# Snake hunters

**Chapter 1: Some holiday**

The night finally gave way to morning. I peeled my sweaty, aching body from the sheets and went in search of cool air to soothe my new crop of mosquito bites. Fat raindrops pummelled the earth outside. Everything seemed larger than life here in the tropics: the rain, the insects, but most alarmingly, the predators. I watched a pair of brothers duelling with enormous rain-soaked leaves and imagined how I could have spent my summer: bike-rides with my younger brother over Jesus Green and down to the river to picnic or sneaking into the Fellows’ Garden for an icy dip in the pool. Instead, I was here on an uncomfortable, miserable, and downright dangerous expedition with Uncle Peter’s mad friend Jonathan.

Jonathan, or Professor Wallace, as I was meant to address him, had recently impressed the medical world with his studies on snake venom. He had invented a way to measure levels of Heparin in the blood. Heparin is an anticoagulant: a drug that prevents blood clot formation (a process called coagulation). The first drug of its kind, Heparin was rapidly changing medicine and revealing new possibilities for heart surgery. Too much Heparin leads to bleeding and getting the level just right can be tricky. With Professor Wallace’s test, you can measure heparin levels in the patient’s blood and adjust the dose until you get the level right. It works like this: you take blood from a patient, putting half in a vial with venom and half in a vial without. The venom mimics an important coagulation component called thrombin. Heparin stops the function of human thrombin but has no effect on snake venom thrombin. So, when the vial without venom takes longer to clot than the vial with venom, you know the patient has heparin in their blood. Put the difference in clotting times into an equation and you get a measurement of the heparin level. Simple, other than the fact it relies on venom from one of the deadliest predators in South America.

The only thing standing between me and *Crotalus durissus*, a type of pit viper commonly known as the South American rattlesnake, was a rain shower. Once the clouds cleared, we would start our expedition to higher ground where the usually

nocturnal rattlesnake is active in daylight. At least he wasn’t making me hunt snakes in the dark, I suppose.

# Chapter 2: The trap

Crouched awkwardly on a low branch, my right foot was numb, and my mouth felt so dry my tongue stuck to my teeth. I did not dare to adjust my position or reach for my water bottle. Professor Wallace had just sent the signal. Three short blasts on the sheepdog whistle. A snake was close by. Snakes cannot sense high-pitched noises travelling through air, Professor Wallace told me, but any movement or vibration near the ground can be detected up by their lower jaws. Snake jaws were the last thing I wanted to think about right now.

My job was to monitor the traps. These upturned baskets covered in leaves each contained a freshly prepared meal of rat. Once the snake entered the basket, the entrance should snap shut. After a decade of expeditions through five continents, some of the trap doors had become unreliable. I was expected to spring from my branch and secure the trapdoor, sealing the precious venom and its terrifying host inside.

Here it came, slower than I expected, inching soundlessly along the ground. Could it hear the vibrations of my heart hammering against my chest wall, I wondered? Straight into the trap, as the Professor had planned, but the trapdoor remained open. I jumped down, swung my stick and the trapdoor slammed shut. As my racing heart began to settle and I crept backwards from the trap, a rasping cry not far away stopped me in my tracks.

# Chapter 3: Deadly or deadlier?

When I reached the Professor, he was slumped against his backpack, half conscious. I felt utterly helpless. My only first aid skills were the recovery position and fitting a

triangular bandage. I attempted the former, dragging the Professor onto his side before running down to the village to find help.

I can’t provide a clear account of what happened next. Two women from the village examined him, pulling open his eyelids, twisting his neck, and inspecting his arms and legs. His left leg told the story. Swollen to the size of a sturdy tree trunk, mottled and purple, with blood oozing from puncture wounds above the ankle, his leg bore the typical signs of a pit viper bite. Was it the bite of *Crotalus durissus*, deadly in more than half of cases, or the bite of a less harmful relative? The village women seemed pleased that his eyelids and neck moved normally and that his breathing continued unchanged. No weakness meant no neurotoxins, and no neurotoxins told them that this wasn’t the deadly *Crotalus.*

Professor Wallace spent a week in the care of the older village woman, Agata. She instructed me to sit with him, soothing him during fits of confusion, and forcing him to drink, especially when his urine turned black. I tried not to watch what she did to his swollen left leg. She applied leeches to suck his blood, removing them once they became bloated with their meal. It was gruesome, but it seemed to help. His leg reduced in size and turned a paler shade of purple. When he woke on the seventh day, I knew had recovered. His first words to me were “did you secure the trap”?

# Chapter 4: Liquid gold

We stumbled through the undergrowth together. The Professor leaned heavily on my shoulder to keep the weight off his injured leg. I was confident that all snakes in the area would have heard our approach and scattered. The trap remained exactly as I had left it a week ago. The Professor could not crouch down, so I peered cautiously under the leaves with my torch. All was still and silent within the basket, but I could just make out the dark coils of a long, muscular body. As I turned to tell the Professor, my torch light fell upon something bright. I looked again and noticed that the coils surrounded five or more white, leathery eggs. I pulled the Professor down to look. Startled at first, he turned to me with surprise and then wild excitement. He rolled onto his back, laughing uncontrollably. “We did it”, he gasped. “A lifetime’s supply of pit

viper venom- the liquid gold of coagulation”. I’d prefer actual gold, I thought to myself, but his excitement was contagious, and for a moment I celebrated our remarkable achievement.

# Science facts from this story

Snake venoms

Snake venoms mimic and disrupt many aspects of blood coagulation. They can cause both clotting and bleeding. For the snake, this is an effective way to kill their prey.

Coagulation tests

This story is set in the 1950’s, when heparin was first being used in medicine. However, snake venoms remain widely used in clotting tests performed by hospital laboratories. Professor Wallace’s clotting test is based on a test still in common use called the reptilase time. Venom from South American pit vipers mimics the blood clotting component thrombin but are not affected by Heparin.

Snakes

Rattlesnakes often inch along slowly in a straight line, a bit like a caterpillar. This movement, called rectilinear motion, is thought to help them save energy. It is true that snakes are unlikely to hear a sheepdog whistle. Snakes mainly hear through vibrations passing from the ground to their jaw bones and then to then to the inner ear via the stapes bone.

Snake bites

Snake venoms often contain a mixture of toxins. As well as disrupting coagulation, toxins can interfere with the function of nerves and muscles causing sudden weakness (paralysis). When the muscles that help us to breathe become paralyzed, death follows rapidly unless urgent medical care is available.

Leeches

Leeches produce their own anticoagulants called hirudins. Leeches have been widely used in traditional medicines to increase blood flow and to improve wound healing. Drugs based on hirudins are used to treat blood clots.