

# Q-Strip @ ThermoNED 2022

Daan van der Werf



This presentation is based on observation during 5 years development and study.

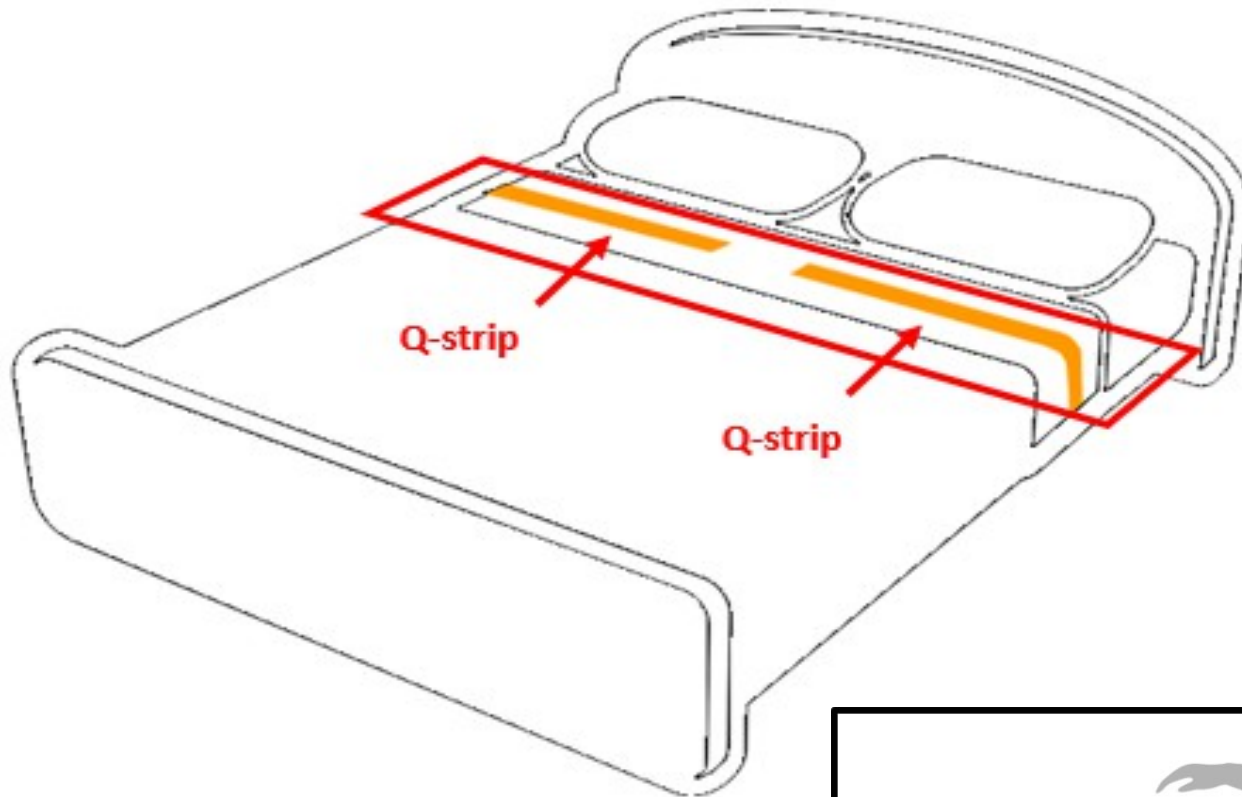
**Q-strip**  
project

# This is a Q-Strip

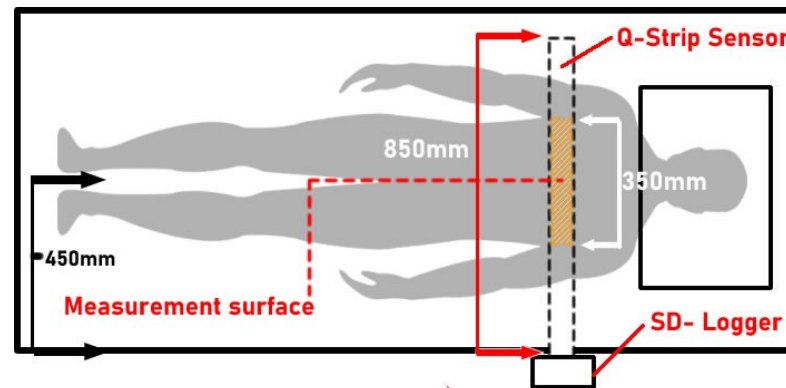
- Sensor to measure sweat.
- Measuring resistive values
- 2 electrodes
- Paperfibers
- Additives

Prototype v 1.03

# Position of the sensor field



Datalogger



Placed on brestheight with the mattress sheet on top (basic cotton during tests)

# What makes this sensor unique

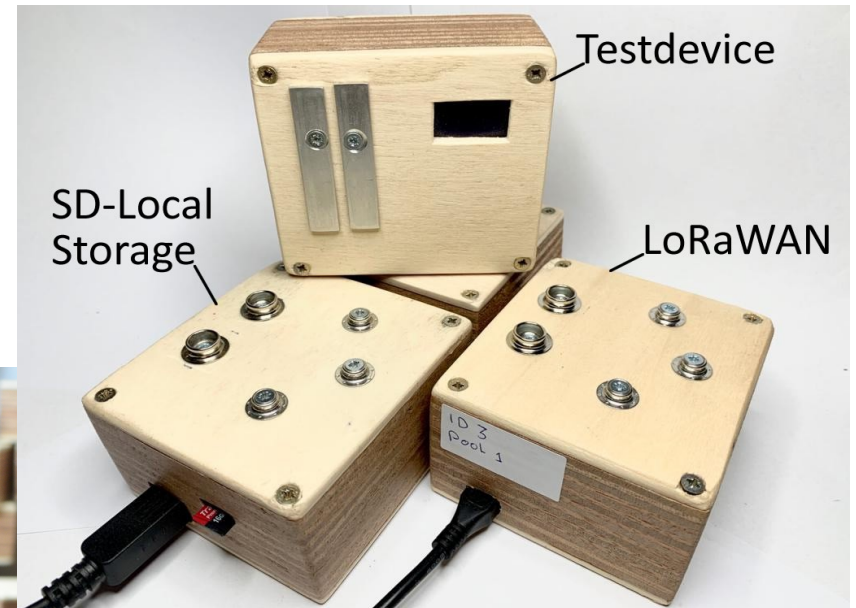
- Longitudinal measurement.
- Non intrusive/invasive.
- Fast capillary action.
- Stable measurement during sleep.
- Accessibil and affordable. (materials)
- I never seen any sensor giving such datasets.

Let's Jump to the beginning->

# Where did Q-Strip Start

Mission: Let's make a Bed-wetting alarm!

