

Desert Medicine, Bites and Stings



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Medicine

Disclosures

- I have received NIH grants to study, Infectious disease, drug abuse and prevention.
- I have spoken as part of a speakers bureue for AbbVie with regard to an antibiotic.
- I will not be discussing any of the above topics today

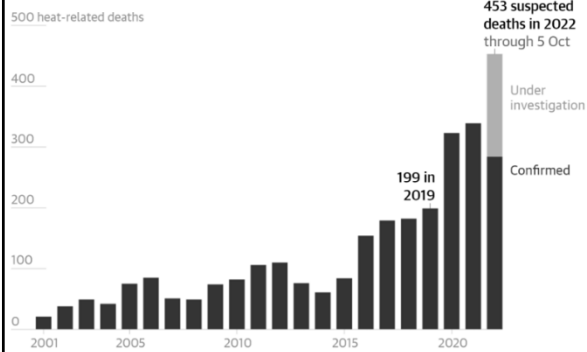
Heat



Heat Illness

- Heat Cramps
- Heat Exghaustion
- Heat Stroke
- Burns

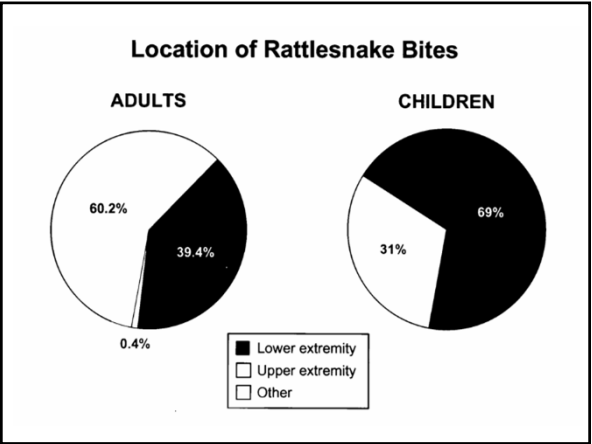
Heat-releated deaths in Maricopa county, Arizona

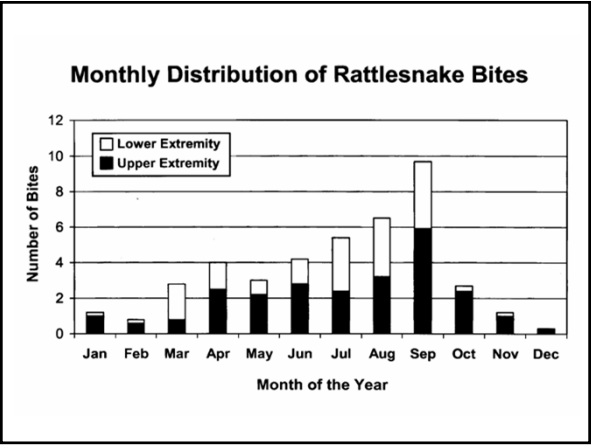


Case: A new antidote for an old problem

- A 3 year old man is envenomated by a rattlesnake.
- He has no history or asthma and takes no meds
- He has no allergies







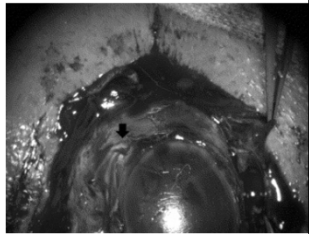








RULE ONE:
PLEASE DON'T KISS
SNAKES



Penetrating Ocular Injury Caused by
Venomous Snakebite
Chien-Chung Chen et al
AJOM

