail breaks off.

muscles around the fracture zone swell to stop bleeding.

tail is then regrown:

usually doesn't look quite the same

contains only cartilage after growing back (vertebrae are not regenerated).

Hyoid:

not much to say here - anchors tongue (although some muscles from the hyoid extend to mandible, skull and even the cervical vertebrae.