- First prototype was born.
- Spikes of data!
- Lots of prototype research



Museum prototypes

# Let's Multiply our IOT devices!

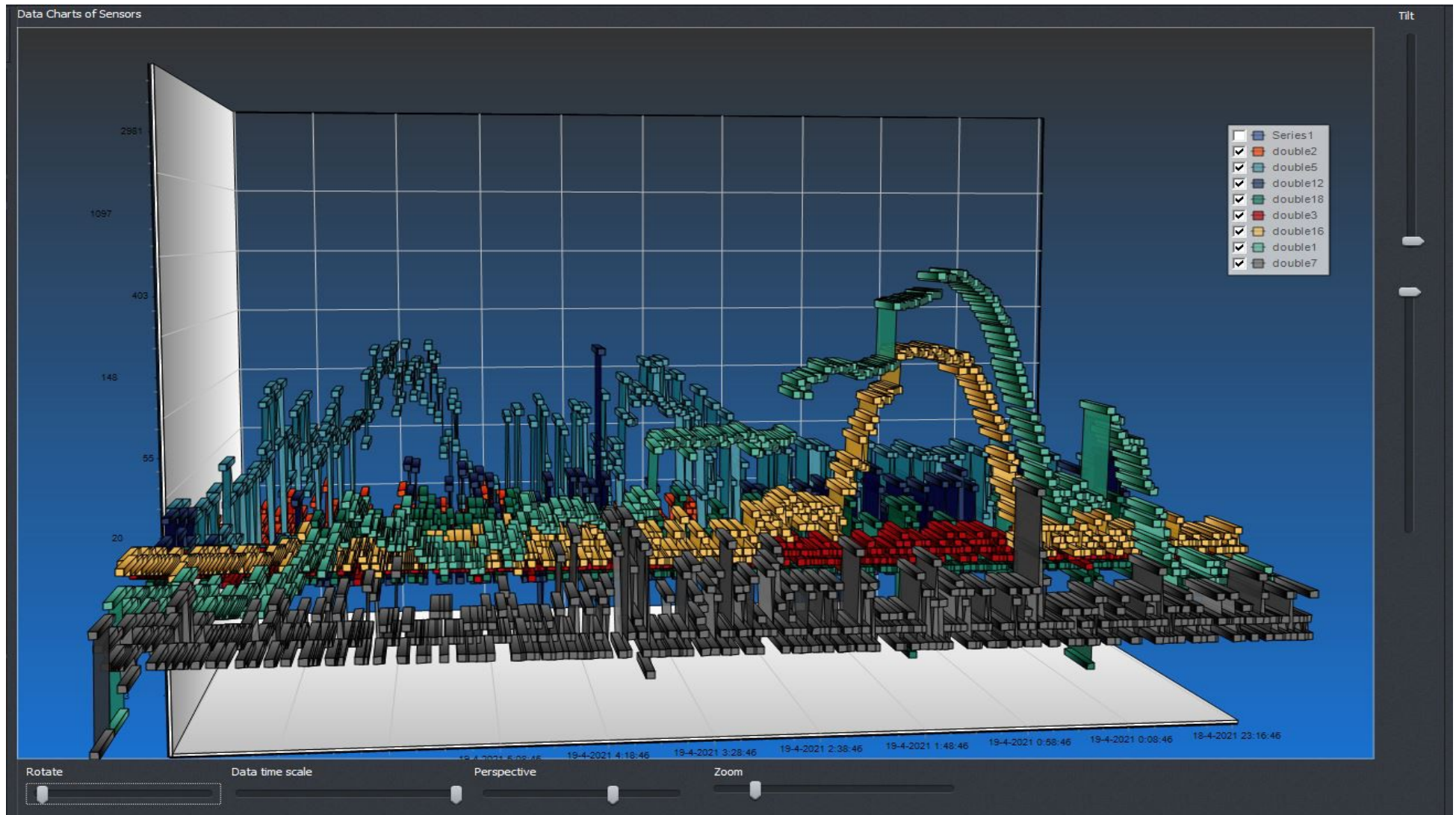
“If You do what You always did, You get what You always got”.

The screenshot displays the 'The Things Stack Community Edition' interface. The top navigation bar includes 'Overview', 'Applications', 'Gateways', and 'Organizations'. The user 'Daan van der Werf' is logged in. The main content area shows the 'Double18' device page, with a breadcrumb trail: 'Applications > Nightlog > End devices > Double18 > Live data'. The device ID is 'eui-70b3d57ed00489fe'. The 'Live data' tab is active, showing a table of data messages. The table has columns for 'Time', 'Type', and 'Data preview'. The data preview shows JSON payloads with sensor readings for 'Room' and 'Sweat', along with metadata like 'FPort', 'Data rate', 'SNR', and 'RSSI'.

Time	Type	Data preview
↑ 17:32:39	Forward uplink data message	Payload: { Room: 23.47, Sweat: 5.21 } 02 58 09 2B <> FPort: 1 Data rate: SF7BW125 SNR: 7.25
↑ 17:32:39	Successfully processed dat...	DevAddr: 26 0B B3 2A <> FCnt: 6 FPort: 1 Data rate: SF7BW125 SNR: 7.25 RSSI: -72
↑ 17:31:30	Forward uplink data message	Payload: { Room: 23.15, Sweat: 2.65 } 01 F4 09 0B <> FPort: 1 Data rate: SF7BW125 SNR: 7.25
↑ 17:31:30	Successfully processed dat...	DevAddr: 26 0B B3 2A <> FCnt: 5 FPort: 1 Data rate: SF7BW125 SNR: 7.25 RSSI: -69
↑ 17:30:21	Forward uplink data message	Payload: { Room: 22.5, Sweat: 2.64 } 01 F4 08 CA <> FPort: 1 Data rate: SF7BW125 SNR: 9.75
↑ 17:30:21	Successfully processed dat...	DevAddr: 26 0B B3 2A <> FCnt: 4 FPort: 1 Data rate: SF7BW125 SNR: 9.75 RSSI: -78
↑		Payload: { Room: 23.47, Sweat: 2.65 } 01 F4 09 2B <> FPort: 1 Data rate: SF7BW125 SNR: 9.75

IoT Device data from prototypes centralised cloud panel

# Collecting and trying to make sense out of the data



8 people on LoRaWAN (IoT) Devices with different participants sleeping in realtime.  
Software written in Pascal (Delphi)

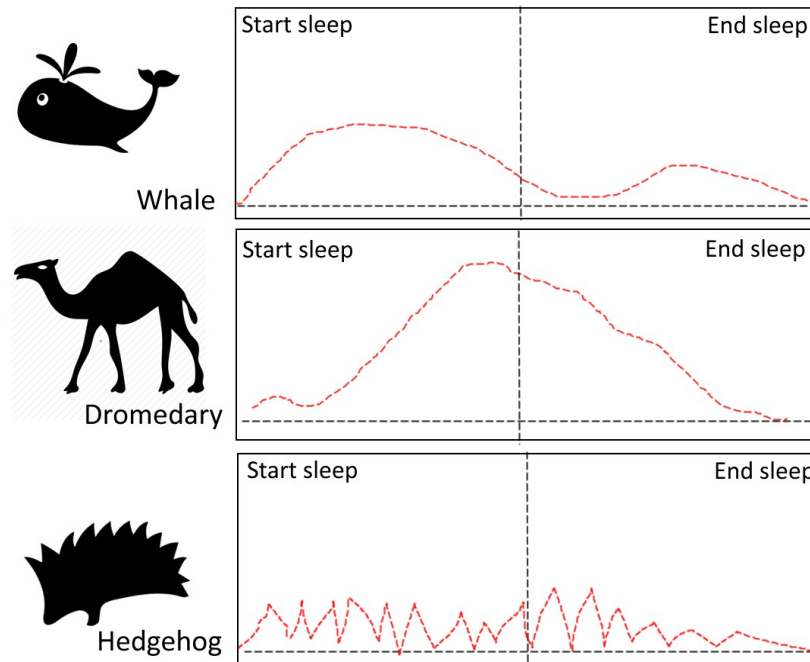
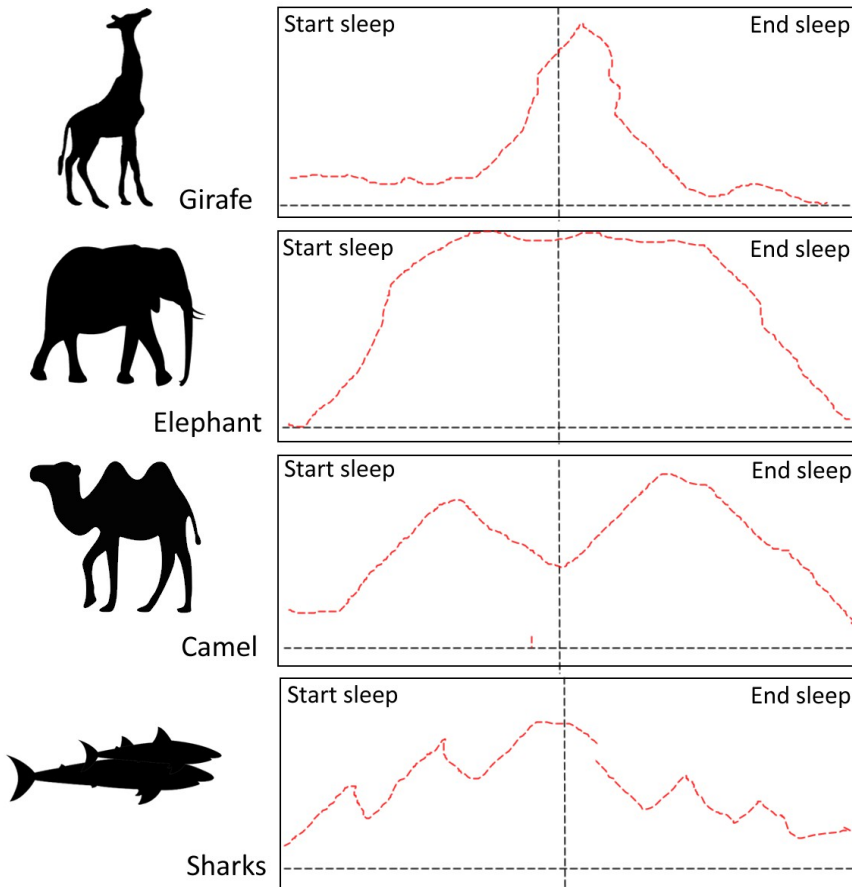
# Mapping What We Measure