RULE TWO:
PLEASE DON'T
HANDLE DEAD
SNAKES





34

**The New England
Journal of Medicine**

SEARCH
PAST ISSUES

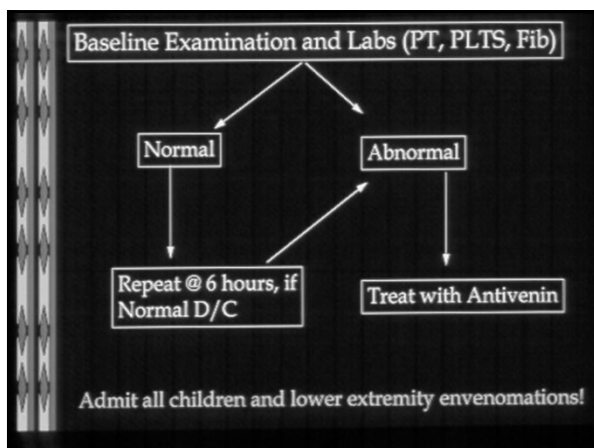
THIS WEEK
IN THE
Journal

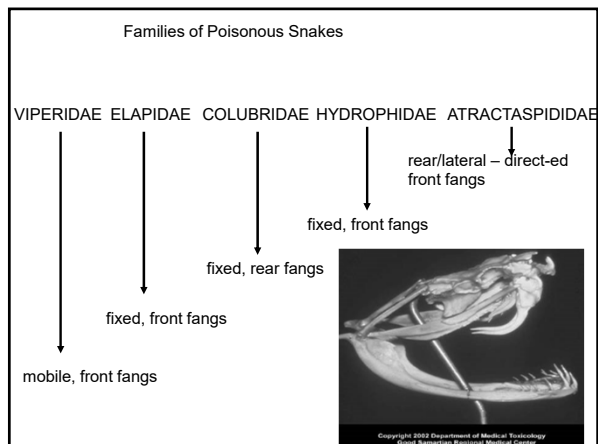
LOG ON
TO FULL TEXT
(Subscription Only)

Envenomations by Rattlesnakes Thought to Be Dead

To the Editor:

Even after suffering potentially fatal injuries, venomous snakes are capable of injuring humans. Klauber performed experiments showing that rattlesnake heads are dangerous for 20 to 60 minutes after decapitation. (1) We prospectively collected data on patients admitted to our toxicology referral center for rattlesnake bites. Thirty-four patients were admitted for rattlesnake bites from June 1997 to April 1998; of these, five patients (14.7 percent) -- all men between 20 and 48 years old -- were bitten by snakes that had been fatally injured and were presumed to be dead.







US: Thousands of snake bites occur annually

Hundreds in Arizona


< 10 deaths per year

5 million snake bites

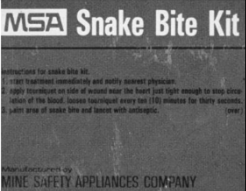
125,000 deaths



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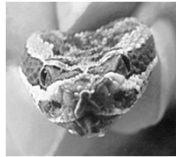
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Families of Venomous Snakes

- Viperidae $\xrightarrow{\text{subfamilies}}$ **Crotalinae**
Viperinae
- Elapidae (coral snakes)
- Hydrophiidae
- Atractaspididae
- Colubridae



US Pit Vipers



Rattlesnake



Copperhead

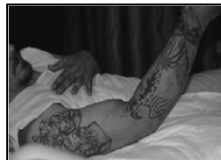


Cottonmouth

Who are the victims?

Unlucky \longrightarrow *Leg bites*

unintelligent \longrightarrow *Hand bites*



Legitimacy of Snakebite

- Legitimate Bite
 - did not recognize encounter with snake before being bitten
 - recognized encounter and immediately attempted to move away, but was bitten anyway
- Illegitimate Bite
 - recognized encounter with snake, but did not try to immediately move away
 - pet snakes, moving snakes, killing snakes, kissing snakes, playing with snakes, feeding snakes

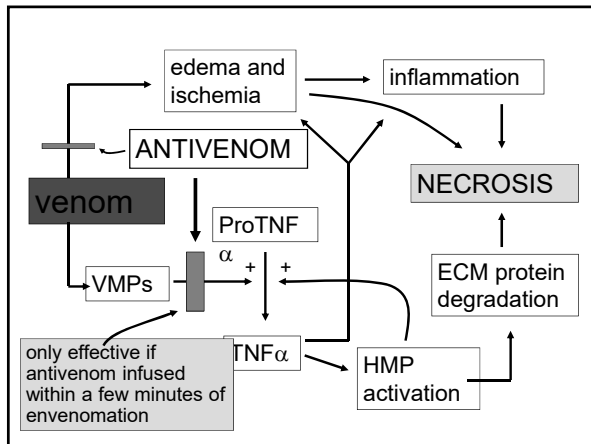


Edema After Snakebite

- Swelling looks very scary
- Long, linear incisions on envenomated extremity would decrease tissue pressure and might “restore” blood flow
- Tissue necrosis would then be prevented


Tissue Hypertension

- Tissue hypertension quite exceptional despite edema
- Fasciotomies and SQ decompression do not prevent myonecrosis in animals receiving IM or SQ venom injections
- Noninvasive vascular studies demonstrate increased blood flow in envenomated extremities in most all patients



