

Chiroptera

By Dominic Billings

Based on Batman: Aegri Somnia by Dominic Billings

ACT I

BLACK, ONLY THE SOUND OF A SINGULAR BAT. NOTHING DRAMATIC OR OMINOUS - THE SOUNDS OF FORAGING OR CHATTERING TO OTHER BATS.

Image of a solitary bat flying through the crepuscular dusk.

TITLE CARD: PART I - ANIMALIA

CUT TO:

TITLE CARD: UNIVERSITY HALL, NEW YORK CITY, NOVEMBER 15

INT. UNIVERSITY HALL - NIGHT

Dr. Bian Fu delivers a speech from the lectern to a full house in the university's main hall.

DR. BIAN FU

Why are bats such good viral hosts?

Bats are the common denominator of most recent discoveries of pandemic viruses. Whether it's new strains of Ebola, or outbreaks of Marburg virus - in each instance, bats were the source.

Flying foxes hosted the Nipah virus, which infected the sap of date palms. Bats played a hand in MERS. Camels ate fruit which bats carrying the virus had eaten, spilling over into humans. The SARS outbreak originated in my home province, via palm civets and bats.

One theory is because bats are the only mammals capable of flight. Every day, their metabolism and body temperature rise to the level of what would be a fever in humans. For other animals, when a virus invades, their metabolism rises. With it, the immune response to combat the intrusion. When flying, a bat's body emulates this effect compared to when they're otherwise active. The increase is 15 to 16 times their regular metabolic rate when not flying. This is twice as much as birds in flight, seven times

as much as rodents running to exhaustion.

Bats can offer refuge to a virus, without killing the bat. This allows the virus the opportunity to spread to other species. Bats host viruses as if they were symbiotic. Bats don't become sick, as you'd expect of a dog carrying rabies, affecting the dog and any humans it bites. When faced with a virus, the marginal amount a bat's metabolism needs to rise to pose an immune response is far less.

The immune systems of bats are well-evolved, a 50-million-year-old order of mammals. In contrast to humans, we developed a couple hundred thousand years ago.

Imagine you - as a human - are sick with a fever. Were you to encounter another virus, your body is already alert. You wouldn't notice the extra response. It's the same for bats. But rather than bats feeling sick, it's like comparing the heat from the exertion of exercise to a fever. One form of feeling hot is welcome, the other not. Bats need to alert their immune system less to viruses. Compared to humans going for a run, their metabolic rate is even higher when flying. Imagine how much more energy you would need to take flight than to run? By contrast, our bodies try to heat out the virus when we have a fever. This is even at the expense of feeling altogether unpleasant.

Flight is also helpful in spreading viruses. Compare with rats spreading the bubonic plague. Rats are terrestrial. Given their small size, bat habitats are very wide compared to humans.

My heart rate might get to around 160 beats per minute. When a bat flies, its little heart will be 10 times

faster, somewhere around 1000 bpm. The human body temperature is 100 degrees Fahrenheit, or 37 degrees Centigrade. A human develops a fever in response to an infection brought about by a virus. The body temperature rises above this. By contrast, bats' body temperatures rise above 37 degrees Centigrade whenever flying.

What about when bats hibernate in winter? When bats aren't flying in this period, their body temperature is lower. This serves the opposite effect.

A great many viruses which bats harbor aren't suitable for making the jump to humans. But viruses hosted in bats can jump across bat species with relative ease. Pick a bat cave at random. In likelihood, several diverse bat species would be roosting side-by-side. They can be dense populations. At their largest, on the scale of the human populations of the biggest cities in the world in one bat colony. This gives viruses a greater facility in adapting to an altogether distinct species. For example, another mammal, like camels, pigs, civets, pangolins, or humans.

Viruses, like species, differ in their genome. Our researchers in the field, as part of Project CONSERVE, take swabs from live bats. We do this to extract viral genetic material. In a database, we keep a record of viruses we know the genome for, of which sequence accessions are available. The research is proactive. We find out what geographic regions have the greatest spillover potential.

Humans hunt bats for bushmeat, either for consumption, or to sell for income. Bats can be abundant in communities living next to forests home to large roosts. Any contact with bats could be an opportunity for

transmission of a virus. From a bat biting someone handling it, cutting it up as bushmeat, or any exposure to its urine, feces, or blood. This contamination could be from water sources for a community. It could be from exposed food, which bats have nibbled.

Some communities harvest guano in the habitats of bats. Forest clearing makes way for agriculture, ruining the soil because of unsustainable practices. To still make use of it, trying to make it fertile again, we need to add fertilizers to replenish it. We apply manure rich in nutrients, like potassium, nitrogen, or phosphate. Bat manure - guano - is rich in such nutrients. Humans harvest bat guano - digested insects - though in the process disturb bat roosts. The alternative is to produce fertilizers using chemical processes. But this is a driver for climate change, disrupting the planet's nitrogen cycle.

Our research, as part of Project CONSERVE, aims to prevent spillovers of pathogens. We know the likelihood of future spillovers will come from bats. It isn't known for certain the chain of events leading Ebola to spill over into humans. But in likelihood, the host would've been fruit bats. They experience none of the damaging effects from the virus humans do. Did this come from a human eating a fruit bat as bushmeat? We don't know.

Another of the reasons bats are good viral hosts is because humans destroy habitats. This could be to make way for agriculture or urban settlements. Bats can adapt, roosting in abandoned or inhabited buildings. Bats roost in caves or abandoned mines. But humans sometimes breach these habitats to extract guano and can become infected. Also, animals expel more of a virus

they're hosting when stressed.

As bats are nocturnal, when humans sleep, the behaviors of bats can be unbeknownst to us. It's easy for bats to move in and out of human habitations under the cover of night when humans sleep. Bats can eat the food we leave lying around. More likely, it's the food of domesticated animals in our care. This is what occurred with the Nipah virus when fruit bats excreted into the swill of pigs. Why were the bats in the environment of pig farms and orchards? Because forest trees didn't bear fruit due to fires lit by humans nearby."

A minor fuss in the wings off stage among the conference staff distracts Robert, seated in the front row. The president of the Trust, Laetitia Verte, approaches him, whispering in his ear.

LAETITIA VERTE

Robert, I'm afraid we're still expecting Dr. Hammarstedt. We've tried contacting him both on his home phone and on his cell. Are you still OK to provide some closing remarks in the next few moments? We'd scheduled Dr. Hammarstedt to follow Dr. Bian?

Robert affirms it's fine and leaves his seat. He approaches the stage stairs as Dr. Bian provides concluding comments.

DR. BIAN FU

Bats aren't to blame for being such good hosts to viruses. It's worth remembering, we're encroaching on their environment, rather than vice versa. Bats have scared people for centuries or millennia. This has been for many reasons, including their genuine ability to spread disease. But in the modern era, our species threaten bats. If we eat bats, or use them for whatever human use, even digging out guano in their habitats, what can we expect?

I would like to point out two Chinese

characters on the screen behind me.

Displayed on the screen behind her are two Chinese characters: 蝠 and 福.

DR. BIAN FU

They are 'bats' and 'fortune', or 'blessing'. Note, the characters both look similar, and their pronunciations are the same. This contrasts with the cultural beliefs in many parts of the world of bats as maligned. Chinese culture sees bats for the benefits they offer, both to humans and the environment. Thank you.

Dr. Bian leaves the stage to audience acclaim. Robert strides across the stage, shakes Dr. Bian's hand and commends her speech.

ROBERT ANTHONY

A great many thanks to Dr. Bian. Her brilliant insights illuminate the unique, incredible nature of these oft-maligned creatures. Further thanks to Dr. Bian's team at the Kunming Institute of Zoology for their work on Project CONSERVE. This leads me to introduce myself. My name's Robert Anthony. I'm executive chairman of the Anthony Wildlife Trust, which is proud to sponsor the efforts of Project CONSERVE. I thank you all very much for registering to attend this conference. Dr. Hammarstedt was due to deliver the second of the keynote addresses on this evening's program. He's now unable to join us. We're disappointed to miss Dr. Hammarstedt's keynote. But you'll be grateful this has brought the cocktail party forward on the evening's program.

The audience ruffles with pockets of cathartic laughter.

Bruce steps off the stage and approaches Laetitia, the Trust president.

ROBERT ANTHONY

What's this about Hammarstedt?

LAETITIA VERTE

We got a hold of his wife on the phone
- she hasn't seen him for more than a
week and has called the police.

INT. FOYER - UNIVERSITY LIBRARY

Laetitia pulls Robert aside from the cocktail party to speak
with a detective.

DETECTIVE

Mr. Anthony, sorry to bother you. We
can consider enough time has now
elapsed to qualify Dr. Hammarstedt as
a missing person. The university gave
us access to Dr. Hammarstedt's office
to search for clues. We found a
proposal for a grant, applied to your
foundation.

The detective hands Robert a document, about 70 pages long.

INSERT OF PRINTED PROPOSAL IN ROBERT'S HANDS.

The cover page suggests it's the proposal for the Project
CONSERVE grant. This was what Kirk was to have given the
keynote about. Magnus Hammarstedt's details are on the front
page as the lead contact for the proposal. The second page is
a letter signed by Hammarstedt. It presents a proposal to the
grant advisory committee of the Anthony Wildlife Trust. A
detailed plan follows.

DETECTIVE

Are you familiar with this?

ROBERT ANTHONY

I know of the project, but not the
details. I don't administrate the
grants for my foundations. Nor do I
serve on any of the advisory
committees assessing the applications.
My role's ceremonial. But I tend to
keep myself informed with which
applications are successful.

DETECTIVE

Could you let me know if this
application was successful for a
grant?

ROBERT ANTHONY

It was. We were expecting to hear about its progress from Dr. Hammarstedt this evening. Another of the participants of this project application listed on the cover page is here.

DETECTIVE

(gesturing to the printed proposal)
Did you first become acquainted with Hammarstedt via this project?

ROBERT ANTHONY

I first engaged Magnus in a private role as a consultant. I have a colony of bats roosting in the grounds of my property. I wasn't certain how to deal with them. Many of them seemed to be dying during the winter because of a fungus on their muzzle. I thought Kirk might be able to help.

DETECTIVE

Did he visit your home?

ROBERT ANTHONY

No, over the phone. Overkill on my part, engaging the world's foremost expert on bats. It turned out any vet in the country could have helped.

(holds up hard copy grant proposal)

Is there an issue with this project relating to Magnus going missing?

DETECTIVE

It's about trying to figure out what he's working on at present, to give insight to where we could find him. Most of this is gibberish to me.

(gesturing to proposal)

You have no sense where he would be, based on what you know about him?

ROBERT ANTHONY

Not in a way where he wouldn't have cause to at least let his wife know. Otherwise, my assumption would be he's on a research trip somewhere. He's a Swedish national. But even if a family member in Sweden became ill, you'd

imagine he'd let his wife know before getting on a flight.