All charts are blocks of 8 hours sleep

X = time, Y = sweatrate



## 7 Basic Nocturnal Perspiration Patterns



Q-strip.com 2021

This mapping is being created during development phases of the Q-Strip



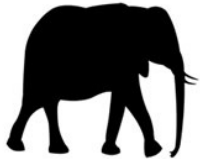
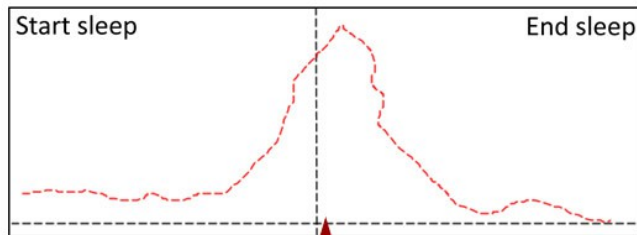
# Giraffes

Q-strip

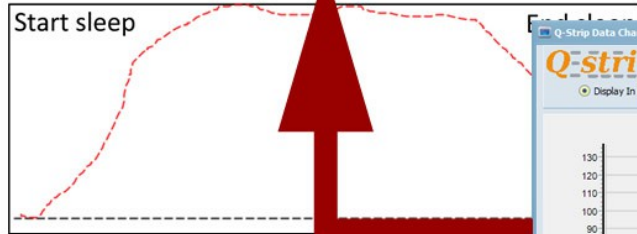
## 7 Basic Nocturnal Perspiration Patterns



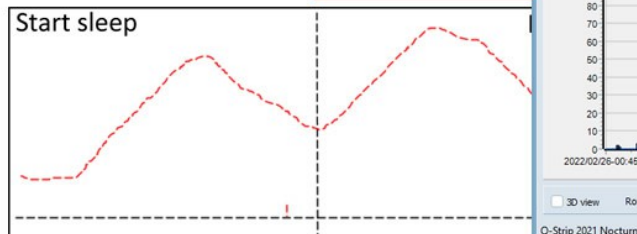
Girafe



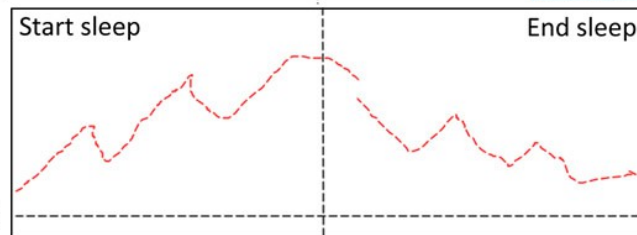
Elephant



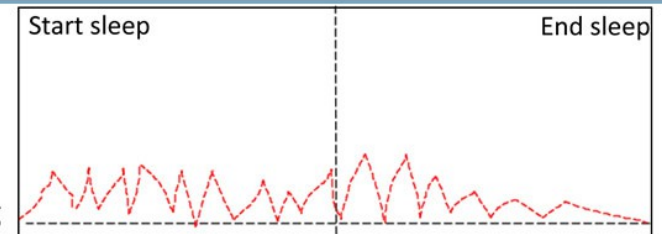
Camel



Sharks



Hedgehog



Giraffes = Explosive burst(s)

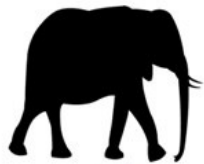
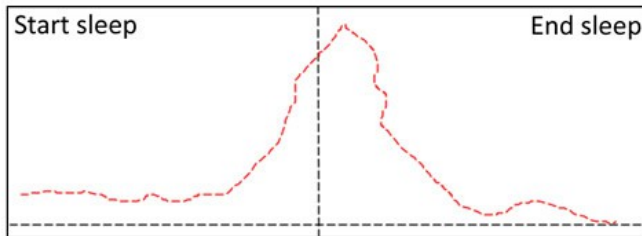
# Elephants

Q-strip

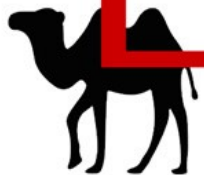
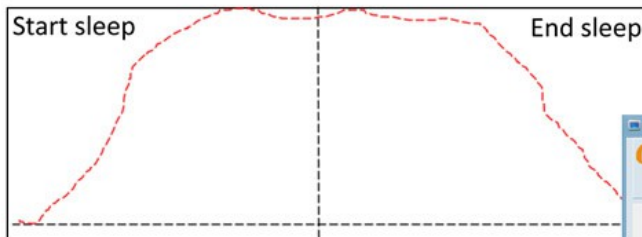
## 7 Basic Nocturnal Perspiration Patterns



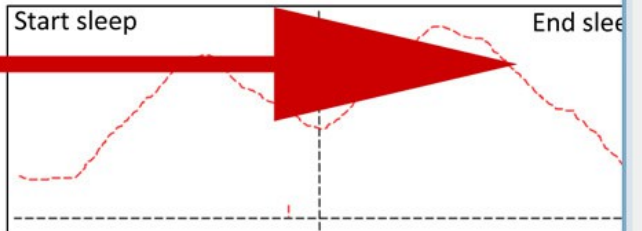
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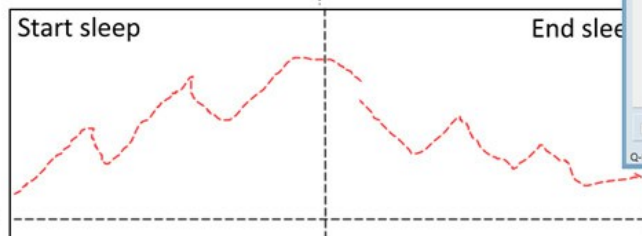
Elephant