Local Tissue Effects

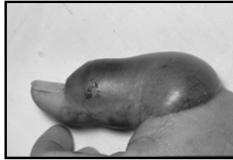
- Puncture wounds / scratches / lacerations
- Swelling
 - Mild to massive
 - Progression varies





Local Tissue Effects

- Hemorrhagic bulla (blebs)
- Local necrosis
 - Tissue loss
 - Amputation
- VMPs and other digestive enzymes



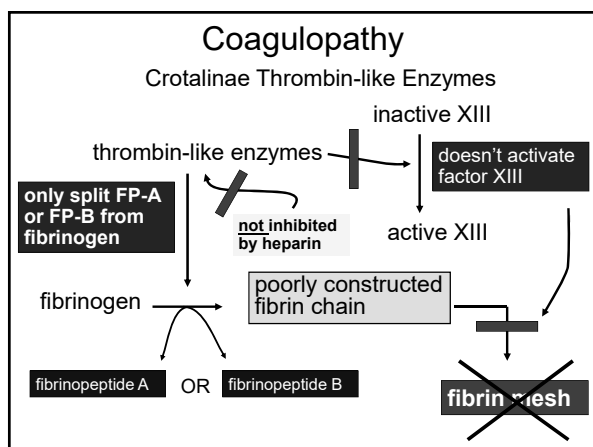
Blebs

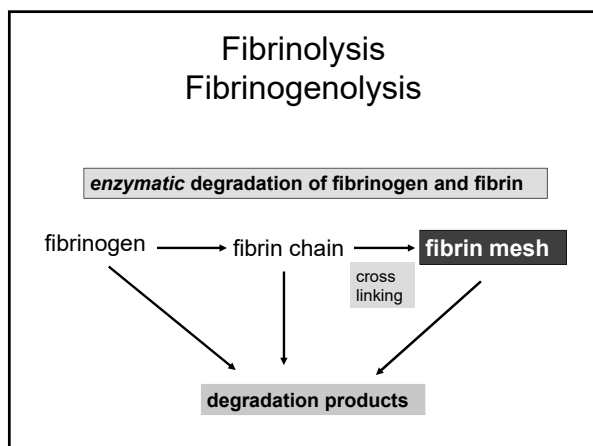


Blebs











ED Management

- IV fluids
- Pain control
- Measure circumference
- Neurovascular checks
- Elevate extremity



Antivenom?

Indications for Antivenom

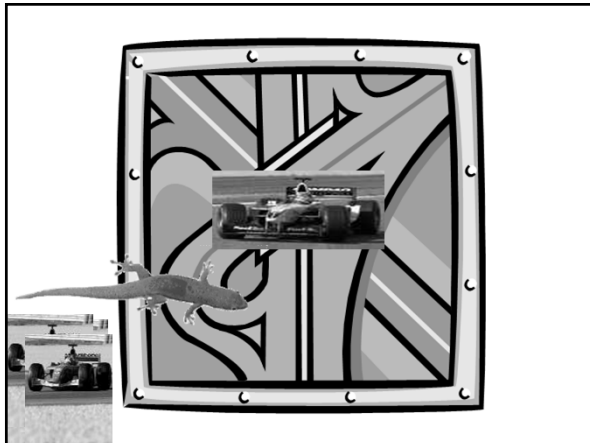
- *Rapid* progression of swelling
- *Significant* coagulopathy or thrombocytopenia
- Neurotoxicity
- Shock