DETECTIVE
You know his wife?"

ROBERT ANTHONY
I've visited his home before and met his kids when they were small.

DETECTIVE
In what capacity?

ROBERT ANTHONY
Somewhere between friends and colleagues. I admire Magnus's conservation work.

DETECTIVE
You've visited his home only once?

ROBERT ANTHONY
Correct. A couple of years ago.

DETECTIVE
Is it possible he could be in China, in relation to the project in the proposal, on a research mission?

ROBERT ANTHONY
Senior scholars like Magnus have a lot of autonomy in how they carry out their activities.

DETECTIVE
Our police department could contact authorities over there. But it'll become a lot more difficult. It's a missing person case at this stage. No one's committed a crime. It'd be unlikely to get much help from the Chinese, which is understandable. Anyhow, thanks for your help, Mr. Anthony.

ROBERT ANTHONY
Let me know if you need anything further.

TITLE CARD: HAMMARSTEDT RESIDENCE, NOVEMBER 15

INT. HAMMARSTEDT HOME - NIGHT

Bruce sits opposite Magnus' wife, Annika.

ANNIKA HAMMARSTEDT

I offered the police everything I know. Magnus hadn't presented himself to family meals for weeks. He'd seldom been leaving home, so couldn't have been taking meals out of the house. A couple of months ago, Magnus collapsed at home. I took him to the hospital. They conducted tests, including stool samples. These uncovered an exclusive diet of flowering plants and insects. More fruit than any human should be eating. The human body can only sustain such a diet so long without detrimental side effects. I went into his study, and found it filled with unopened snacks and perishables which had gone off. I'd noted every item he'd taken from the kitchen to ensure he was getting a semblance of a balanced diet. But Magnus had only been keeping up appearances.

He'd spend hours foraging at night in their backyard. I attributed this to his declining mental state. I was grateful he was in the safe enclosure of our backyard. Here, I knew his whereabouts, and could attend to him if he injured himself. Most nights, Magnus would forage in the early hours of the morning, then come inside around dawn. I'd find him sleeping somewhere around the house during the daytime.

ROBERT ANTHONY

Can you tell me the specifics of Magnus's mental state? Had Magnus sought a formal diagnosis?

ANNIKA HAMMARSTEDT

Since Magnus's hospital admission, we'd been waiting for a psychiatrist's assessment. His decline was precipitous in the past six months. I'd been in relative denial.

ROBERT ANTHONY

Was there any history of mental illness in Magnus's family? Do you suspect he'd been abusing any substances?

ANNIKA HAMMARSTEDT

Unlikely. But Magnus had a paternal uncle and maternal aunt with serious mental disorders. My understanding is Magnus hadn't ever known what it his was in specific. Nor if they'd ever had formal diagnoses.

ROBERT ANTHONY

Would you like me to look through Magnus's home office records? See if my fresh eyes can turn anything over.

ANNIKA HAMMARSTEDT

Yes. In my state, I'm open to help. I've been frantic, pawing through Magnus's office papers like a maniac.

The kids and I are about to go stay with my parents anyhow.

CUT TO:

Robert whisks up the stairs, passing the children's colorful bedrooms at the top of the landing.

Robert climbs a vertiginous ladder from the landing to access Magnus' study in the attic.

INT. MAGNUS' STUDY - NIGHT

Robert enters the space. We hear rain starting to fall on the roof, soothing. A skylight allowed the illuminance of the night's sky to infuse the space through its portal.

Books, academic journals, and piles of paper are everywhere. Magnus has fashioned myriad bookcases of innovative, characterful designs. It forms a cosy, comfortable and naturalistic decor with timber floorboards. Indigo-dyed cuttings of linen drape over surfaces. A birch branch leans on a pile of vintage books, nature bleeding into the domestic living space. A refuge of solitude and reflection, knowledge, and curiosity.

Magnus' tomes and journals could pass as a private library on

the subject matter of bat zoology.

Robert paws the bookshelf. His fingertips lead him to a thin periodical, an issue of a scientific journal. Robert flicks through the pages with little method, settling on one of the articles. He nestles into the couch with the journal taken from the shelf.

QUICK CUTS OF INSERTS FROM ARTICLE ROBERT IS READING:

Photos inside markets of pelts, shells, tusks, and tiger skins. A menagerie of live animals. Mounds of poached pangolin scales, destroyed by burning. A figure in the article of a genetic classification chart of species

Robert chances upon a short pile of handwritten journals on a side table. He skims the pages of one, filling with dread at its contents.

TITLE CARD: CENTER FOR PSYCHIATRIC RESEARCH, NOVEMBER 15

INT. CENTER FOR PSYCHIATRIC RESEARCH - NIGHT

ROBERT ANTHONY

If I provided you with a list of symptoms, could you form a diagnosis, or close to it?

DR. NAOMI WU

Without having the patient in front of me? In an informal, hypothetical way. Why?"

ROBERT ANTHONY

A friend and colleague of mine has gone missing. I'm trying to piece together what his affliction could be.

DR. NAOMI WU

We can try, for argument's sake. It could be of no help but go on.

ROBERT ANTHONY

He seems to be unable to differentiate between reality and any delusions.

DR. NAOMI WU

...Of?

ROBERT ANTHONY

(hesitating)

Being a bat. This friend is a zoologist, specializing in the study of bats. But I've reason to believe they've veered into believing they are a bat.

DR. NAOMI WU

How do you know this?

ROBERT ANTHONY

Journal entries.

DR. NAOMI WU

Do you know if your friend has any experience with periods of psychosis?

ROBERT ANTHONY

I now know he had a history of serious mental illness in the family. In the past months, he seemed to have adopted a nocturnal lifestyle. He'd withdrawn from his family, as well as anything else of a social nature.

DR. NAOMI WU

You've been in contact with his family?

ROBERT ANTHONY

Yes, his wife.

DR. NAOMI WU

What did she notice?

ROBERT ANTHONY

She couldn't offer an enormous amount of insight because he was so withdrawn. Only he might know what had been occurring. She's at her wits end, as all this has gone on under her nose. He wouldn't have anything to do with the family in the months leading up to his disappearance. But he was still in the house the whole time, in his study, up until a week or two ago.

DR. NAOMI WU

Does he already have any diagnosed mental illnesses his wife has

communicated to you?

ROBERT ANTHONY
None she was aware of.

DR. NAOMI WU
For argument's sake, this could resemble a type of psychosis. Do you know whether in the past, they've been a substance abuser?

ROBERT ANTHONY
I asked his wife the same. She didn't believe so. I went through his home study. There was nothing in the way of paraphernalia, or discarded evidence of substances.

DR. NAOMI WU
Including any prescription meds?

ROBERT ANTHONY
The only drugs in their bathroom cabinet belonged to his wife.

DR. NAOMI WU
To come back to the journals, no evidence of hallucinations - auditory or visual?

ROBERT ANTHONY
No. His journal entries outlined efforts to make scientific inroads to transform himself. In a very earnest, almost level-headed way. Like following the scientific method toward a crazy end.

DR. NAOMI WU
This seems to rise to the level of delusional beliefs. Unless he was working toward this and making gains to which we're not privy.

ROBERT ANTHONY
Yes.

DR. NAOMI WU
You're dubious of this possibility?

ROBERT ANTHONY

I'll be in contact with some of his colleagues soon to establish what's possible.

DR. NAOMI WU

We're starting to narrow. Delusions and seeming psychosis are consistent with schizophrenia. Without hallucinations, it could even be paraphrenia. For this disorder, the patient experiences paranoid delusions whilst maintaining their intelligence. This seems consistent with your friend. Strong disengagement from social interaction is symptomatic of schizoid personality disorder. Fantasies of being a bat, or wanting to, could be consistent with the rich fantasy worlds of such a disorder.

ROBERT ANTHONY

Schizoid being different from schizophrenia?

DR. NAOMI WU

Yes, though related. Schizoid is more characteristic of directing attention to the inner life. In contrast to the outside world.

ROBERT ANTHONY

Is it strange at all a scientist wouldn't have explored the option of medication?

DR. NAOMI WU

(shakes head)

Lots of people have strange hang-ups and self-imposed stigmas on medication. Let's zero in on the nature of the delusions, as this seems to be the prevailing symptom sticking out the most. How would you have described the mood of your friend in the journals you uncovered? Was he manic or depressive? I understand it'll be difficult for you to say. Not without interacting with him first-hand during his delusions.

ROBERT ANTHONY

You're right, it's hard. I didn't get much of a sense from the journals he was manic or depressive. As I hinted at before, the way he was carrying out his work seemed level-headed. Which is even more confusing given his behavior was so erratic.

DR. NAOMI WU

OK, so a mood-neutral delusion. We'll move on to some of the themes of these delusions then. Would you describe the nature of your friend's journal entries to be grandiose? I know you suggested he wasn't manic. Anything narcissistic?

ROBERT ANTHONY

No. Magnus can be difficult, and remote to some. But I considered him warm-hearted.

DR. NAOMI WU

What does your friend study with bats?

ROBERT ANTHONY

His work - as I understand it - is multidisciplinary. I attended an event tonight where he was due to give a talk about disease ecology. The role bats play as hosts of viruses. Sometimes those diseases can spill into the human population. or other species. Is there any chance a pathogen is the cause of his mental illness?

DR. NAOMI WU

(purses lips)

Delusional parasitosis is a belief one is harboring a parasite, virus, or some other bug. We split diagnoses for this disorder into primary and secondary. Primary is pure delusion, whereas secondary are symptoms of an existing physical condition. Some pathogens can result in schizophrenic symptoms. Viruses can cause brain inflammation, or encephalitis, affecting mental health. But any links

between an infection and schizophrenia aren't well established. Invasive pathogens are unlikely to be the only cause of a mental disorder. Links exist, in acute and chronic instances. But there's still a lot of room for the development of knowledge on the matter. There are some curious findings in the field. But for whatever ends you're seeking to find out, it's worth dismissing.

DR. NAOMI WU

Without your friend here, everything we're discussing is speculative. On the one hand, he sounds as though he's caught within a psychosis. His thoughts sound ordered if you're suggesting his journal entries were sensical to you. Otherwise, we could expect his thoughts to be tangential. Which you don't feel like you observed?

ROBERT ANTHONY

There was coherence. But the chronological order of the journal entries showed a decline.

DR. NAOMI WU

Any ideations in the journals of a suicidal nature, or wishing harm upon others?

ROBERT ANTHONY

There was a latent antipathy to the nature of humanity, but nothing specific.

DR. NAOMI WU

(sighs, offering a small, sympathetic smile)

Let's leave it there, Robert. It's almost impossible to conduct a comprehensive differential diagnosis without the patient. The cause could be so many possibilities and risk factors. It could include heritability within his family. We don't know if your friend already received a diagnosis of a mental illness his wife

might be unaware of. He could have treatment with antipsychotic medication he stopped taking.

Robert thanks Naomi, and both agree to retire for the evening.