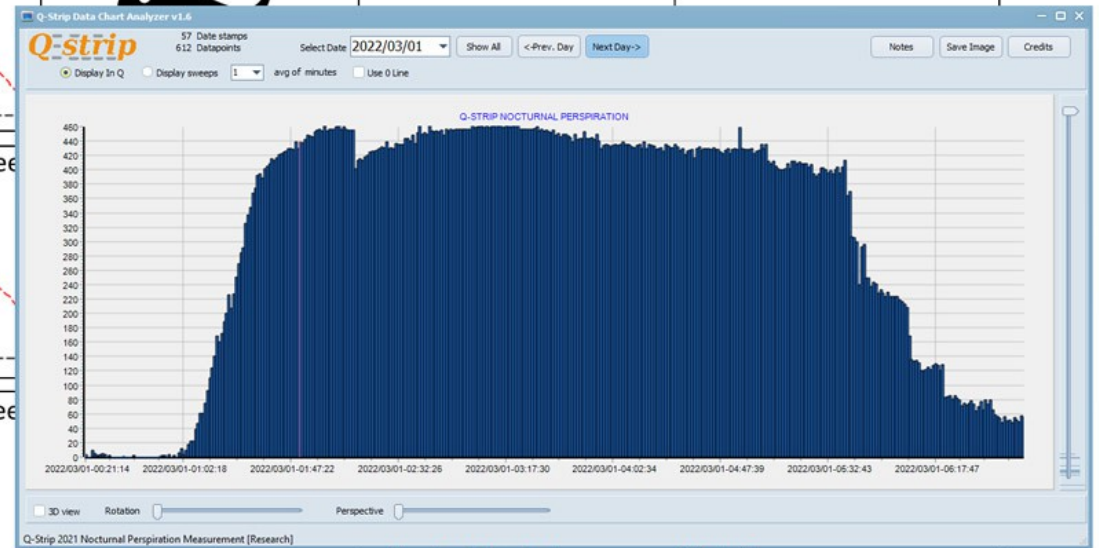
Camel



Sharks



Hedgehog



Elephant = Heavy overall

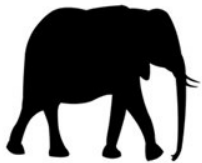
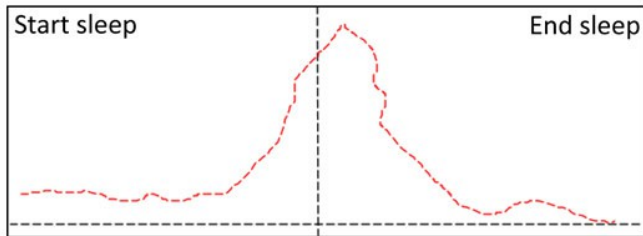
# Camels



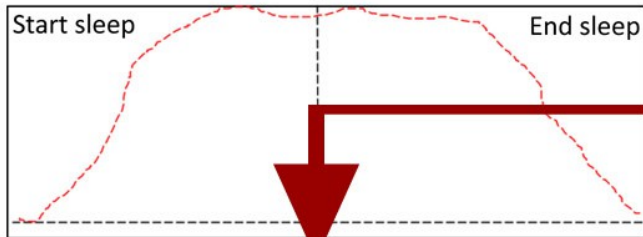
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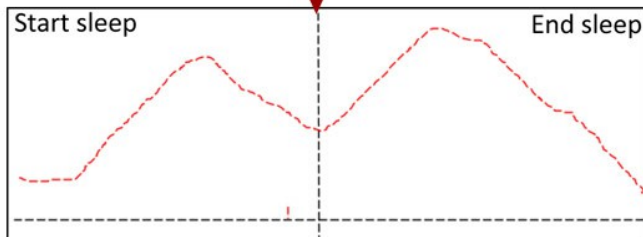
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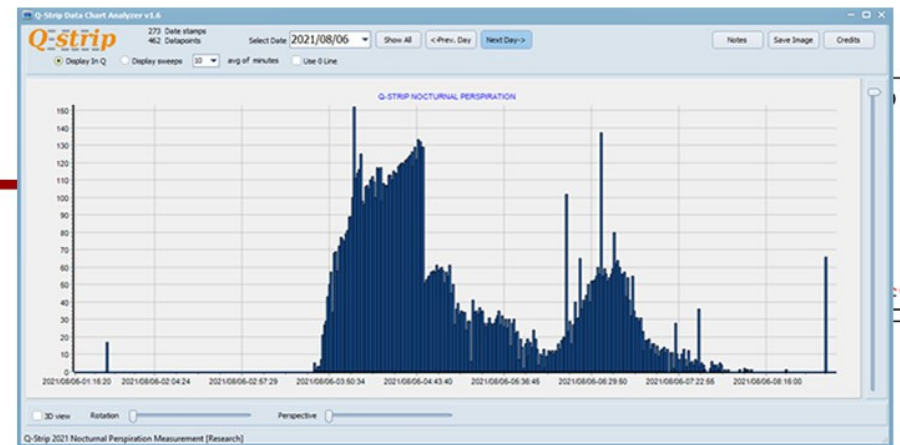
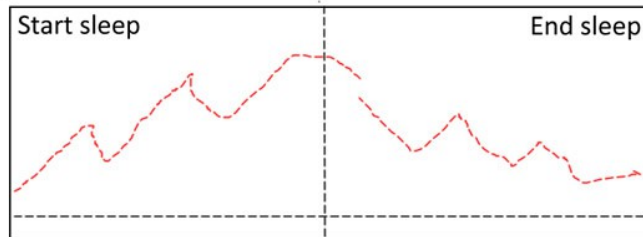
Elephant



Camel



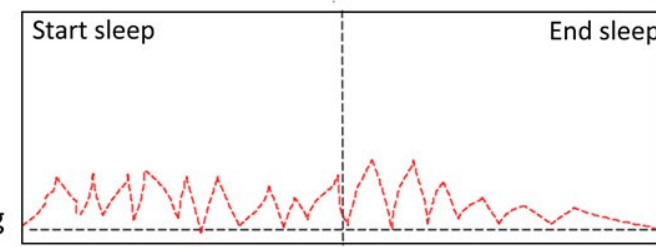
Sharks



Dromedary



Hedgehog



Camel = most interesting figure in this study

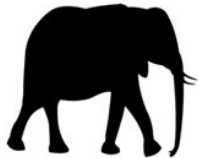
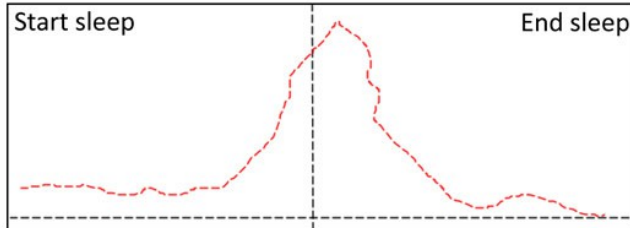
# Sharks



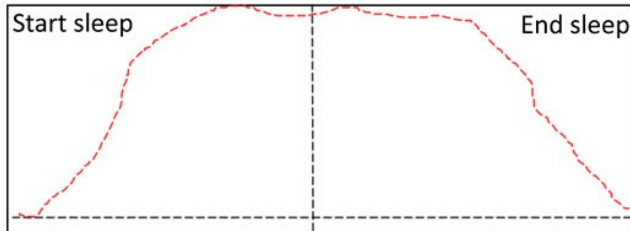
## 7 Basic Nocturnal Perspiration Patterns



