Discrimination and identification of characters useful to determine electrocution vs burned feathers

Hector Cruz-Lopez, PhD

FWC Forensic Research Laboratory

&

Harlette Lacau

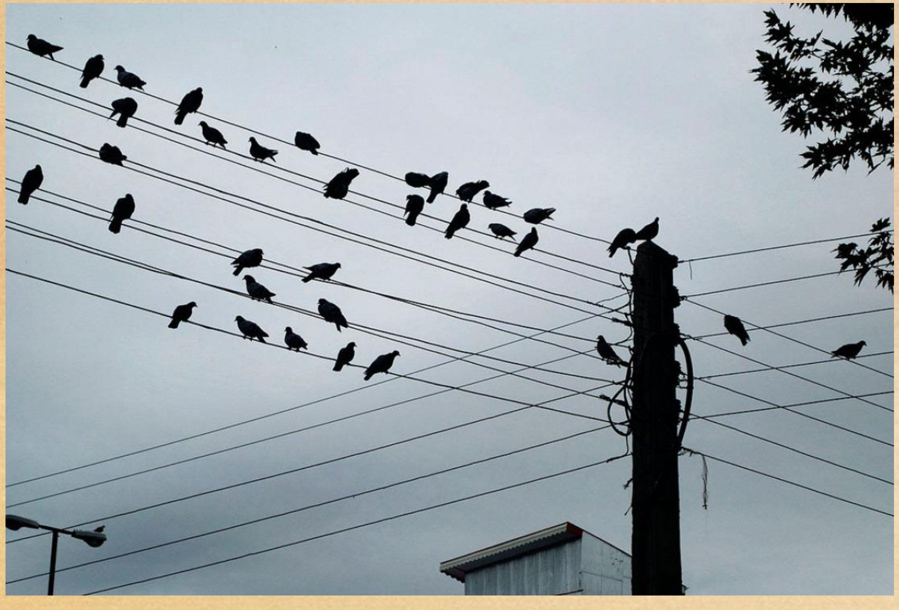
Keiser University Forensics Program

Electrocution vs. Burn Injuries

- Electrocution

- Burn


for the birds




On The Wing Photography
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Causes of electrocution and burn injuries

- Electrocution
  - Natural
    - Lightning
  - Manmade
    - Powerlines
      - Aerial
      - Downed powerlines
- Burns
  - Natural
    - Lighting induced forest fires
  - Manmade
    - Burner or flare stacks
    - Crop burns
    - Forest fires
    - Solar plants

Elements required simultaneously for electrocution

- Electrical source
- Current pathway through the body
- Grounding (eg. Bare feet, metal pipes etc)

- No harm if well insulated from ground,
  - Birds sit on high tension wires with no effect.

Mechanisms of Death by Electrocution

- **If current travel through brain/ spinal cord**
  - brain centres paralysed and die.
  - if interferes with respiration, asphyxial death
- **If current travel through heart**
  - VF and cardiac arrest, even with ventricular fibrillation and die even with 120v for split of a second.
- **If current travel through the chest wall**
  - Direct paralysis of chest muscles – asphyxial death (traumatic asphyxia)