TITLE CARD: X UNIVERSITY, X LAB NOVEMBER 16

INT. UNIVERSITY LAB - DAY

DR. BIAN FU

Echolocation capacities aren't exclusive to bats or whales, as you might imagine," Bian responded. "Humans can detect echoes of sounds made in our environments, but it isn't as heightened as it is for a bat. In what form did you find evidence of this?

ROBERT ANTHONY

Hammarstedt's personal journal entries hinted at experiments to stimulate areas of the brain.

DR. BIAN FU

I'm doubtful this would enhance human echolocation. It would correspond to the brain's capacity to only receive and interpret echoes. Magnus would need to alter the human larynx to be able to emit sound waves at such frequencies.

ROBERT ANTHONY

If someone were to attempt to change their larynx?

DR. BIAN FU

Are you suggesting Hammarstedt was looking into this?

ROBERT ANTHONY

Evidence from journal entries in his home study suggest as much. He was attempting to use some sort of prosthetic or implant.

DR. BIAN FU

(raises eyebrows)

But what about hearing the frequencies emitted from a modified larynx? Bats emit sounds which are ultrasonic, higher than the range of hearing capable by humans.

(makes the link)

Hammarstedt was attempting to change the anatomy of the human ear?

ROBERT ANTHONY

(pauses, stares at Dr. Bian, bearing a tight, wry grin)

He had access to the greatest minds in advances in cochlea enhancements. He'd also made overtures toward altering his vision. To allow it to become more sensitive to pitch black environments.

DR. BIAN FU

But for what purpose would he harness greater echolocation abilities? Animals use echolocation to locate prey, such as small insects. They also use it navigate the distance from an object, like a tree. But we humans can measure with our eyes the distance between objects to navigate. We could even use technology if navigating long distances. Humans don't need echolocation to hunt insects.

ROBERT ANTHONY

Hammarstedt's diet also had made a shift in the last few months before his disappearance. A hospital test showed evidence he'd not eaten much else except fruits, nectar, and insects." Robert corrected himself, "More like eating entire plants bearing flowers than nectar.

DR. BIAN FU

I'm dubious why he would try altering his vision. Bats' vision is less sharp than humans because they're able to harness echolocation. They're also less capable of interpreting color. Megabats have scotopic and photopic vision. They're able to see at night

and during the day. They're less nocturnal than their smaller counterparts and can be active at twilight. Nocturnality serves an adaptive function. It allows bats to carve a niche, by hunting insects by echolocation in the dark.

ROBERT ANTHONY

One of Magnus's scientific journal articles I read in his study last night was about flying primates. Also, the oldest known fossilized species of bat. The connection between why Magnus was studying these makes more sense to me now. He could've been exploring the evolutionary link between bats and primates. With emphasis on a particular species.

DR. BIAN FU

(scoffs, shaking head in doubt)
Flight in humans? Because we're

taxonomic relatives with apes and simians? In combination with the flying primate hypothesis?

ROBERT ANTHONY

His personal journal mentioned anatomical modifications, but also bioengineering. Would Magnus have been able to apply more advanced techniques such as this to make himself into a bat?

DR. BIAN FU

Even the prospect of success with anatomical alteration seems far-fetched. In what form were these diary entries?

ROBERT ANTHONY

Handwritten sketches of ideas, hints of experimental proceedings. Nothing which would pass muster in a professional setting. Nor making much sense to anyone but Magnus. Could you tell me a bit about the nature of the work you were doing together as part of Project CONSERVE? I only know the

broad strokes. My motivation for attending last night's event was to better familiarize myself.

DR. BIAN FU

Yes, you heard me speak about the risk of the disease spillover from the interaction of mankind and bats. This is at the center of the project. We sample bat populations in locations which have a high potential of risk.

ROBERT ANTHONY

What form does the sampling take?

DR. BIAN FU

Most often, in the field, we'll hang a mist net at the entrance of a cave, which the bats get caught in. Then we'll draw blood from the bat.

ROBERT ANTHONY

Sounds ironic.

Dr. Bian misses it.

DR. BIAN FU

Once we've taken the samples, back in the lab, we test for the presence of infectious pathogens. Once we identify these, we sequence the virus' genome. From this, we get a sense if a virus is new, or the spatial range of it has spread. Also, which species are playing host to the virus. Whether there have been reports in neighboring townships of infection.

ROBERT ANTHONY

Is the sampling of bats a risky process?

DR. BIAN FU

Standard protocol is to have protective equipment on.

ROBERT ANTHONY

Is this always adhered to?

Dr. Bian doesn't answer.

ROBERT ANTHONY

In your experience, do bats ever bite researchers in the field? Risking infection with a virus?

Bian remains quiet, appearing to grow irascible.

ROBERT ANTHONY

Do you feel as though Magnus took risks in his sampling behaviors? If precautions weren't taken, could mistakes allow an unintentional invitation for infection? Could interactions to study the bat populations invite a spillover by researchers?

DR. BIAN FU

No. Are you implying we would risk an accident? To introduce bat samples testing positive for a dangerous pathogen into the humans?

Robert weighs Dr. Bian's irritated response.

ROBERT ANTHONY

If Magnus trained himself in handling bats, did this make it more likely for him to be complacent?

DR. BIAN FU

(exasperated, tone pointed.)
Once you feel familiar with what you perceive the risks to be, it becomes OK to loosen any protocols.

ROBERT ANTHONY

(changes gears, softens tone)
Do you think Magnus poses a threat?

DR. BIAN FU

There's no evidence.

Robert pauses.

ROBERT ANTHONY

Where were these samples for the Project taken?

DR. BIAN FU

From the KIZ's home province, Yunnan.

The greatest diversity of species in China is here.

ROBERT ANTHONY
How many sampled species?

DR. BIAN FU
Over a hundred.

ROBERT ANTHONY
With these virus samples, did Project CONSERVE experiment with genetic mutations to develop treatments?

DR. BIAN FU
Yes.

ROBERT ANTHONY
For pathogens which don't yet exist?

DR. BIAN FU
Yes. But one day, they could spillover from the animal population to humans and mutate. We'd have already developed a medical treatment.

ROBERT ANTHONY
Does the government regulate this experimentation?

DR. BIAN FU
The US government imposed a moratorium a few years ago in response to incidents. A few times a year, an infection acquired in a laboratory occurs somewhere in the world. It can involve pathogens as serious as Ebola. But the US government has since lifted the moratorium. I, too, had my concerns about conducting such research in a city of several million like Kunming. Magnus was trying to prevent further pandemics by research in the underlying epidemiology. But this is the fraught world of zoonosis we live in. We disturb bat populations in the wild at our own peril, even in the noble name of science.

(switching gears)
"Are your own efforts to unearth what's happened to find out where and

why Dr. Hammarstedt has gone missing?
Or is the culpability of your
foundation's funding the stronger
driving force?

Robert senses Bian intended the comment as a pointed rebuke.

ROBERT ANTHONY

It's a fair question, Dr. Bian. To
figure out what's gone on with Magnus
for sure, but I'm on the hook for all
this having gone on under my nose too.
The buck stops with me. Could I
request access to Dr. Hammarstedt's
lab reports and any other files from
his work in China at the KIZ.

Bian's face shows a smoldering bitterness, now with a
smugness too.

DR. BIAN FU

I can't give you this. I will have to
check with our lawyer at the KIZ.

ROBERT ANTHONY

(taken aback)

Your lawyer? What do you mean? I've
funded the project. I don't
understand.

(stops, astounded, exhales)

Dr. Bian, I can't have you working on
this project if you can't be
forthcoming and transparent with me.

(considers for a moment, then
shakes head)

You must leave this project if you
can't be forthcoming with the lab
reports.

DR. BIAN FU

(raises eyebrows in a dismissive,
accepting way, shrugs shoulders)

OK. Fine.

Bian stands up, masking any indignation well, and leaves the
lab.

CUT TO:

Robert phones Laetitia Verte, president of the Anthony
Wildlife Trust.

ROBERT ANTHONY

I'm after the Trust's underlying documentation for the work funding Dr. Hammarstedt. Whatever you can rustle up. What's acceptable for us to request access to from the respective project institutes? As the funding body. Can we ask for lab reports, any notes taken, emails, hard drives even?

LAETITIA VERTE

If we funded any IT equipment for the project.

ROBERT ANTHONY

Would Magnus have been working on the Trust's computer network, or the university? Could he even have been using the KIZ network when he was in China?

LAETITIA VERTE

It'd depend on whether he chose to save files to the Trust's network or another institute. He even could've used a personal drive, whether stored online, or a hard drive.

ROBERT ANTHONY

But in the event Magnus has saved files of interest on the Trust's network, can we access them?

LAETITIA VERTE

Yes.

TITLE CARD: CENTER FOR PSYCHIATRIC RESEARCH, NOVEMBER 16

INT. CENTER FOR PSYCHIATRIC RESEARCH, DR. WU'S OFFICE - NIGHT

ROBERT ANTHONY

(warm smile, knocking at the door frame)

Me again

Dr. Wu lets out a fond laugh, smiling in a friendly manner.

DR. NAOMI WU

What can I do for you, Mr. Anthony? I'm relieved you're paying my salary, otherwise I'd have to start billing

you.

Robert bites his lip before starting, aware of the absurdity he's about to utter.

ROBERT ANTHONY

I have some follow-up questions from my friend we spoke about last night. I want to know, could a bat tissue or cell grow inside a human?

Naomi laughs, then straightens up, still smiling.

DR. NAOMI WU

It seems far-fetched to me. The more pertinent question most likely is, what would be the implications of its failure?

Robert pauses.

ROBERT ANTHONY

The focus of the work you do is developing a viral vector for the purposes of gene therapy, correct?

Naomi nods.

ROBERT ANTHONY

I'm here again about the colleague I came to you for last night. The focus of their work is the threat of emerging infectious diseases.

DR. NAOMI WU

(without intending to be in humor)
A great irony. A sick man researching epidemiology.

ROBERT ANTHONY

(gestures acknowledgement)
I imagine this research started out beneficent. But as we discussed last night, there's a strong pattern of turning his work upon himself. Could genetic engineering alter viruses to make them more infectious?

DR. NAOMI WU

Yes. But only with research universities with biosafety level 4

standards.

Robert considers this.

ROBERT ANTHONY

Does much stop anyone from adhering to the biosafety levels? Whether the facilities are up to the required standard?

DR. NAOMI WU

There's a possibility. But working outside the necessary biosafety levels, could risk one's career.

ROBERT ANTHONY

What's a typical biosafety level 4 pathogen? Ebola?

DR. NAOMI WU

Yes. Pathogens spread by aerosol. Transmissible between people in the air from the mouth and nose. A lot of the BSL 4 viruses are zoonotic or have bat origins.

ROBERT ANTHONY

What does an institute need to be eligible for BSL 4?