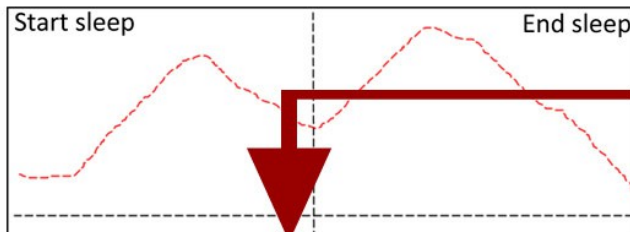
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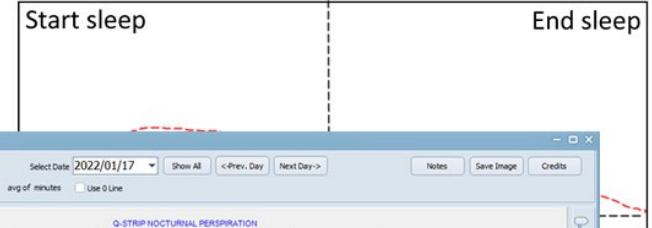
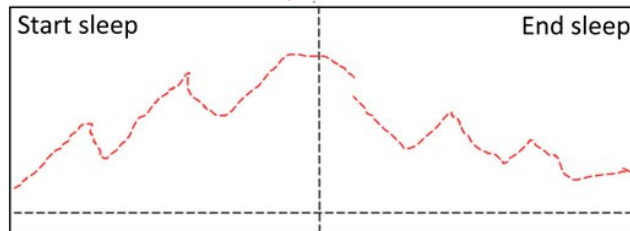
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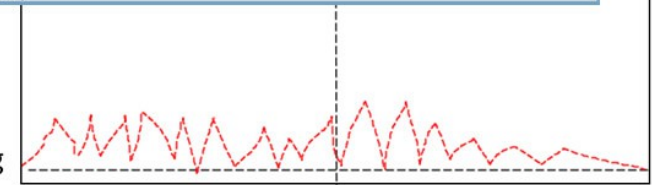
Camel



Sharks



Hedgehog



Sharks = Changing curves are interesting in this study

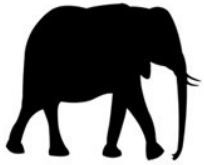
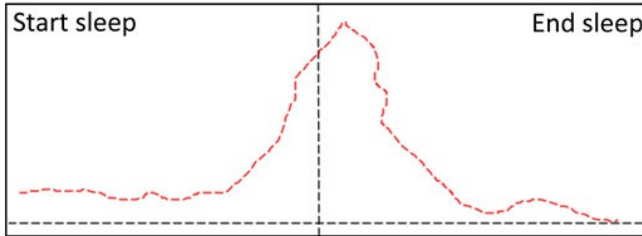
# Whales



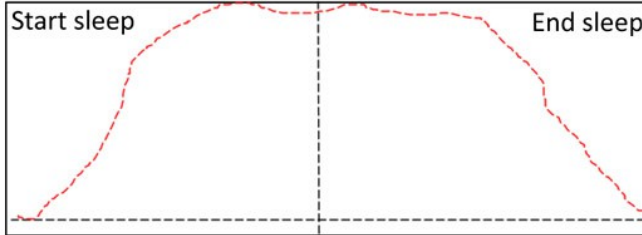
## 7 Basic Nocturnal Perspiration Patterns



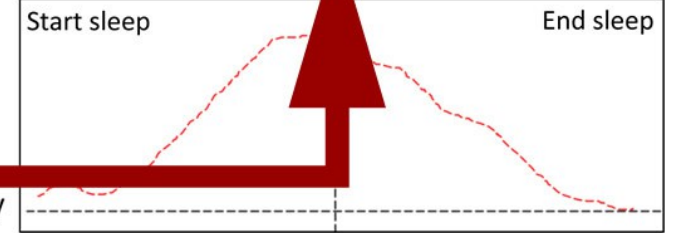
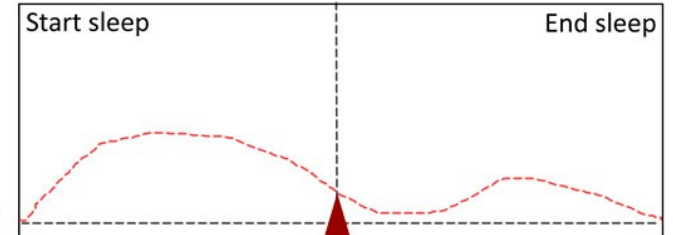
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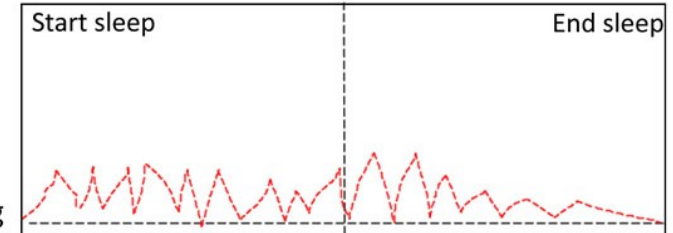
Elephant



Dromedary

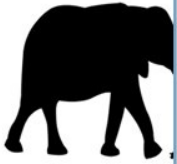
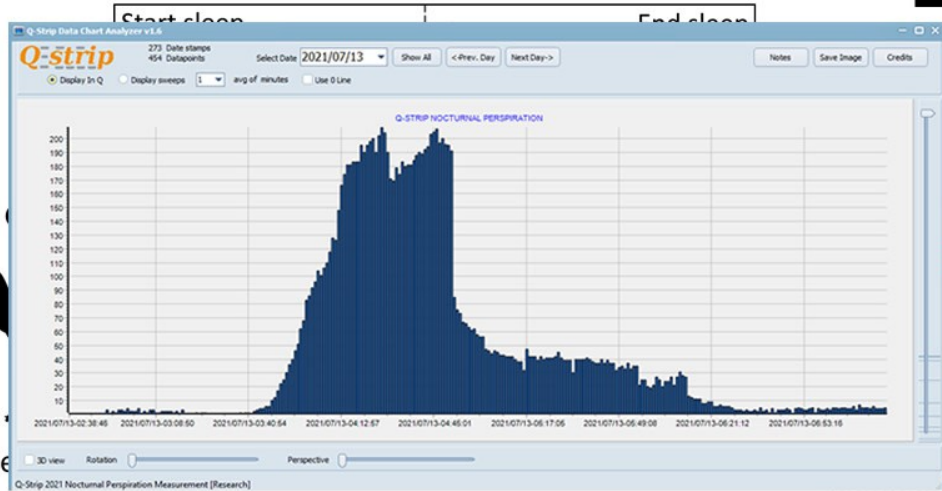


Hedgehog



# Dromedary *Q-strip*

## Basic Nocturnal Perspiration Patterns



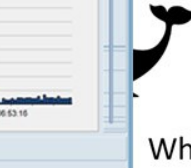
Ele



Camel



Sharks



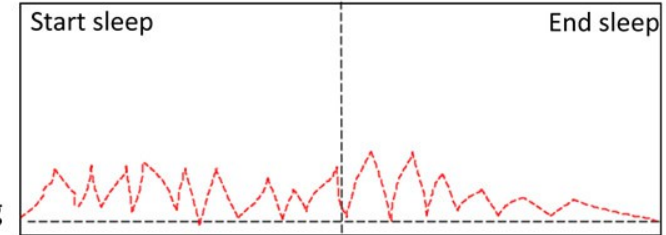
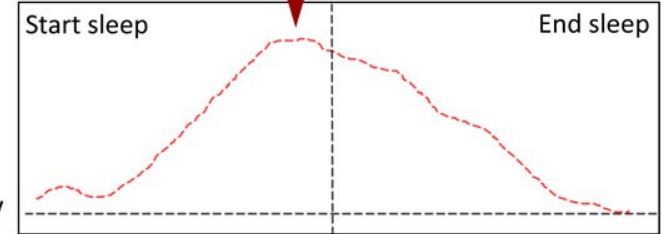
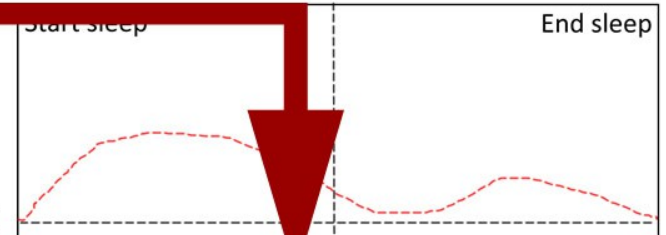
Whale