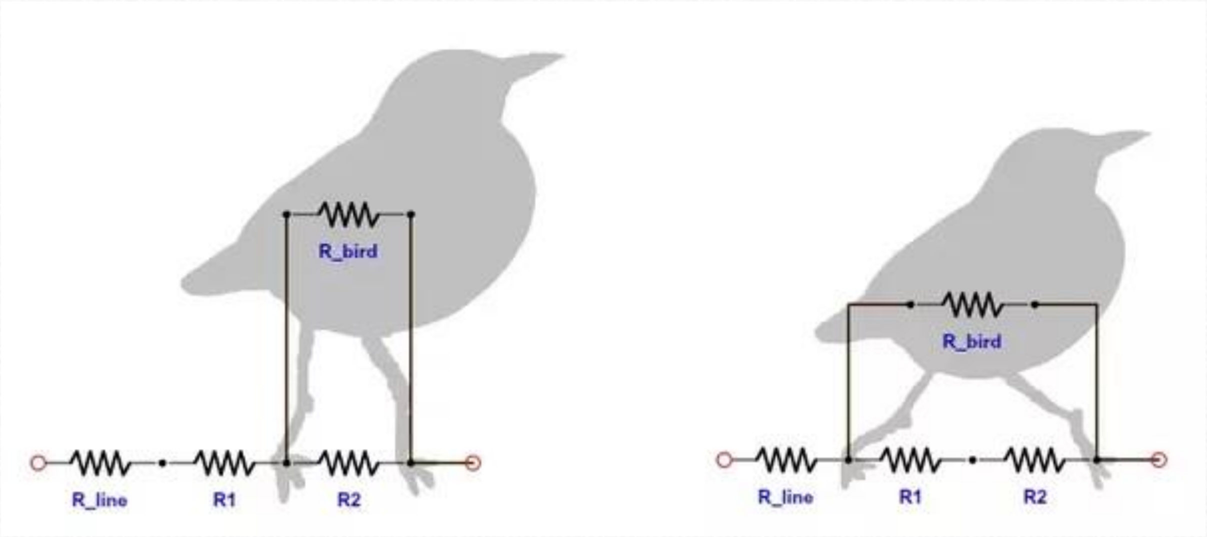
Current flows through the body through the shortest and least resistance pathway.

- **If wing to head –current goes through brain** –
  - respiratory centre paralysis (can die immediately),
- **If wing to leg – current goes through heart-**
  - ventricular fibrillation (need few seconds of contact to die), loose consciousness in 10 – 15 seconds, as the brain has oxygen reservoir for a few seconds, with out cardiac output. Therefore can make a sound.
- **If wing to wing – current goes through chest wall muscles**,
  - resulting continuous contractions or spasms of inter costal muscles and diaphragm - leading to traumatic asphyxia (need several minutes of contact to die)

Current will always flow in the path that offers least resistance.

Parallel circuit:

R_bird = R2



Non Parallel circuit:

R_bird < R1 + R2

Happy bird

Fried bird

Phase to Phase Contact

Phase co Ground Contact

Mechanisms of Burn Injuries

- Bird perched on flame stack
- Bird flying over “invisible” flame
- Bird flying over forest fire
- Solar plant reflection


NORTON
6
GOULD
ABDICK
MEARS
KRACO


© Bob Gosford


Burning injuries

Electrocution injuries

Experimental Design

- Electrocution
  - Objective: to replicate electrocution conditions by passing electricity through feathers
  - Compare to provided feathers to identify similarities
- Burns
  - Objective: to replicate burn conditions by exposing feathers to flames produced by methane
  - Compare to provided feathers to identify similarities

Experimental conditions

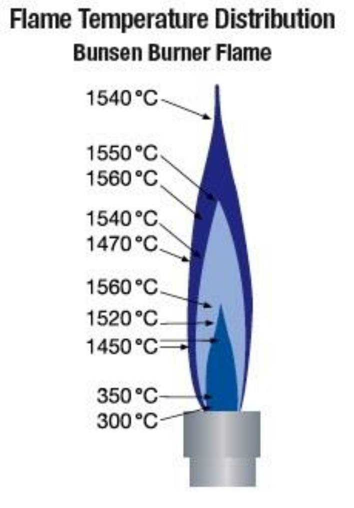


Figure 3.