DR. NAOMI WU

You change your clothes and shower before entering the lab and decontaminate. Wear all-body protective suits supplying air. The lab is either in an altogether different building, or otherwise restricted. Plus, the facility needs a supply of air, as well as an exhaust.

ROBERT ANTHONY

Could someone work on transmissible viruses outside a BSL 4 facility?

DR. NAOMI WU

(raises brow, rolling eyes to the side)

They could. One would hope their peers would catch wind of what they were doing. A BSL 4 facility wouldn't even allow someone access unless they'd

undergone training.

ROBERT ANTHONY

If someone wanted to get genetic material into their cells, could they via a viral vector?

DR. NAOMI WU

Yes, with the help of a molecular biologist. But any professional would deem testing on a colleague to be unethical. But in a technical way, they could try to introduce foreign DNA. It'd work like a vaccine.

ROBERT ANTHONY

Is it safe?

DR. NAOMI WU

(sucks her teeth)

No. Scientists use parts of a virus which would be pathogenic, but modified, like we do here. The body doesn't overreact to the intrusion. It's a balancing act. We want the viral vector to infect the organism, but the body to continue to function. Gene therapy is different to vaccines - it's therapeutic, rather than preventive. Someone treated has a genetic disorder in their DNA. Gene therapy corrects these mutations. By contrast to a vaccine, we don't want to see an immune response provoked. It is possible to lower white blood cell count by taking medication. If an alteration is radical though, the body will reject it. You're thinking your friend somehow tried to turn himself into a mutant or hybrid? What you're entertaining as possible is the realm of science fiction. The greatest minds I know, specialized in their fields, can't come close to what I sense you're considering.

No one in the scientific community has any stake in assisting someone not of a sound mind. He couldn't have gotten the help necessary to come close to a mutation. I'm sorry, Robert. But

anyone can collect a bunch of academic articles together on abstract possibilities. By the sound of it, your friend's meanderings have only served to mislead you, down the rabbit hole with him.

TITLE CARD: ANTHONY WILDLIFE TRUST HQ, MIDTOWN MANHATTAN,
NOVEMBER 16

INT. ANTHONY WILDLIFE TRUST, LAETITIA VERTE'S OFFICE - NIGHT

Laetitia Verte's office is among the eyrie of midtown's neo-Gothic and Art Deco skyscrapers. The office's furnishings are elegant and handsome.

ROBERT ANTHONY

Dr. Hammarstedt's research could've had less than desirable consequences, which the Trust funded. It's important to mitigate anything further which might be unwelcome.

LAETITIA VERTE

How bad?

ROBERT ANTHONY

I'm apprehensive about how dire such implications could be. It could mean harm coming to himself, or a broader swath of others.

LAETITIA VERTE

What do you mean?

ROBERT ANTHONY

As you know, some of Magnus's work centered on the potential of bat zoonoses. Some of his research had a biosecurity facet. For all we know at this point, he complemented the funding from our foundation with another. He could've been seeking to explore biodefense ends. It's an open question, not an accusation - a possibility among many. Magnus seems to have been experimenting on himself. If the research he conducted poses a risk to others, as the financier of the research, I'm responsible. This goes double if Magnus has taken leave

of his senses.

LAETITIA VERTE

Do you have reason to believe Magnus's work, if malign, has been in tandem with anyone else with malicious intent? What do the notes you found in his home study suggest?

ROBERT ANTHONY

I'm feeling confident he must be acting alone in anything which might be nefarious. There was laxity in safety protocols at Dr. Bian's lab in Kunming. Any of the risky research undertaken as part of the project seemed to have a dearth of guardrails. My expectations around the nobility of the scientific community were far too optimistic. The buck stops with me. Any lack of guardrails is because the funding in my name didn't ensure any as a precondition. I realize I had a lot of naivete and lacked understanding. My optimism around scientists self-regulating their work was naive. If there's still room for me to make amends, I'd like to, if it means further harm coming to no one else besides Magnus.

(looks straight on at Laetitia)
Do you think I'd be crazy to go to Kunming to speak with Magnus's colleagues?

LAETITIA VERTE

(breathes in with depth, exhales,
rubs her forehead)
Does much keep you from contacting them from here?

ROBERT ANTHONY

I've already contacted a couple of the project team members by phone. Each hung up once I said who I was, which leads me to imagine Dr. Bian had already spread the word not to talk to me.

LAETITIA VERTE

This is absurd. You're the project's

patron.

Robert turns his head to the side, in acknowledgment of the shared incredulity.

LAETITIA VERTE

Why would they speak to you in person in Kunming, if not over the phone?

ROBERT ANTHONY

(raises brow)

It's a risk. I can only bet if I'm in front of them, it'll give them less room to wriggle and obfuscate.

LAETITIA VERTE

(shakes head)

You're right, it is a risk.

(scoffs in exhalation)

It's a long way to go for what might leave you empty-handed. I don't even see why you need to involve yourself in this way?

ROBERT ANTHONY

I'm responsible for my philanthropic foundation funding Magnus's research.

LAETITIA VERTE

There isn't a direct culpability between your dollars and the state of Magnus's mind. Does it matter whether you're responsible, or where the funding came from? Magnus hadn't stated outright malign intent in the final funding application. The way I see it, this circumstance is because of Magnus's conduct.

ROBERT ANTHONY

(shakes head)

Since reading the proposal, red flags in the stated direction of Magnus's research now seem obvious to me.

LAETITIA VERTE

But you don't assess every grant application - a committee does," argued Laetitia.

ROBERT ANTHONY
But my name's all over it.

LAETITIA VERTE
At least it was accidental. It's not
as though you knew the funding could
risk adverse effects visited upon
others.

Robert's covering his mouth with his hand as he considers,
taking in the counsel.

ROBERT ANTHONY
Accidental or not, I still need to
take responsibility and make amends
where possible.

Laetitia takes in a deep breath and sits upright. She rubs
both her thighs, poised to strike a compromise with her
instinct.

LAETITIA VERTE
Let me do the legwork you need here if
you feel it necessary to go to
Kunming. You're right. There could be
a grave danger greater than the
dilemma of Magnus's whereabouts. The
Trust has an opportunity to take
accountability now for what it's
responsible for. Even if Magnus and
the project team hid it from us.

Robert nods, relieved they're on the same page.

ROBERT ANTHONY
Imagine we're caught flat-footed if
the worst of these suspicions comes to
pass. We'll regret not having taken
accountability. The evidence from the
draft proposal of their intent can be
an opportunity for us to make amends.

LAETITIA VERTE
(nods, still holding reservations)
There's little harm for you to go. If
you need to speak to anyone here, you
can do so by phone over there, or I
can do it for you. To clarify, so I'm
not left wondering, what's your worst
suspicion?

ROBERT ANTHONY

(gathers thoughts)

Behind the back of the project team, Magnus tried to engineer a pathogen. There's also the potential for an accident because of the lower biosafety levels.

LAETITIA VERTE

Why would Magnus engineer a pathogen? Do you mean to make it more transmissible than any mutations arising from the natural world?

ROBERT ANTHONY

Yes. Given the combination of his mental deterioration and preexisting hostility to humans. There seems to me a moderate degree of probability. You disagree?

LAETITIA VERTE

No. I can see it. I don't agree about there being a moderate degree of probability. The likelihood is low to my mind. If you think so though...

ROBERT ANTHONY

(smiles)

I hope you're right, and I'm very wrong.

LAETITIA VERTE

(laughs in relief, rolling her eyes, exasperated)

I do too. You better get yourself to Kunming then.

(gets up, pauses)

Robert, what if there's no leads there? He could still be here in the city, or somewhere altogether different.

ROBERT ANTHONY

(shakes head)

I've no idea where he might be.

ACT II

TITLE CARD: PART II - ANIMUS

TITLE CARD: KUNMING, YUNNAN, CHINA, NOVEMBER 17

PLANE LANDS IN KUNMING INTERNATIONAL AIRPORT. MONTAGE OF CITY SCENES:

Robert's taxi makes its way throughout the city. The downtown appears like any other major Chinese city. A wealth of tower blocks. Shopfronts with pockets of flowering plants, occasional temples, and pagodas.

INT. KUNMING INSTITUTE OF ZOOLOGY - NIGHT

TITLE CARD: KUNMING INSTITUTE OF ZOOLOGY, NOVEMBER 17

Robert enters a laboratory.

DR. BÈI

What do you want to know?

ROBERT ANTHONY

I need to know what Magnus...or you...might have been trying to hide relating to bioengineering.

DR. BÈI

(nods)

I know Hammarstedt had made overtures to genetic engineering firms. To license their tools in exchange for his findings. I confronted him about it two years ago on the matter. He didn't have the necessary training and background. I felt concerned he didn't have guardrails around whatever it was he was doing. The genetic engineering firm shouldn't have been so lax about whom they shared such tools with.

ROBERT ANTHONY

Do you know whether Magnus had any breakthroughs?

DR. BÈI

I know he didn't. It was a dismal failure.

ROBERT ANTHONY

How do you know?

DR. BÈI

He came to me in tears over it - out of his depth. He'd squandered a lot of money on these tools. I don't know the specifics, but my guess is it would have been a small fortune. I don't know if he received funding for it. Some of it, if not the bulk, could have come from his own pocket, is my guess. Very unorthodox. He hadn't staked his reputation on it, as few people knew he was trying these tools outside of myself. There was no shame to be had, as I had no expectation he'd make any headway. How could he, without years of training in using such tools?

ROBERT ANTHONY

Do you picture it could be of any use were I to make contact with the genetic engineering firm, to see if they had any clues about Hammarstedt's whereabouts?

DR. BÈI

You could try, but I don't see why they'd know or care. In some ways, they preyed on his naivete - saw a sucker coming, and took his money, knowing full well it would end in tears. I know two of the directors from my postgraduate studies - cowboys, both. I feared they were in it only for the windfalls.

ROBERT ANTHONY

Dr. Hammarstedt intended to use these tools on himself?

DR. BÈI

(face furrows)

Magnus approached me, outside the context of Project CONSERVE, about gene therapy. He wanted to explore the possibility of modifying genes of cells to create a chimera.

ROBERT ANTHONY

As in the mythological lion with a head of a goat and a snake for a tail?

DR. BÈI

This is the origin of the term, but it has a different meaning in genetics. I sensed Magnus was curious about a range of applications. Combining the genetic material of different organisms.

ROBERT ANTHONY

Bats and human genetic material?

Dr. Bèi ignores the question.

DR. BÈI

This all presumed the recombination of the genetic material was successful. The likelihood of a host organism rejecting the introduction of the foreign DNA was high. But there could be a chance the introduced genetic material would express itself.

ROBERT ANTHONY

Meaning the subject could begin to exhibit characteristics?