Dromedary



Hedgehog



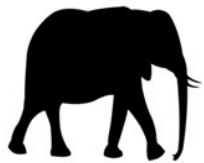
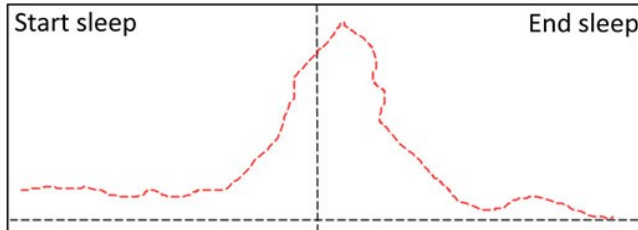
# Hedgehogs

Q-strip

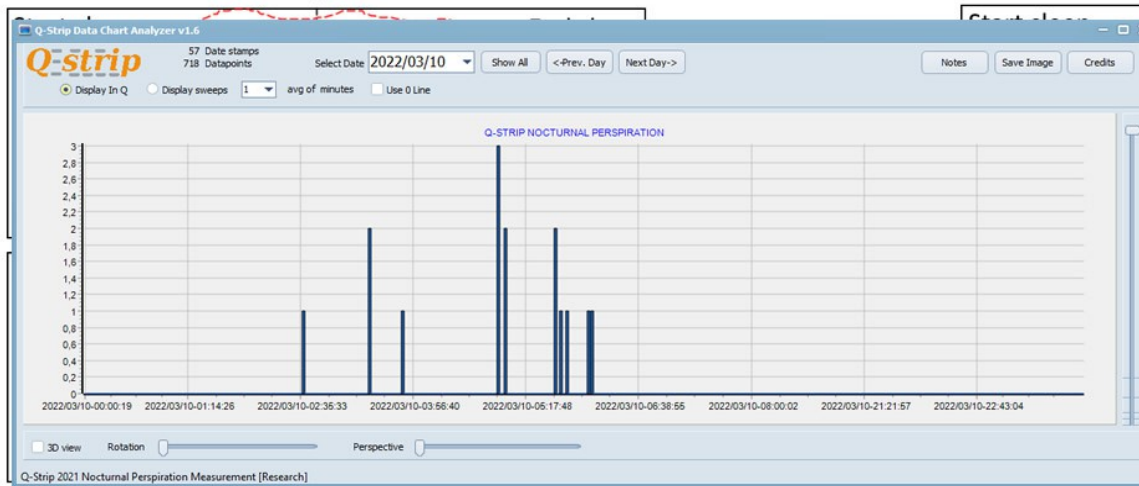
7 Basic Nocturnal Perspiration Patterns



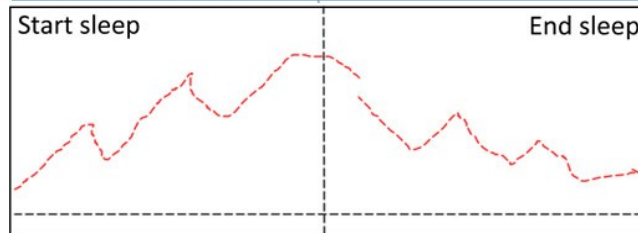
Girafe



Elephant



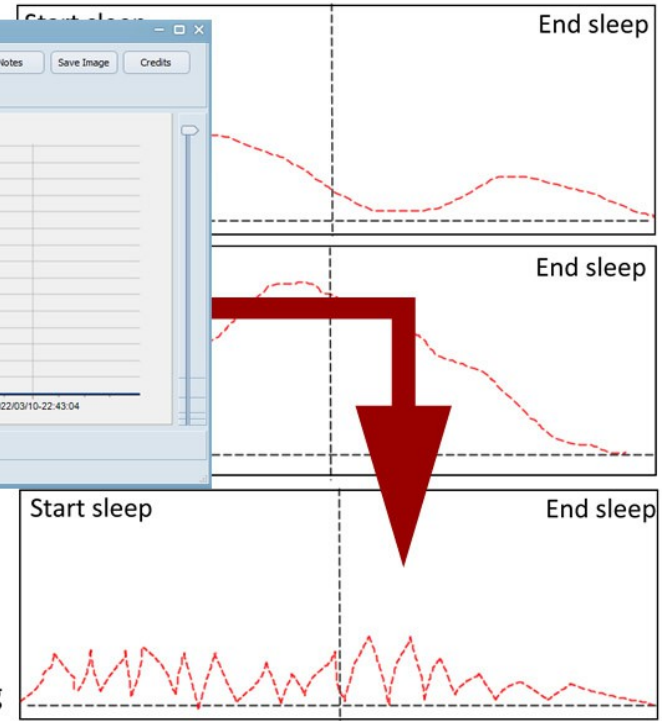