The Case of the Concerned Citizen

- A guy on I-17

The Alleged Scene



Venomous Lizards

Helodermatidae

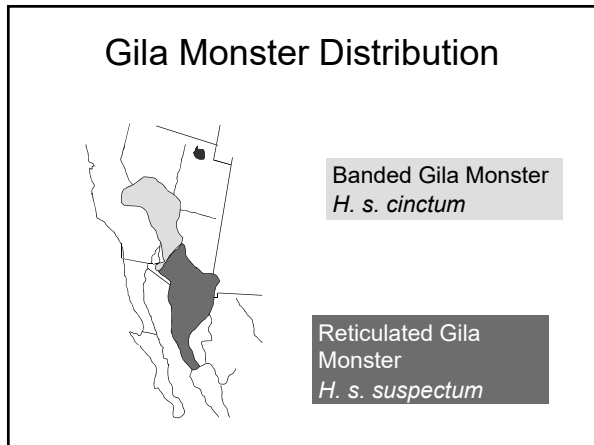
Heloderma suspectum
Gila Monster

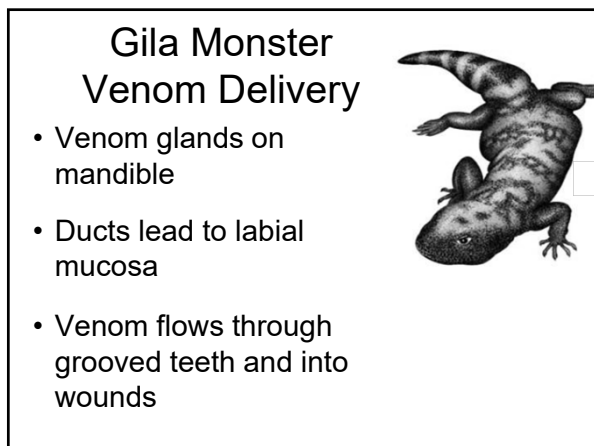
Heloderma horridum
Mexican Beaded Lizard

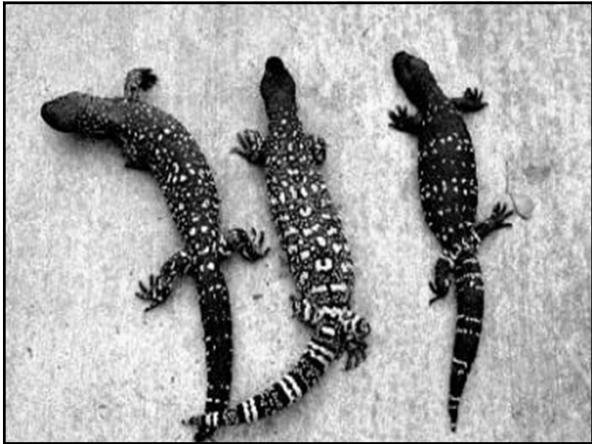
H. s. suspectum
H.s. cinctum

H. h. horridum
H. h. exasperatum
H. h. alvarezi









Removing a Gila Monster

- Pry mouth apart with pliers
- Jam screwdriver down monster's throat
- Dip monster in gasoline and set on fire
- Pour gasoline into mouth and set on fire
- Place fire under jaw without gasoline
- Strike back of lizard's head with large stone

outdoor
health





Scorpions

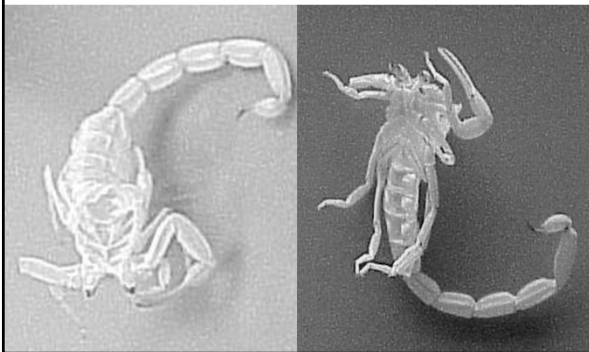
- 40 species of scorpions in the US
- Only one dangerous, considered to be potentially fatal
 - Found in Arizona, some areas of Texas, New Mexico, California, and Nevada
- >6000 calls/year to Samaritan Regional Poison Control Center
- Most managed at home



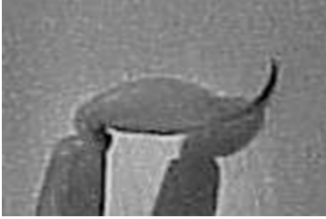
The Bark Scorpion

- *Centruroides sculpturatus/exilicauda*
 - Yellow/tan/brown
 - Up to 5 cm in length
 - Hard exoskeleton
 - Segmented tail curves up, ends in a telson, containing venom glands and stinger

Exoskeleton



Telson



The Bark Scorpion

- Body fluoresces under UV light
- Resides in or near trees; wood
 - Climbs, but not up glass



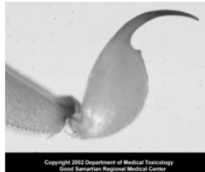


Bark Scorpion



Envenomation

- Most stings cause only local pain
- Onset of symptoms immediate, progress up to 5 hours
- Children tend to be most severely affected
- No deaths reported in the US since 1968