DR. BÈI

Nothing as fanciful as growing a goat head or a snake tail. But past experimentation has shown fascinating traits. There are many genetic engineering techniques. But I wouldn't presume Magnus, on his own, could become an expert in them. Magnus was a very capable scientist, with good connections. But this didn't mean colleagues would help him with no good reason. His comprehension of genetics wasn't sophisticated. I was able to help him, as an expert in the field, but only up to a point. When Magnus's attention later led where it did, I distanced myself. In hindsight, I should've whistle-blown Magnus. I can recognize my clouded judgment.

ROBERT ANTHONY

Is it possible he attempted to proceed with manipulating DNA between different organisms?

DR. BÈI

If he were running such a program with the relevant experts, I have to imagine it would be public knowledge by now.

ROBERT ANTHONY

Could he be the lead on such a funding proposal -with a different backer, not Anthony Wildlife Trust?

DR. BÈI

The precautionary principle would apply from grant bodies. No credible fund would finance blending the genes of bats into humans.

ROBERT ANTHONY

Could Magnus alter sampled viruses taken from bat populations in the wild? Engineer them to make a big dent in the human population? A deliberate zoonosis.

DR. BÈI

Do you mean an act of ecoterrorism? You're supposing Magnus sought biodefense ends behind all our backs? To harness a pathogen as a bioweapon?

ROBERT ANTHONY

It's a theory I'd prefer to put to sleep, which is why I'm running it past you.

DR. BÈI

He would have to be acting alone.

ROBERT ANTHONY

Dr Bèi, I found the draft proposal showing you, Dr. Bian Fu, and Magnus, misled the Anthony Wildlife Trust.

DR. BÈI

It's true. We took insufficient precautions of biosafety in the lab

for the type of pathogens we dealt with. Our facilities here at the KIZ are to the standard of biosafety level 2. Many pathogens hosted in bats warrant biosafety level 3 or more. This was not borne out of malice. It was to cut costs, as I understood it. Under US regulation, we would need a BSL 4 facility. Which Magnus' university had, but the budget would've ballooned. The Anthony Wildlife Trust wouldn't have considered an application so expensive. Chinese regulations have more discretion to choose the level of biosafety.

ROBERT ANTHONY

Dr. Bian instructed you not to speak to me, correct?

Dr. Bèi nods.

ROBERT ANTHONY

Why? What's Dr. Bian Fu's role in all this?

DR. BÈI

(grimaces)

Dr. Bian is a proud academic, with a stellar reputation. Other than Magnus, she has more expertise in this field than anybody. It's understandable why she takes exception to challenges. Even from a deep-pocketed patron such as yourself. It's possible she has some guilt about our deception to the Trust in relation to the proposed biosafety. We deemed it safe, but others might consider it risky. My bet would be Dr. Bian, like me, had the same concern about Magnus's mental state. Dr. Bian and I should've heeded the signs of his decline, and intervened.

Good luck. Let me know if you discover Dr. Hammarstedt's whereabouts. What are your next steps?

ROBERT ANTHONY

I'm planning to visit Xishuangbanna,
to speak your Project CONSERVE
colleague, Dr. Cardia.

DR. BÈI

Oh, yes. Magnus had been conducting
research trips to the rainforests
there.

ROBERT ANTHONY

Do you know what for?

DR. BÈI

No. But it was one of the last trips
he made before going missing. The team
at Xishuangbanna Tropical Botanic
Gardens will know more. One of the
cave biologists there - not a member
of the Project - was to go with him on
the trip but fell ill. You may be able
to speak with them there.

ROBERT ANTHONY

Can you think of anything worth
mentioning about Dr. Cardia in
relation to the Project, or Magnus?

DR. BÈI

(raises eyebrows)

No. She also shares with Dr.
Hammarstedt some of those sentiments.
Holding humanity in contempt.

TITLE CARD: XISHUANGBANNA TROPICAL BOTANICAL GARDEN, NOVEMBER
18

EXT. XISHUANGBANNA TROPICAL BOTANICAL GARDEN - DAY

Dr. Cardia greets Robert at the pond next to the visitor's
center of the XTBG. Covering the water's surface are lily
pads several meters in diameter. These are overseen by palm
trees, tall and uniform like flagpoles. Surrounding this are
hectares of manicured gardens, giving way to virgin
rainforest.

The two walk the grounds of the garden as they spoke. Robert
feels the need to break the ice with Dr. Cradia. He's ill at
ease in her company, detecting an undercurrent of unexplained
scorn.

ROBERT ANTHONY

I'm curious about the Garden's vision as a 'Noah's ark of tropical plants.' What does this entail?

Though a simmering disdain persisted, the doctor seems enthused to discuss the topic.

DR. ANA CARDIA

We operate a seed bank here for endangered tropical plants. It's intended to preserve the genes of plant species. Should an extinction ever occur, we could bring the species back using the preserved seed.

ROBERT ANTHONY

I wanted to know what you could illuminate from your work alongside Dr. Hammarstedt. Could Magnus have been developing a virus, adapted from the bat population?

The suggestion seems novel to Cardia.

DR. ANA CARDIA

(shakes head with confusion)

What would be the motive?

ROBERT ANTHONY

I know how Magnus felt about the state of humanity. The impact it's having on the environment and biodiversity. He was very vocal on how much he despised deforestation. When humans change natural, wild environments to make way for humans.

DR. ANA CARDIA

Magnus cared, in a very deep way, about the ecosystem, and the fragility of ecologies. It's very infectious and inspiring when he invokes such thoughts. I envied his ability to suck the marrow of nature. It was beautiful how he communicated and educated others on the topic. But, in contrast to what you're suggesting, he believed the greater threat was a reverse zoonosis.

ROBERT ANTHONY

His concern was for the capacity for human populations to introduce infectious diseases?

DR. ANA CARDIA

Not in a literal sense. My interpretation was he meant zoonotic disease was the defense against humans.

ROBERT ANTHONY

Meaning humankind was the virus of nature?

DR. ANA CARDIA

(nods)

Yes. I can't disagree with him.

(ventures a fierce look of resolution)

Let's consider the pathogens which have crossed over into the human population from bats. SARS, MERS, Ebola, Nipah, Hendra. What do we expect? We force bat colonies to roost in abandoned mineshafts because we fell the forest. Man forces the colony to compete for food with civilization and domesticated animals. Farmers use bat guano as fertilizer in agriculture. The irony being agriculture is one of the drivers of the land clearing of bat habitats. This brings wild bat populations into proximity with human settlements. Bats live in the biggest populations except humans - one in every four mammals. No wonder our species are abutting theirs. We don't appreciate what it means for wildlife to remain wild.

The Hendra virus came from bats infecting a horse in suburban Australia, causing them to die. Farmhands tried to hand-feed the dying horses. They contracted flu-like symptoms and died themselves. Why? Because fruit bats nibbled on the same food as the horses. Why are bats sharing food with domesticated horses? Deforestation, depriving the bats of

their habitat and food sources. The bats are more likely to shed the viruses they carry when distressed. Wild animals are suffering in proximity to the human settlements we've imposed on them. We're feeling the blowback. The same story with Ebola virus, Lyme disease, malaria. This is what happens when we deforest. Though we're surprised when these pathogens spillover.

What is more miraculous than life? Yet we treat it like it's nothing. We need genetic variability and a diversity of species. Although cattle and urban dwellings are more precious to us than tropical rainforests. I'm not sure whether you came here to hear my diatribe or not. You might feel my views are a little strong...but it doesn't keep them from being correct.

ROBERT ANTHONY

Was Magnus a misanthrope?

DR. ANA CARDIA

(pauses, sighing)

For certain he was against anthropocentrism. He by no means believed humans were the center of the universe, let alone planet Earth. At the same time, he was a part of mankind. I prefer to think of Magnus as an altruistic misanthrope.

Vampire bats need to consume up to their full body mass in blood each night to survive, lest they starve. They can lose a quarter of their mass within a couple of days and die. Yet they're also among the few examples of altruism in the animal kingdom. Vampire bats bring back blood sucked from their prey to the roost. They give this to the young, or those members of the roost who cannot hunt - at their own expense, even if not relatives.

"How can you defend mankind.

Geologists coin the modern era in our name. We've led ourselves to the brink of the mass extinction of millions of species. We factory farm helpless animals. Mankind allows millions of children to die of preventable diseases. On a scale equal to an annual holocaust. Is misanthropy, through a different lens, not a love of life in its whole? Are we exceptional? Why is violence committed upon the biosphere condoned?

ROBERT ANTHONY

Meaning the environment justifies violence?

DR. ANA CARDIA

(as though personal toward Robert)
Civilization is violence. Factory farms are violent. Resource extraction is violent. Combusting fossil fuels is violent. Even our social systems are violent. Nature does not have violence. A tiger mauling an antelope to death isn't violence - it is nature taking its course. There's a balance in it. There is no balance to what man does.

ROBERT ANTHONY

(sighs)

What if a human victim was innocent?

DR. ANA CARDIA

Is the antelope in the example I gave innocent? It's neither innocent nor guilty. Nature makes no discernment. Do we mourn the antelope? If we watched the mauling happen in a nature documentary, we would feel sadness for the antelope. But we recognize nature taking its course. Why should we make a distinction for so-called innocent people of our own species?

Our civilization supports what ought to be crimes against the environment, which cannot speak for itself. Tell me, who is not responsible for civilization's adverse effects? If you

pick any person, and they are not responsible for all the world's ills, then who is?

We diffuse responsibility, yet we cannot all shift the blame. Dislike the notion all you like. No matter how noble our intentions, or altruistic our actions, we all leave this world worse off than we found it. We could've co-existed, Robert. But our species has a pathology putting us central, the same as when astronomers believed the Sun and planets of the solar system orbited the Earth.

ROBERT ANTHONY

Dr. Isley, your colleague, Dr. Bèi, advised me Magnus was last seen on a research trip somewhere in the rainforest. Is this also your understanding?

DR. ANA CARDIA

It is. I'd suggest speaking with one of our researchers, Dr. Dong Xue. She's not a participant of Project CONSERVE, but often went with Dr. Hammarstedt on trips. Dr. Xue was to join Magnus on the most recent visit to a cave in the prefecture, though she fell ill and couldn't go. I'll introduce you to her now. Let's head back toward the laboratories.

INT. SPELEOLOGY LAB - DAY

TITLE CARD: BIOSPELEOLOGY LABORATORY, NOVEMBER 18

Dr. Dong Xue faces her lab computer when Dr. Cardia introduces her to Robert, leaving them alone to talk.

ROBERT ANTHONY

Can you tell me everything you recollect from the plans of the most recent trip with Magnus?

DR. DONG XUE

Yes, I'd taken ill.

ROBERT ANTHONY

You've accompanied Dr. Hammarstedt on research expeditions many times before?

DR. DONG XUE

Yes. We explored many cave systems in southwest China. My field of specialization is cave biology.

ROBERT ANTHONY

How many trips would you say you took together?

DR. DONG XUE

Close to thirty.

ROBERT ANTHONY

Were the two of you close?