Camel



Sharks



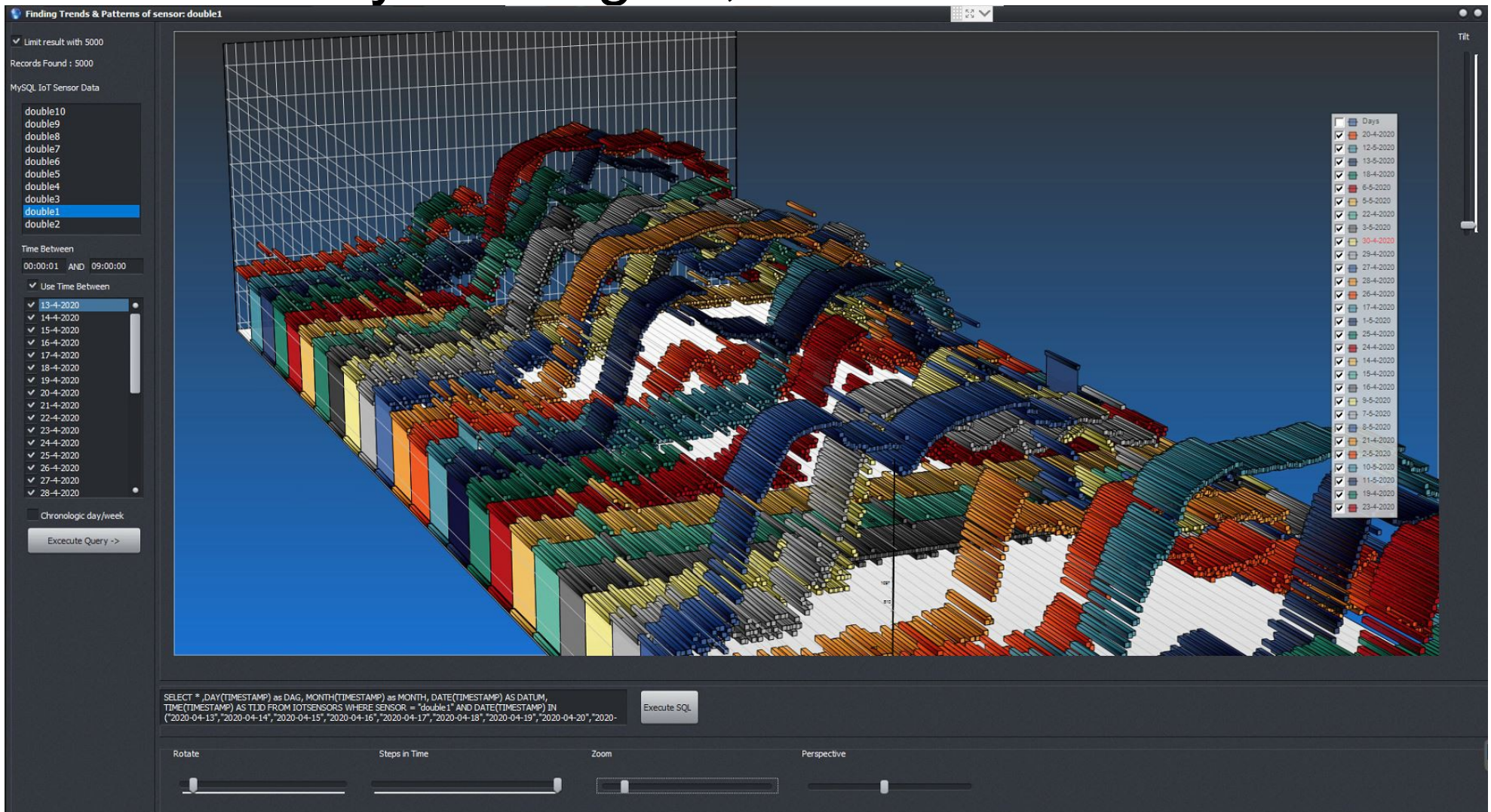
Hedgehog



Hedgehog = almost no sweat activity

# That was the index part

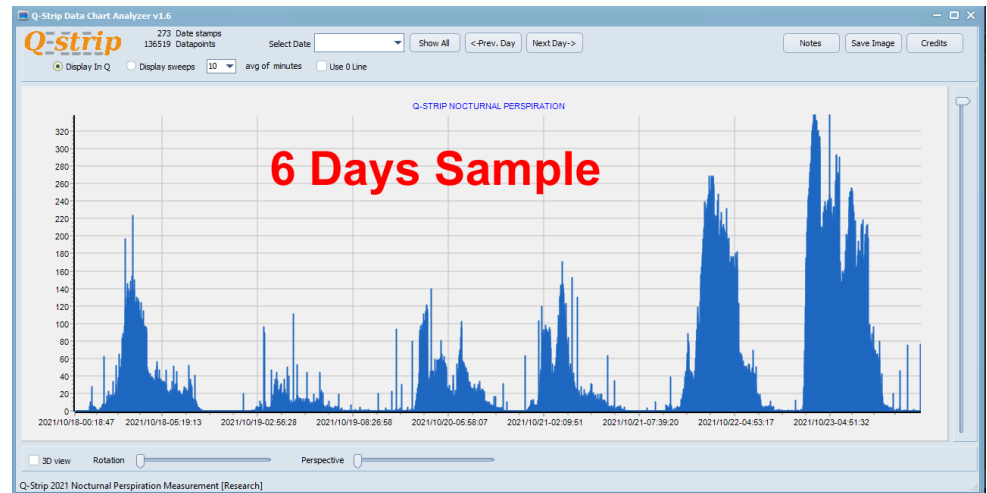
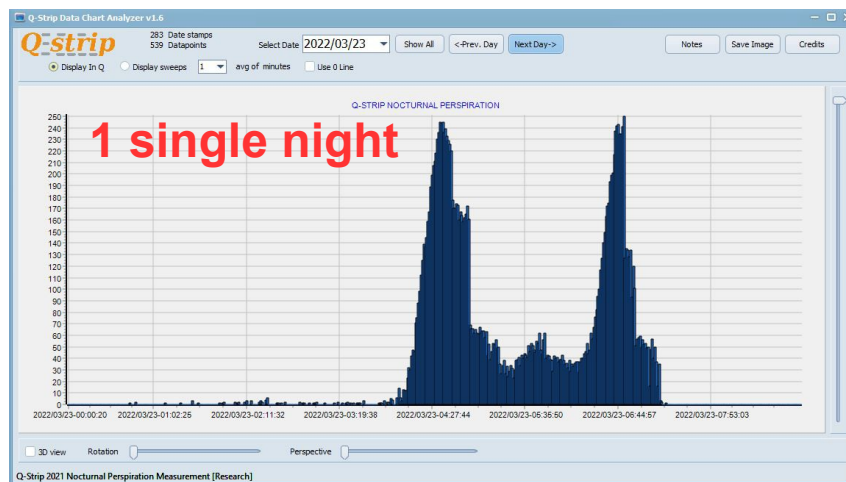
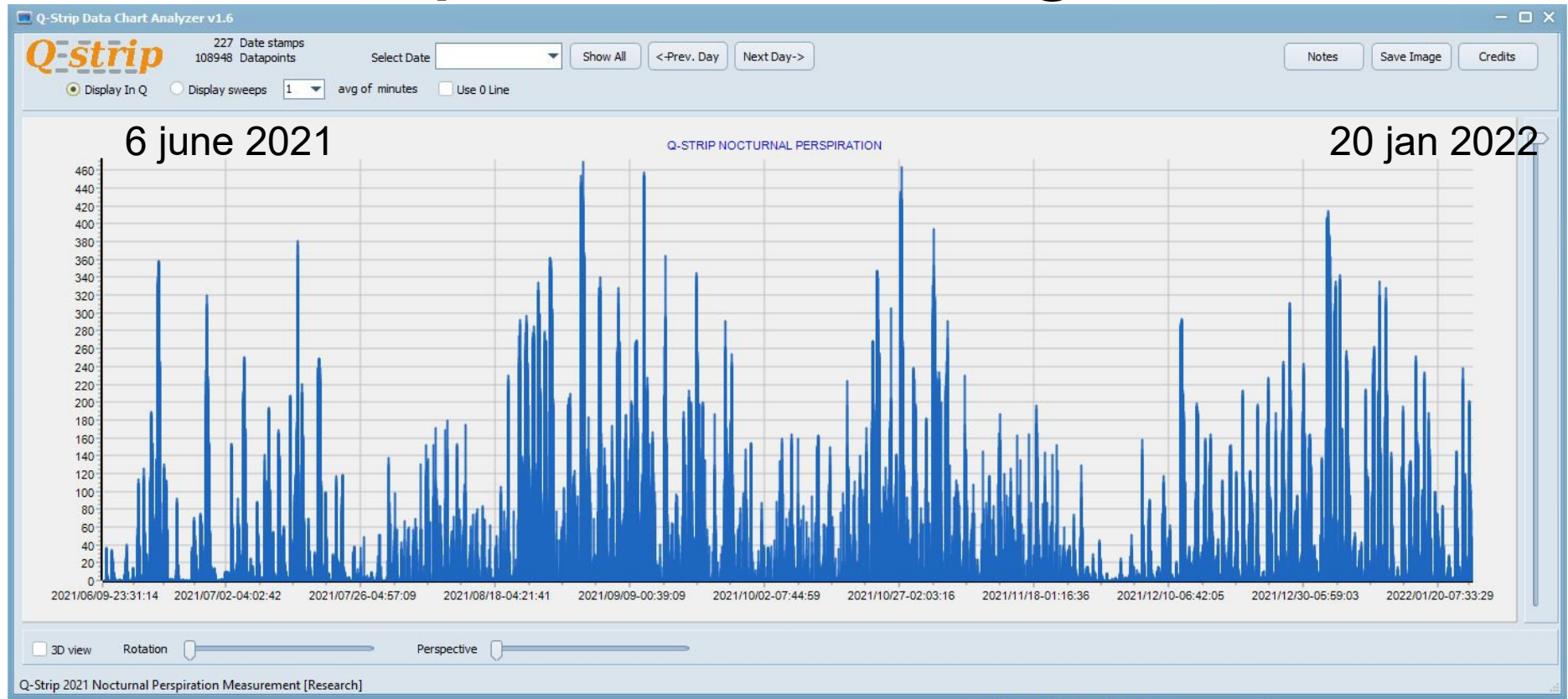
## Get ready for stage 2, visualisation