Electrocution

- Open wires

- Power supply with alligator clips

Methane burn

- Methane hydrate flame

- Methane from cow

College fraternity student


Lenk No. 65F
For
Lenk Model 65
Laboratory Burner
WARNING


1
2
3
4

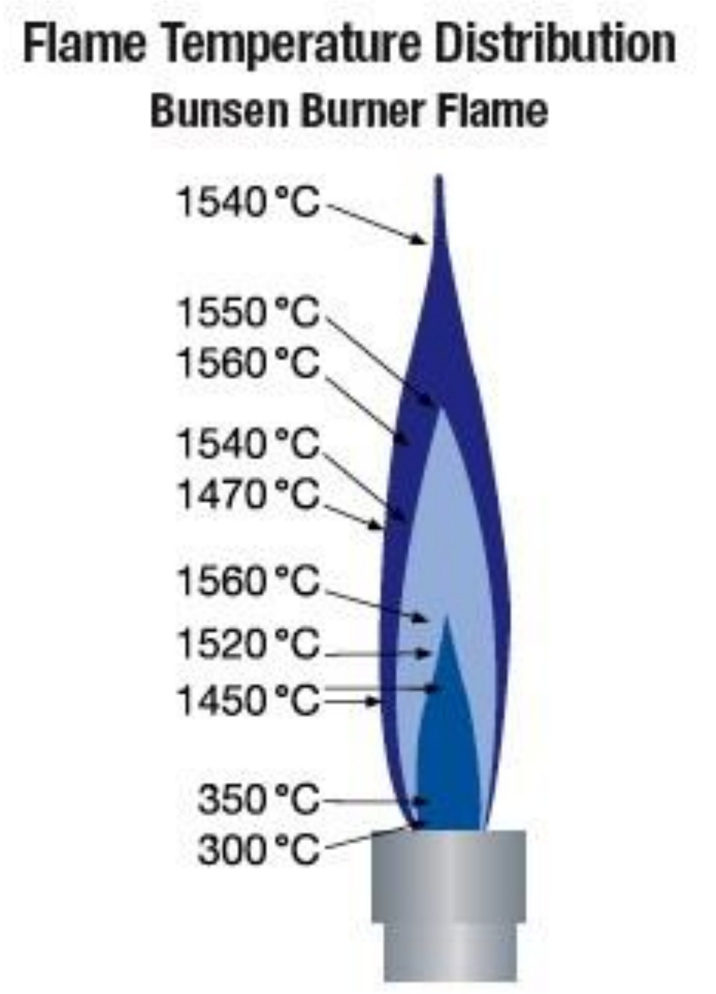

Flame Temperature Distribution
Bunsen Burner Flame
1540 °C
1550 °C
1560 °C
1540 °C
1470 °C
1560 °C
1520 °C
1450 °C
350 °C
300 °C

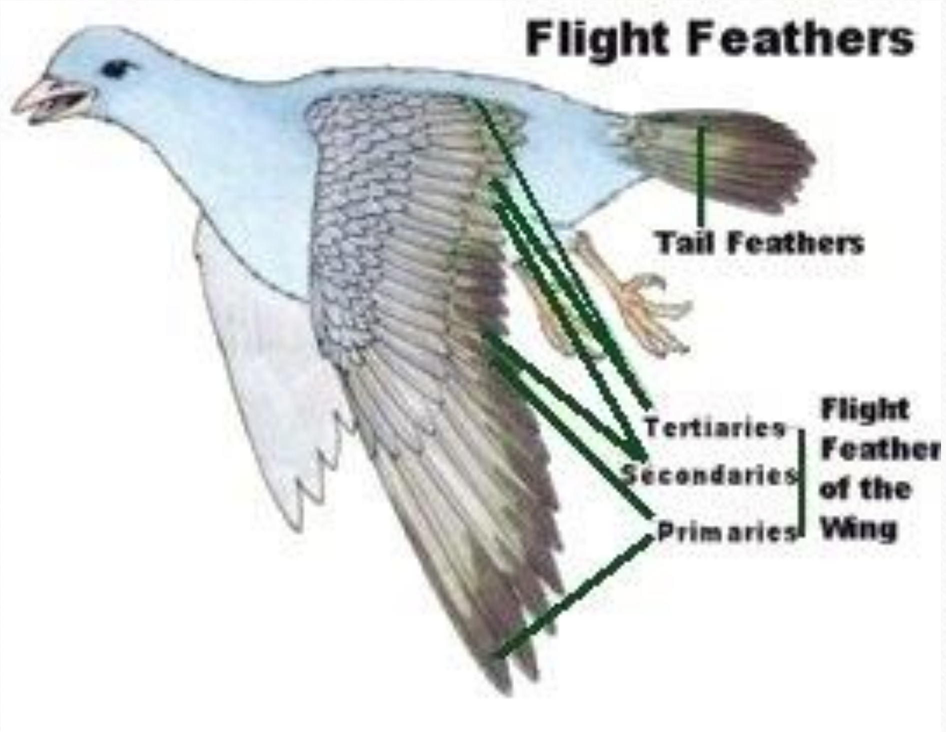
Figure 3.