DR. DONG XUE

(snickers, trying to mask it)

No, far from it. I'm sorry to laugh. Dr. Hammarstedt is a very eccentric, remote person. His behavior had become erratic, and his work began to lack rigor. His mind...had begun to deteriorate. It was steady, not a dramatic drop, but it became...sad. I don't know how. He became ill in some way.

ROBERT ANTHONY

When the two of you traveled together, you must've talked some?

DR. DONG XUE

Yes, but...he was in his own little world. I pitied him.

ROBERT ANTHONY

Other colleagues were of the same mind as you on Hammarstedt's decline in mental state?

DR. DONG XUE

Yes, we joked about it, I'm embarrassed to say.

ROBERT ANTHONY

Would you be able to guess

Hammarstedt's mental condition? I'm not asking for a diagnosis. I know you're not a medical doctor. I'm curious about your best guess.

DR. DONG XUE

No. I'm sorry, I have no idea. Mental illness does not have the same attention in China as it does in the West. He seemed like he was going crazy. It had become severe. I was fearful of going on this last trip together. I hadn't said this to anyone before, but my pneumonia leading up to the trip was...I'm sorry, I don't know this in English...

ROBERT ANTHONY

(fumbles for a moment, before apprehending the connection)

You mean your body responded to what you worried about in your mind?

Xue nods.

ROBERT ANTHONY

Psychosomatic?

DR. DONG XUE

Yes! Like a body-mind interaction. I noticed he'd begun talking to himself. It sounded like he was talking to someone, not like when you mutter to yourself. It was like a conversation. I started to find it scary and felt unsafe. He hadn't been violent, but it began to feel like it might only be a matter of time before he did. He would get angry with whoever it was he was talking to, in his head - almost screaming.

Robert exhales in exasperation.

DR. DONG XUE

I didn't bond with Dr. Hammarstedt. But I respected him and the quality of his earlier work and didn't wish ill fortune to befall him.

ROBERT ANTHONY

Can you tell me about any areas where your own research overlapped with Hammarstedt's?

DR. DONG XUE

I study any lifeforms found in caves and karst systems. He was studying bats and collecting samples.

ROBERT ANTHONY

Did your own work focus on bats, Dr. Xue?

DR. DONG XUE

Not focused upon - cave life in general. Caves are home to a rich biota, though shut off from the world. We don't know how much life there is in there. We categorize cave life into troglobitic species, troglaphiles and sub-troglaphiles. Troglobitic species have adaptations for caves, including some worms, mollusks, spiders, millipedes, crayfish. There are no troglobitic mammals. Troglaphiles divide their life between caves and above the surface. Sub-troglaphiles frequent caves or spend part of their life in caves. But they also need to live above the surface. Bats belong to these second and third categories. They sleep in caves during the day, but hunt outside at night.

ROBERT ANTHONY

Would Dr. Hammarstedt go with you deep into exploring the cave system?

DR. DONG XUE

Yes, for his own research. Other times I needed help. It can be dangerous to be in cave systems by oneself.

ROBERT ANTHONY

Would it be possible to provide me with a listing of the locations of the research trips? It might help me connect some dots.

DR. DONG XUE

Yes, Magnus developed a database you could use. It's a collaborative platform for sharing data of bat caves all over the world.

ROBERT ANTHONY

For conservation purposes?

DR. DONG XUE

Yes, for biodiversity. It helps us to check where and when bat populations shift in their range.

ROBERT ANTHONY

What sort of information does the database show?

DR. DONG XUE

There are a couple of datasets - I'll show you.

(pulls swivel chair to computer and opens a spreadsheet)

This first dataset shows the location and name of each cave, and the bat species within.

(opens another spreadsheet)

This dataset corresponds to the IUCN Red List. It tracks all bat species threatened with extinction.

ROBERT ANTHONY

To what extent would caves in this database have surveys or maps?" asked Robert.

DR. DONG XUE

Each to varying extents. Some surveying I've done, other cave systems we would be working from pre-existing surveys.

ROBERT ANTHONY

Do you have any of these at hand you could show me?

DR. DONG XUE

Very many.

ROBERT ANTHONY

Can a layperson follow these?

DR. DONG XUE

Cave surveys follow many similar principles from other maps and forms of cartography. You're caving?

ROBERT ANTHONY

I'm assessing my options.

DR. DONG XUE

Were you to enter a cave system, there would need to be several precautions to take. You'd need the right equipment to begin with. There can be little information about changed conditions. This can affect what's on a map in great ways. Vital details can be missing.

ROBERT ANTHONY

Would it be possible to show me an example of a cave system you and Dr. Hammarstedt did some surveying work on? As an example?

Dr. Xue opens a file, a hand-drawn cave survey overlaid with computer-drawn objects.

DR. DONG XUE

This map is a birds-eye view, like most maps. But there are three-dimensional ones, showing the volume. The modern standard is for surveys created with computer-aided design. Maps like this one are old, but still used. Dr. Hammarstedt helped me survey a couple cave systems - to break up the load. We would sometimes aid one another, like a barter for one another's research.

ROBERT ANTHONY

What's the process of surveying?

DR. DONG XUE

The old school way is simple, remaining the same for centuries, using a compass and measuring tape. Now though, we use a digital instrument or laser rangefinder.

ROBERT ANTHONY

Is there a standardization of how accurate maps are, or is it all subjective?

DR. DONG XUE

No, there are grades of accuracy. Caves which don't get much attention mightn't have a grade. One of the best aspects of cave surveying software is keeping surveys up to date. Which is great, because you don't want a partial map.

ROBERT ANTHONY

There's one set of symbols on these maps used across cavers?

DR. DONG XUE

Yes, standardized by the international body for caving and speleology. How necessary is it to know this? What are you expecting, you'll find Hammarstedt in a cave?

ROBERT ANTHONY

If I wanted to check out one of these cave systems myself, would it be naive on my own, if I had a map with me?

DR. DONG XUE

Do you have any experience caving solo?

ROBERT ANTHONY

None.

DR. DONG XUE

No one goes alone. It's far too dangerous. Which cave did you have in mind?

ROBERT ANTHONY

Caves Magnus's conducted research in - the last he's known to have visited - the one you both intended to visit.

DR. DONG XUE

To try to find him there?

ROBERT ANTHONY

It isn't possible for someone to dwell
in a cave?

DR. DONG XUE

Like our prehistoric ancestors, the
cavemen? Even in the prehistoric era,
it's likely our conception of cave
people is false. Humans don't do well
in damp, dark and cold environments.
Humans could dwell at the mouth of
caves, but not deep inside.

It's worth keeping in mind, people
have different reactions to being in
cave systems. Some find it hostile;
others feel as though some caves are
teeming with life, which can bring on
its own feelings. In China, it's
estimated we're yet to define 90% of
the invertebrate species in caves. I
assume, if you're considering
following in Magnus's footsteps,
you'll be visiting caves where bats
live. If you visit bat caves during
winter, when they're hibernating, you
risk disturbing them. Once awakened,
there's no food outside for them to
nourish themselves.

ROBERT ANTHONY

Would you be able to tell me the
location of Magnus's last known trip?

DR. DONG XUE

(sighs, not getting through to
him)

Yes. It was a cave in the
Xishuangbanna rainforest.

She opens another file of a cave survey, pointing to the
geographical coordinates.

ROBERT ANTHONY

Why was Magnus using this cave for
research?

DR. DONG XUE

Because of the genetic diversity of
bat species inside. Viruses can spread
and adapt with ease to new species

within the same order - bats, in this instance. Viruses, like species, differ in their genome. Researchers in the field take swabs, either from the bat, or their guano deposits. Then they can extract the viral genetic material. The genomes of the viruses are then cataloged in a database. The research is proactive. To find what geographic regions have the greatest spillover potential.

ROBERT ANTHONY

Do you know whether he came back from this trip?

DR. DONG XUE

I hadn't heard from him, nor have others from the Garden's other labs.

ROBERT ANTHONY

It's possible he could still be in the cave?

Dr. Cardia re-enters, enquiring how the two of them are going. Dr. Xue shoots Isley a look, and Ana asks Robert if she could have a word alone with her.

Robert steps out of the lab, into the hallway, feeling awkward.

INT. HALLWAY - DAY

After conferring with Xue, Isley slips out into the hallway with Robert.

ROBERT ANTHONY

Mr. Anthony, I know you haven't asked for my advice, but forget the cave. Magnus isn't living in a cave in the rainforest. No one, no matter how ill, is living in caves. People die in caves, but not live. How worthwhile is it for you to venture into the jungle? Dodging tigers, bison, and elephants, looking in vain for a man who's lost his mind? I'd question your own sanity for following through on such a pursuit.

I'm not dismissing your instinct. Only

trying to temper it or infuse some sense. The notion you can rescue Dr. Hammarstedt is folly, a fixation.

Caves inspire fear and wonder of what might lie within. Dark, claustrophobic, mysterious. But they're environments of which some species have adapted. Humans can visit, at some risk, with specialized equipment. There's no dead soul of Dr. Magnus Hammarstedt in the underworld to which you could journey. It is the literal allegory of Plato's cave. The shadows projected on the cave wall appear to show a representation. The meaning is the sciences will show us reality, not the myths we perceive.

Caves seem full of wonder and mystery. They are due to the adaptations of subterranean life and geology. But anything further you project onto caves is a figment of your imagination.

Cardia pauses, conscious she's affecting Robert.

ROBERT ANTHONY

You and Dr. Xue have made the risks clear to me.

DR. ANA CARDIA

(sighs)

Why is this of great priority for you? You appear fixated on the outcome of his whereabouts. How responsible could you be?

Robert holds the silence.

DR. ANA CARDIA

(resigned)

As one of our benefactors, I'll arrange for some caving gear. You'll need a wetsuit, waterproof boots, a helmet, and headlamp. If you intend to abseil into any vertical pits, you'll need a harness and carabiners. I hope you know what you're doing.

EXT. XISHUANGBANNA RAINFOREST - DAY

TITLE CARD: XISHUANGBANNA RAINFOREST, NOVEMBER 19

Robert is alone in the rainforest, under a dense tree canopy. He passes a colony of megabats.

Robert meets the cave, mossy boulders, and thick lianas either side of its mouth. The opening leads into a narrow horizontal gallery. Sunlight penetrates only several meters into the passage.

Turning on his headlamp, he retrieves a printed copy of a survey of the cave.

INT. CAVE - DAY

Robert reaches the point along the first gallery where natural light goes no further. The survey shows a descending step, following by a vertical pit, dropping off. According to the survey, the chimney is 40 feet deep, and five feet wide. He leaps across with a short run-up. The gradient then increases downward at a precipitous rate.

We begin to hear flowing water. The survey shows a waterfall, a few meters high, up ahead, cascading into a small lake.

Robert tries to scale down the adjacent wall. It's a calcite flowstone formation, resembling a waterfall of rock. He lost his footing on the slippery wall a couple meters from the surface, water breaking the fall.