Management

- Most symptoms improve within 9 to 30 hours without treatment
- Pain and paresthesias may last up to 2 weeks
- Options:
 - Antivenin (not currently available)
 - Sedation and pain control

Antivenin

- Recommended for Grade III and IV envenomations
- Results in rapid reversal of neurologic and respiratory toxicity within one hour
- Risks
 - Hypersensitivity reactions
 - Serum sickness

Scorpion Antivenin

- Goat serum derived
- Contraindications
 - Previous scorpion antivenin
 - Asthma
 - Beta Blockers
 - CAD









Black Widow

- *Latrodectus mactans*
- Female is 8-10 mm, black with red hourglass mark on ventral surface
- Live in woodpiles, crevices, barns...

Envenomation

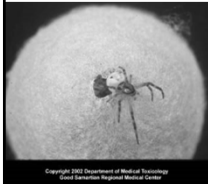
- Female bite produces sharp pain
- Pair of fang marks with surrounding erythema
- 15 minutes to 6 hours following the bite, "latrodectism"





Venom

- α -latrotoxin
 - Potent neurotoxin
 - Induces neurotransmitter release from nerve terminals



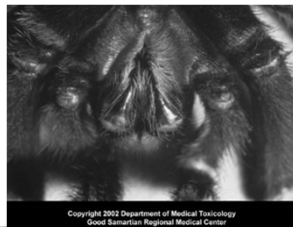
Latrodectism

- Neuromuscular
 - Muscle cramps – site, chest, abdomen (may mimic acute abdomen), thighs
 - Rigidity, tremor, weakness, priapism
- Systemic
 - Nausea, diaphoresis, pavor mortis (fear of death), salivation, urinary retention
- Cardiopulmonary
 - Hypertension, tachycardia, bronchorrhea



Management

- Airway
- Tetanus prophylaxis
- Pain control
- Antivenin to speed recovery










Management

- Airway
- Tetanus prophylaxis
- Pain control
- Antivenin to speed recovery





| Identification of Bees and Wasps | | | |
|---|--|---|--|
|  6/8 inch European honey bee | |  1 1/16 inch Africanized honey bee | |
|  1 1/16 inch Bumble bee | |  7/8 inch Carpenter bee | |
|  13/16 inch Mud dauber | |  5/8 inch Paper wasp | |
| | |  5/8 inch Yellow jacket | |

KILLER BEES



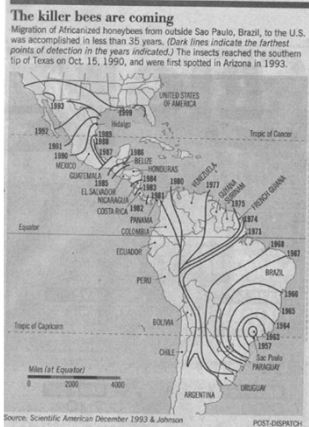
KILLER BEES

- Phylum: Arthropoda
 - Order: Hymenoptera
 - Includes bees, wasps and ants
 - *Apis mellifera scutellata/adansoni*
 - More aggressive subspecies than native European bees of North/South America



HISTORY OF THE KILLER BEE

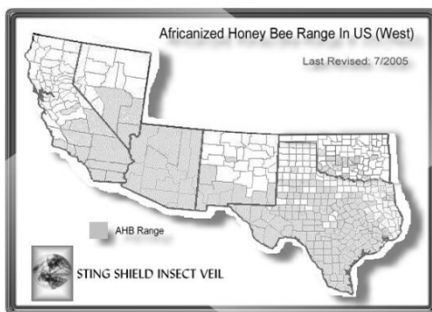
- *Apis mellifera scutellata/adansoni*
- Imported to Brazil in 1956
 - Thought to be more efficient honey producer
- In 1957, 26 queens escaped into the wild
- They interbred with domestic honeybees and spread rapidly
 - Africanization
 - Taking on the aggressive characteristics of African honeybees
- Africanized bees entered United States 1990



Apis mellifera scutellata

- Highly aggressive nest defense
 - Massive attacks with minimal provocation
- Will chase victim up to 0.5 miles
- Don't jump in the water
 - They will wait for you to surface
- Swarm several times per year
 - Leads to rapid proliferation & spread