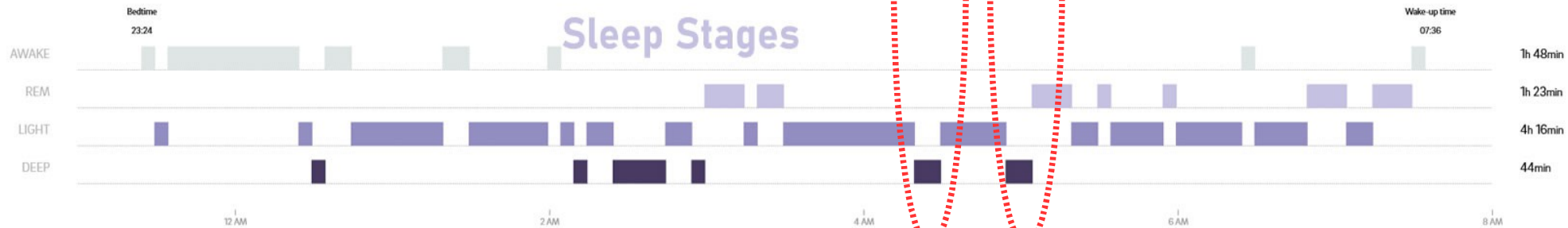
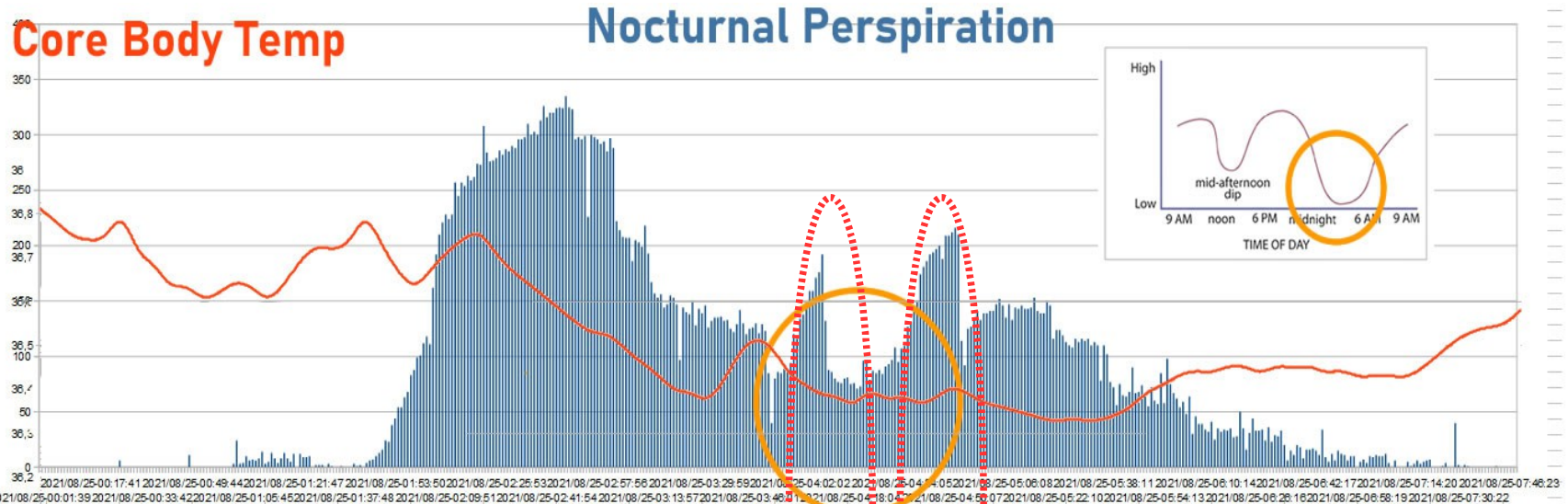
1 month data X= Time, Y=Sweatlevel, Z=Nights



# 1 person 227 nights



# Multivariable recording



# Next Level => Microclimat

Example of Cooling Down a Camel

Daan van der Werf [Scientific data sensor 1]

Gender: male Age: 41 years BMI: 25.3

Underpressure Fan 2 a few seconds ago

Overpressure Fan 1 a few seconds ago

Temp a few seconds ago 22,83 C

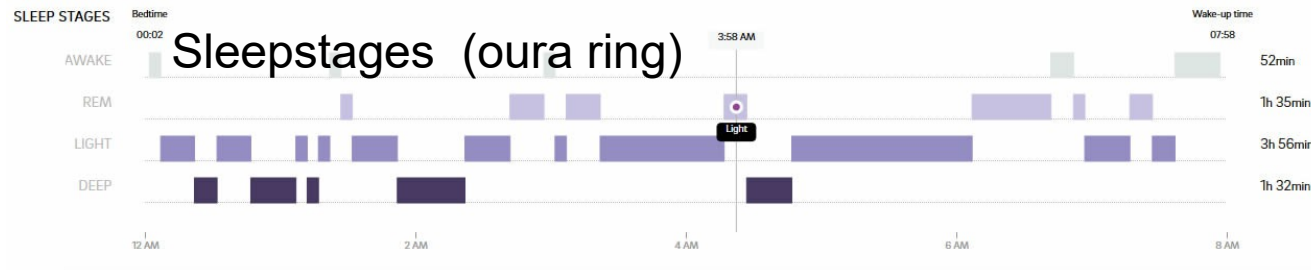
Sweat a few seconds ago 6

Nocturnal Perspiration a few seconds ago



Algorithm

Heating/cooling  
Bi-directional  
Over pressure  
Under pressure  
Extreme silent



Microclimat field lab (bed)



Sleep monitoring



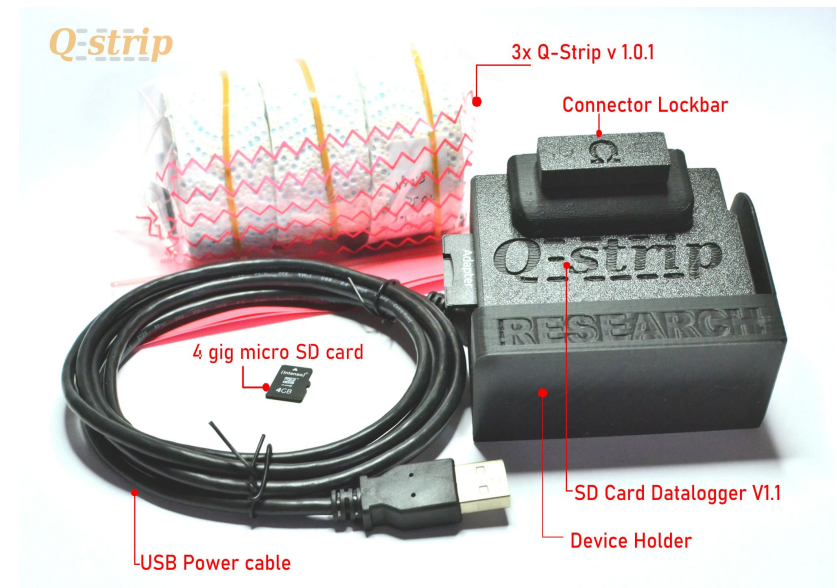
Microclimat unit

# We're open to Collaborate !

It is what it is, any questions?



Check out my sweatrate  
of last night, cheers :-)



[www.research.q-strip.com](http://www.research.q-strip.com)

# Multiple fields of sweat

illnesses

**wellness**

nutrition

**thermo regulation**

hormones

**sleep**

symptoms

de-toxing

medicine

signal molecules

metabolism