Robert paddles to the edge of the water on the other side.

Vertical stalagmites and stalactites covered the ceiling and floor of the hall. He goes ahead down a gallery leading off from the hall. Curious limestone deposits protrude at odd angles of deposit from the wall. They're covered in a white, creamy cave milk made from crystallized limestone.

A smattering of microbats fly around. We begin hearing strange noises.

The cave walls now turn very dusty, and the height of the gallery lowers a few feet, so he's now crouching.

We begin to hear the increasing sound of many bats at the opposite end of the gallery. Several try to pass as he crouches forward.

The survey showed the gallery he's in will open to a chamber,

200 feet in height, then goes no further.

Robert passes through the gallery into the open space, akin to a modest cathedral. The number of bats roosting from the ceiling numbers in the thousands. As far as his torch illuminates though, no signs of Magnus.

ACT III

TITLE CARD: PART III - ANIMA

TITLE CARD: NORDGEN, SWEDEN, NOVEMBER 22

NordGen's location is a castle among landscaped grounds now serving as a university. Built in the style of French Renaissance architecture, it resembles a modest château. Ivy climbs on its facade. The castle overlooks the shore of the Oresund strait to Copenhagen.

Dr. Yelizaveta Romanenko greets Robert on the lawn of the castle's entrance, continuing to her lab.

INT. NORDGEN LAB - DAY

ROBERT ANTHONY

I appreciate you making the time, Dr. Romanenko.

DR. YELIZAVETA ROMANENKO

You're welcome. I made the time without knowing what you needed, other than you're a beneficiary of Project CONSERVE.

ROBERT ANTHONY

Yes, the project lead, Magnus Hammarstedt, has been missing. I've been contacting the other institutes for the project in Gotham and China. NordGen's the last on my list.

DR. YELIZAVETA ROMANENKO

I hope we can be of some benefit, though I'm sorry to say, I'm not confident how. I don't believe Dr. Hammarstedt ever visited our institute in person.

ROBERT ANTHONY

Could you tell me about your dealings with Magnus throughout the course of the project?

DR. YELIZAVETA ROMANENKO

I've been the sole contact from our institute with Dr. Hammarstedt, though I've not met him, either here or elsewhere.

ROBERT ANTHONY

Your involvement was in the context of providing cryonics?

DR. YELIZAVETA ROMANENKO

Correct. I'm a cryobiologist. I study what happens to life in freezing temperatures.

ROBERT ANTHONY

How do the cultures native to the Arctic manage to adapt?

DR. YELIZAVETA ROMANENKO

The temperature inside a well-built igloo lined with fur on the walls and floor can be 10-20 degrees. Also, their fur clothing keeps them very warm. Those communities and cultures have adapted to such conditions over a thousand years.

ROBERT ANTHONY

Hammarstedt engaged your cryonics expertise for the conservation of animal genetic resources?

DR. YELIZAVETA ROMANENKO

Yes.

ROBERT ANTHONY

In what form?

DR. YELIZAVETA ROMANENKO

Germplasm, a genetic resource in the form of living tissue. He wanted to create a gene bank, a repository of DNA and RNA. For plants, the seeds are in a seed bank. For animals, we store the reproductive cells, embryos, or germplasm.

ROBERT ANTHONY

Do you have any idea what samples he intended to collect?

DR. YELIZAVETA ROMANENKO

He said he wanted to try to harness the genetic material of close to all the bat species. From memory, this was some number over a thousand. A frozen

zoo. These genetic resources preserved by cryogenics would allow for their protection. If a species becomes endangered or extinct, the genes would be on hand. I have no idea if he had any of the samples he intended to preserve, or if it was all fanciful.

ROBERT ANTHONY

Couldn't he have conducted such conservation in a normal zoo? Even a national park or other protected areas?

DR. YELIZAVETA ROMANENKO

(shrugs)

I don't know.

ROBERT ANTHONY

Is there any possibility he could've been trying to cryopreserve himself?

DR. YELIZAVETA ROMANENKO

Cryonics? Dr. Hammarstedt didn't express an interest in this to me. Why do you think he wanted to cryopreserve himself?

ROBERT ANTHONY

I'm trying to explore all possibilities. What's the process of cryopreserving bats?

DR. YELIZAVETA ROMANENKO

We freeze biological tissues in liquid nitrogen, which halts metabolism. You're suspicious of Dr. Hammarstedt's motives?

Dr. Romanenko turns toward her computer, opening a file showing a technical drawing of a row of boxes.

DR. YELIZAVETA ROMANENKO

I found this on the shared network for the Anthony Wildlife Trust for the project. It's a mock-up of a prototype Magnus lodged at the Chinese patent office. The text is in Chinese, but I translated it. It's for enclosures to breed and feed bats in captivity.

ROBERT ANTHONY

He was breeding colonies of bats in the lab, taking live animals from the wild?

DR. YELIZAVETA ROMANENKO

Yes. The patents don't prove it, but I asked Dr. Bian Fu at the Kunming Institute of Zoology, and she confirmed this with me.

Robert shook his head at Dr. Bian's subterfuge, as Romanenko continues.

DR. YELIZAVETA ROMANENKO

I can't be certain what work was being conducted with the breeding of colonies from captive wild bats. But off-site conservation seems the most sensible bet.

Robert takes a moment to try making sense of it all, taking a deep breath. His brow sharpens.

ROBERT ANTHONY

How many bat species in the world have their genome already sequenced?

DR. YELIZAVETA ROMANENKO

I don't know, but we could look it up.

(turns back to computer and performs a search)

Six families of bats, in the taxonomic sense. Almost a dozen species within those families.

Robert pauses.

ROBERT ANTHONY

My knowledge of genomics is rudimentary. But am I correct, someone could clone a member of a species with a sequenced genome?

DR. YELIZAVETA ROMANENKO

It's possible, with trial and error.

ROBERT ANTHONY

Could Magnus collect samples of all bat species to sequence each genome? If he kept them in a frozen zoo for

later cloning. Could he make contingency for their resurrection in the event of an extinction?

DR. YELIZAVETA ROMANENKO

(tilts head in equivocation)

A genome project for any species is a giant undertaking. Within Project CONSERVE, Magnus did oversee a genome project to sequence one species. The northern bat.

ROBERT ANTHONY

Is the species endangered?

DR. YELIZAVETA ROMANENKO

No, it's assessed as least concern. Magnus chose it because it was native to Sweden, and its range was so far north, adapted to the Arctic Circle. It's also similar in genetics to another species, but they look different. This was of curiosity for research purposes.

ROBERT ANTHONY

Could future advances in genome projects allow for sequencing of tissues of all bats? Even beyond Magnus's lifetime?

Dr. Romanenko thinks for a moment, then nods. She catches herself, uncertain whether her thought is worth expressing, then takes a deep breath.

DR. YELIZAVETA ROMANENKO

It's possible....he could be in Lapland.

ROBERT ANTHONY

In the very north of Sweden?

DR. YELIZAVETA ROMANENKO

(noncommittal)

We run a pilot project to cryopreserve the genetic material of the northern bat species. Like a frozen zoo, but for a single species, at a very modest scale, for experimental observation. The conditions there are suitable as a gene bank. Low tectonic activity. It's

surrounded by permafrost, and is above sea level, should the ice caps melt. Let me make a call now to this research station.

Yelizaveta calls the research station. She continues into an animated conversation in Swedish, as Robert watches on. When she hangs up, she gestures to Robert he might've inferred the drama from watching her whilst on the call.

DR. YELIZAVETA ROMANENKO

It seems our colleague, Dr. Hammarstedt, has made a visit to the research station in Lapland. My counterpart there let me know Hammarstedt presented to the facility. One of the research station staff was working late and saw someone outside. This staff member was brave enough to go out and check. The person outside told them he was the head of Project CONSERVE. The research station staff thought this was absurd. But they went inside and did an online search, confirming this man was who he claimed. As sudden as he arrived though, he disappeared. Never even hung around long enough to show up during business hours.

ROBERT ANTHONY

His whereabouts is still unknown in the region?

DR. YELIZAVETA ROMANENKO

(shrugs)

It would seem so. The research station had no stake to follow-up on this surprise encounter.

ROBERT ANTHONY

Where in Lapland is this scientific research station?

DR. YELIZAVETA ROMANENKO

Abisko, within the Arctic Circle.

EXT. ABISKO SCIENTIFIC RESEARCH STATION - NIGHT

TITLE CARD: ABISKO SCIENTIFIC RESEARCH STATION, NOVEMBER 23

Robert arrives by train in Abisko, in the foothills of the Scandinavian Mountains. The landscape is a cross between montane and tundra. Taiga forests of pine, spruce, and larch meet the tree line. This gives way to shrubs of dwarf birch, willow, and grasslands. U-shaped glacial valleys carve out from the mountains framing Torneträsk. Beside the surrounding mountain peaks, there's no snow cover in the lower valleys.

The research station consists of a main building and a half-dozen other buildings.

A scientist greets him at the reception of the research station's main building. She introduces herself as Liselotte.

LISELOTTE

I was the one working back late when Hammarstedt appeared. I have little beyond this encounter to suggest where Magnus could be now, but I'll help you.

We have five field huts used for shelter and storage. Since we took the call from Dr. Romanenko, we've checked each of these facilities, with no sign of Hammarstedt.

The station has several vehicles, none of which Hammarstedt took.

I could go with you looking for Hammarstedt in the field, using the field huts as outposts. Besides the road next to the research station, there are no others. I doubt Magnus arrived by vehicle in the first place. The greater likelihood is he came by train, which connects to Stockholm daily. South of the research station is wilderness for hundreds of kilometers. There are sporadic outposts to access food or shelter. But it's devoid of humans except intrepid hikers. To the immediate north, the Torneträsk lake stretches across 130 square kilometres. At a depth of 170 metres, were Magnus to have drowned, there'll be little hope of finding him.

If Magnus managed to hitchhike, the

Norwegian border is only 30 kilometres away, the coast twice as far beyond it. He could also be anywhere between Abisko and the northernmost Swedish city of Kiruna.

ROBERT ANTHONY

I'll accept your offer to join me searching for Magnus. With little evidence he's gone in any direction, let's opt to focus on the wilderness of the south.

LISELOTTE

We can make use of the research station's helicopter and one of its pilots to make a reconnaissance.

CUT TO:

EXT. ABISKO NATIONAL PARK - DAY

The helicopter cruises among the Scandinavian Mountains and throughout the national park.

They pass Sweden's highest peak, Kebnekaise. Liselotte points out a bright red vest on the valley floor.

LISELOTTE

(exclaimed to Robert over sound of the rotors)

Hammarstedt was wearing it.

ROBERT ANTHONY

(yelling)

You're sure?

LISELOTTE

Yes, I recognize the two yellow stripes along the side.

ROBERT ANTHONY

Do you think we should set down here, and explore on foot?