DISTRIBUTION



KILLER BEE VENOM

- Africanized" and domestic *similar components, concentrations in venom sacs*
- Melittin
 - Major component
 - Inserts into phospholipid bilayer of cell membrane
 - Causes breakdown of RBCs, leukocytes, platelets, vascular endothelium

KILLER BEE VENOM

- Phospholipase A₂
 - Principle allergen
 - Triggers release of arachidonic acid
 - Increases release of inflammatory mediators
 - Increases capillary permeability
- Hyaluronidase
 - Breaks down hyaluronic acid and facilitates vascular spread of venom

KILLER BEE VENOM

- Also contains
 - Histamine
 - Mast cell degranulation peptide
 - Apamin: neurotoxin



Killer Bees are slightly smaller than the European honey bee, but only an expert can tell them apart

MORTALITY

- Morbidity and mortality associated with **cumulative dose** of venom injected into venom
 - LD50 in mice is 2.8mg/kg
- >50 Stings minor-moderate systemic toxicity
- >100 major systemic toxicity
- Estimated human lethal dose LD₁₀₀ = 19 stings/kg
 - >400-500 stings
 - Reports of deaths with less, and survival with more than 1000 stings

CLINICAL EFFECTS

- Minor Local reaction
 - Pain
 - Erythema
 - Urticaria
- Major local reaction
 - Angioedema
 - Diffuse edema
- Major systemic reaction
 - N/V
 - Bronchospasm
 - Abdominal pain
 - Shock
- Delayed reactions (8-24hrs)
 - Thrombocytopenia
 - Hemolysis
 - Rhabdomyolysis
 - ARF
 - AMI

EXTREMITY WITH MULTIPLE STINGS



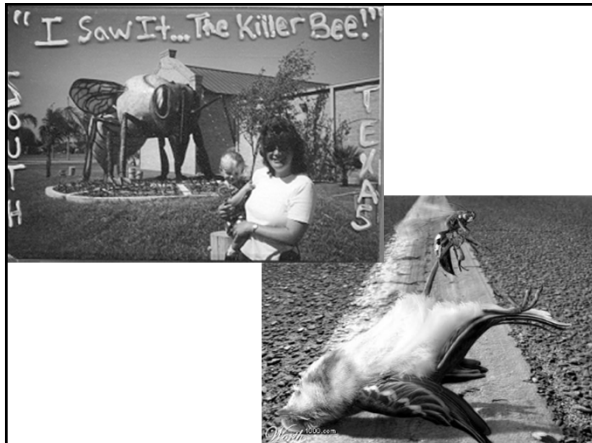
TREATMENT

- Hard to distinguish from anaphylaxis
- Treat as per anaphylaxis
 - Airway mgt
 - Fluid resuscitation
 - Histamine blockers
 - Epinephrine
 - Steroids

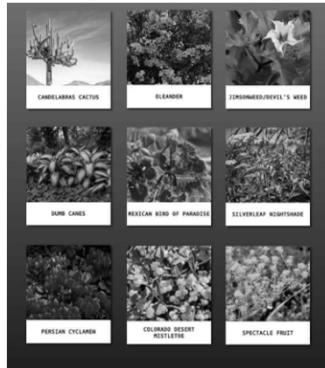


Treatment

- <50 stings
 - Baseline labs
 - Observe
 - If symptomatic or abnormal labs, admit
- >50 Stings
 - Baseline labs
 - Admit for 24 observation to watch for delayed effects
- High risk populations include:
 - Elderly, peds and pts with co-morbidities



Plants Quiz



Suggested Kit

- Day sack
- Lightweight trekking boots / shoes
- Trekking socks and underwear
- Lightweight long-sleeved t-shirt / shirt
- Wicking t-shirts
- Lightweight trekking trousers
- Fleece, Scarf and hat for cold evenings and early mornings
- Wide brimmed sun hat and/or scarf for sun protection, Sun protection
- LED Headtorch & spare batteries
- Compass,
- Water bottles or bladder – 3l or more, water disinfectant filter or kit
- Plastic bags / dry bags, Duct tape
- Glasses, sun etc
- Insect repellent
- Toiletries, Hand sanitizer
- Personal first aid kit, comprising: Painkillers, Ibuprofen or other anti-inflammatory, Imodium, Antiseptic wipes, Plasters, Gauze pads, bandage, Zinc oxide tape, Adhesive tape, Moleskin and/or Compeed for blister treatment, Dehydration mix, Small tub of Vaseline, Tweezers, Scissors, Safety pins, suture kit