LISELOTTE

(yelling)

Let's make use of the helicopter to explore a radius from this point.

There's another research station in Tarfala, a valley beside this mountain. I can radio Tarfala from the helicopter, to see if they've seen signs of Hammarstedt.

Robert listens in on the exchange in Swedish. Liselotte affirms the team in Tarfala had encountered Hammarstedt. She confers with the helicopter pilot for several minutes in Swedish.

LISELOTTE

(turns to Robert)

If we touch down here now, we must stay. The pilot said the valley experiences katabatic winds traveling down the mountain. At this elevation, they come off the snow field and glaciers flowing into the valley. The air cools quicker and becomes dense and heavy. It sends the air down the mountainside much quicker. Sometimes it's only 10 knots, which is about 20 kilometers an hour. Other days it can be 100 knots or more, which is about 185 kilometers an hour. Our pilot's not a pro. He's one of our technicians at Abisko who supports the scientists. He's only used his pilot license to transport our staff to field sites. I agree, it's asking too much of him, and puts us all in danger.

ROBERT ANTHONY

I agree. Let's set the helicopter down at the Tarfala Research Station.

Liselotte radios Tarfala, affirming the station can accommodate Liselotte and Robert.

EXT. TARFALA RESEARCH STATION - DAY

TITLE CARD: TARFALA RESEARCH STATION

The helicopter touches down in the Tarfala Valley. Robert and Liselotte pile out and thank their pilot.

They set toward the station's wooden houses. A half-dozen painted in the characteristic red of Nordic cottages and

barns.

A woman in a navy boiler suit appears from one of the houses to greet them.

JOY

Hi, I'm X, the Joy, come into the main service building for a hot drink.

INT. TARFALA MAIN SERVICE BUILDING - DAY

Though only mid-afternoon, twilight has begun.

JOY

Someone fitting this description pilfered food from the galley. The research staff only saw him from a distance. He was descending Tarfala, after we realized he'd taken some of the supplies. They were of little value to us, so there was little use in pursuing him, absurd as the theft seemed.

There is a lake at the foot of Tarfala Valley, 15 kilometers east, guessing he could now be anywhere along its shoreline. There was a village on the western edge, where a road connected along the shoreline to Kiruna, settlements dotted along the way.

There is a lake at the foot of Tarfala Valley, 15 kilometers east. I'm guessing he could now be anywhere along its shoreline. There is a village on the western edge, where a road connects along the shoreline to Kiruna. There are settlements dotted along the way.

He could have gone in the opposite direction to the village in the lower valley floor instead. If so, he could have followed this as far south as Akkajaure lake by now.

ROBERT ANTHONY

(to Liselotte)

How about we try to option further from civilization?

LISELOTTE

Agreed. Let's keep our momentum up for the day.

ROBERT ANTHONY

Agreed. I don't want to give in to the shorter periods of daylight

JOY

I suggest you stay for an early supper here. This will free you of the need to carry excess food supplies, or skimp on the chance to refuel.

Robert and Liselotte agree.

CUT TO:

INT. TARFALA MAIN SERVICE BUILDING - NIGHT

The three enjoy a hot meal, as twilight has given way to night.

ROBERT ANTHONY

It it normal for this area to not be snowing now, in mid-November?

JOY

Much of what is now visible as snow fields surrounding us is the compaction left over from the past seasons. It recrystallizes, and becomes even denser. This phenomenon occurs at a larger scale with the mass of the glacier here in Tarfala. The glacial ice goes through a similar process of accumulation and ablation. Freezing and thawing.

ROBERT ANTHONY

What's the relationship to the changes in glacial mass to the phenomena of permafrost?

LISELOTTE

The ground beneath ice and glaciers doesn't meet the definition of permafrost. For this, it requires an active layer of soil.

The focus of my research is upon the

frozen peatlands close to Abisko. The value of their study lies in the vast amount of organic matter sequestered in the world's tundra as a carbon sink. The released methane of the organic matter would be devastating.

My research measures the release of such greenhouse gas from the peatlands.

JOY

I also analyze the effects of changes in the permafrost and the glacier on the climate in Tarfala.

ROBERT ANTHONY

(to Liselotte)

Tell me about the Abisko research station's effort to foster a miniature frozen zoo for the northern bat.

LISELOTTE

Climatology models point toward the species declining in the south. Northern bats are extending northward as temperatures increase. Parasites and pathogens for the species are encroaching in the southern part of its range.

Annika utters a short sentence in Swedish. Liselotte smiles, before both realized the language barrier with Robert.

LISELOTTE

She said it's the 'call of the north'. It's known by many names across cultures - a hysteria experienced by people indigenous to the Arctic. They enter a trance-like state, and feel compelled to venture toward the pole, guided by the North Star.

ROBERT ANTHONY

Do you think this could apply to Magnus? A trance has captured him?

LISELOTTE

No. These hysterias are specific to cultures.

JOY

Evidence shows bats have some sense of magnetoreception. We know they can echolocate, but bats could also detect the Earth's magnetic field.

ROBERT ANTHONY

Of what use?

JOY

To orient themselves to their home roost. Like the arctic fox. The arctic fox native to this area uses the Earth's magnetic field to hunt theirs. The arctic fox has a ring of shadow in their retinas, which darkens as it makes its way toward the magnetic north.

LISELOTTE

Bat-eared foxes in the African savanna use their large ears to listen for insects, as a bat would. Even those in the ground.

ROBERT ANTHONY

(gesturing to Liselotte)

We ought to make a move once more.

JOY

So you will set forth south, in the direction of Akkajaure?

Robert and Liselotte nod.

LISELOTTE

(to Robert)

We agree to maintain it as our southernmost demarcation?

Robert nods.

CUT TO:

EXT. WILDERNESS - NIGHT

ROBERT AND LISELOTTE CONTINUE FOR SEVERAL MORE HOURS, PASSING BETWEEN SEVERAL VALLEYS,

The air is biting and crisp. The Sun's absence lends a gentle serenity to the landscape. They're alone but for the sound of

the wind and their steady footfalls upon the rock surface.

Beneath the quilt of stars and moonlight, they stop to pitch tents.

LISELOTTE

(looking at GPS)

We're within several kilometres of Akkajaure. We can start afresh in the morning to check the lake's cabins.

CUT TO:

They erect their tents.

LISELOTTE

The nearby lake, Akkajaure, got its name from Akka. This is one of the traditional goddess-spirits venerated by the local Sámi peoples. Akkajaure translates in the Sámi language to "Akka lake." One of the beliefs is Akka, the feminine Sámi spirit, lived under their tents.

My grandmother was a shaman, or rather a noaidi, a Sámi shaman. The Sámi's traditional spiritual practices are animist.

ROBERT ANTHONY

Meaning the worship of animal spirits?

LISELOTTE

Close. It's best described as a spirituality inherent in life. Even inanimate objects, or so-called non-living beings, such as rocks, or water bodies. Animists believe all these have a soul. The traditional Sámi rituals emphasize a pantheon of these deities. They worship animal spirits like reindeer and bears. The Sámi also venerate the dead, as death is a part of life.

The shaman's role is to straddle worlds: the corporal, ethereal, and natural. In our so-called civilization, we're shut off from experiencing these liminal worlds.

Seldom even close to touching the fringe. I relate to this too. My work is in the sciences, the rational. Yet I also have sympathies towards my grandmother's beliefs and practices.

We cannot escape the conceits of mankind's flaws. It's always with us, even in the noble pursuits of religion and tradition. Traditional medicine and beliefs even drive the trade and hunting of wildlife.

Animist spirits are an answer to managing this proximity and interaction. To the eyes of modernity, it's bogus. What's important is, it's there, for anyone to experience if they want it. This is the role of the noaidi - a mediator of worlds. The living and the dead. Humankind and our brotherhood of other lifeforms and features of the land. The industrialized world values science and reason. One could argue it brought prosperity. But whatever benefits, we're now at the precipice of extinction. Our species does this to our own and others: eradicate, erase, extirpate. Our drive is to self-destruct, with repetition and aggression. To take everything out with us. A species-wide scorched earth instinct, annihilating what sustains us.

Though our own species face extinction, with irony, our population continues to grow. Surrounding us, within a 50-kilometer radius, are hundreds of glaciers. Like in Tarfala, the glaciers have formed all the valleys we've been traversing. Geologists call the era we're now in the Holocene. Its beginning marked by the retreat of the glaciers in the last ice age. It's now believed we have moved out of the Holocene and are now in the Anthropocene, "anthropo-" meaning human. A planetary-wide, geological epoch characterized by the

impact of man.

There is hope, but first, we need to recognize this compulsion is inherent. Are we fulfilling this civilizational drive toward the cessation of life?

A mist sifts across their campsite. Robert inhales, with depth.

ROBERT ANTHONY

If we find him, and he's experiencing hypothermia, what can we do?

LISELOTTE

There's little you can do. At the severe stage, a person goes into cardiac arrest, and needs a life support machine to function.

Liselotte turns toward her tent for the night. Robert grabbed her attention.

ROBERT ANTHONY

I'm going to keep going.

LISELOTTE

Tonight?! No, we'll start fresh in the morning. If you go now, you'll crash in the middle of the day tomorrow.

ROBERT ANTHONY

It's OK. I know. I'll be back by the time the Sun comes up.

LISELOTTE

This is ridiculous. Why?

ROBERT ANTHONY

If I don't go now, we'll miss him. I don't expect you to come with me. But my sense is, if we wait until tomorrow, we'll lose him. I know it's based on nothing more than my sense, but I've come this far, and I need to abide by the thought.

LISELOTTE

(nods, understanding)

OK. I'll wait here until midday tomorrow, then I'll go back to

Tarfala. You'll be able to find me there tomorrow night if you miss me. Be safe. You know there's always the cabins around Akkajaure. There's bound to be someone there, or otherwise a place to shelter.

EXT. ÁHKKÁ - NIGHT

Robert sets forth on his journey into uninhabited land.

We almost hear whispers and murmurs in the dull wind.

He cradles himself from the cold as he walks up a snow-covered mountain. Frost gathers on his face where the hood of his jacket doesn't cover.

The mountain is Áhkká, a massif of a dozen peaks and glaciers, next to Akkajaure.

Over the course of the upward trek, he encountered items of clothing. First gloves, then vests, tops, bottoms, and footwear.

Robert comes across a small, narrow grotto on the side of one of the cliffs of the mountain. It offers shelter a short distance into the rock, no deeper than the width of its opening. He stands at the mouth. The frosty mist migrates across the surface surrounding him. We hear an ululating, droning sound, though can't discern if it's the wind.

Robert enters the breach, and shines his torch, which catches on Magnus' naked body. Robert checks his pulse.

Magnus has parted with his clothes in an attempt at paradoxical undressing. Scar tissue covers his skin at various points over his body. This is where he'd tried one experiment or another, some still bloodied.

Robert holds Magnus's body in his arms.