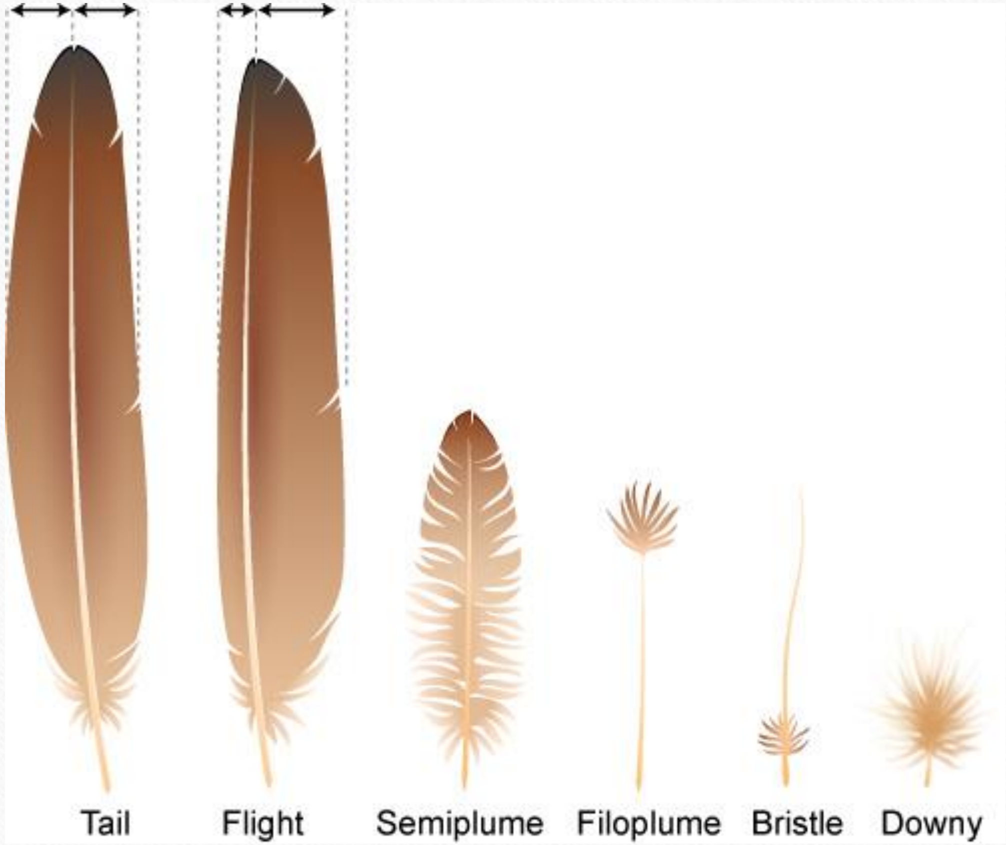
Differences between electrocutions and burns

- Electrocution
  - Injuries are usually exit wounds
    - Electricity wants to leave the body
  - Effect is during the exit
  - Usually fatal as it affects both neurological and cardiac functions
- Burn
  - Injuries are usually entry wounds
    - Flame moves and reaches target
  - Effect occurs on contact
  - Bird may survive if flight reaction is fast

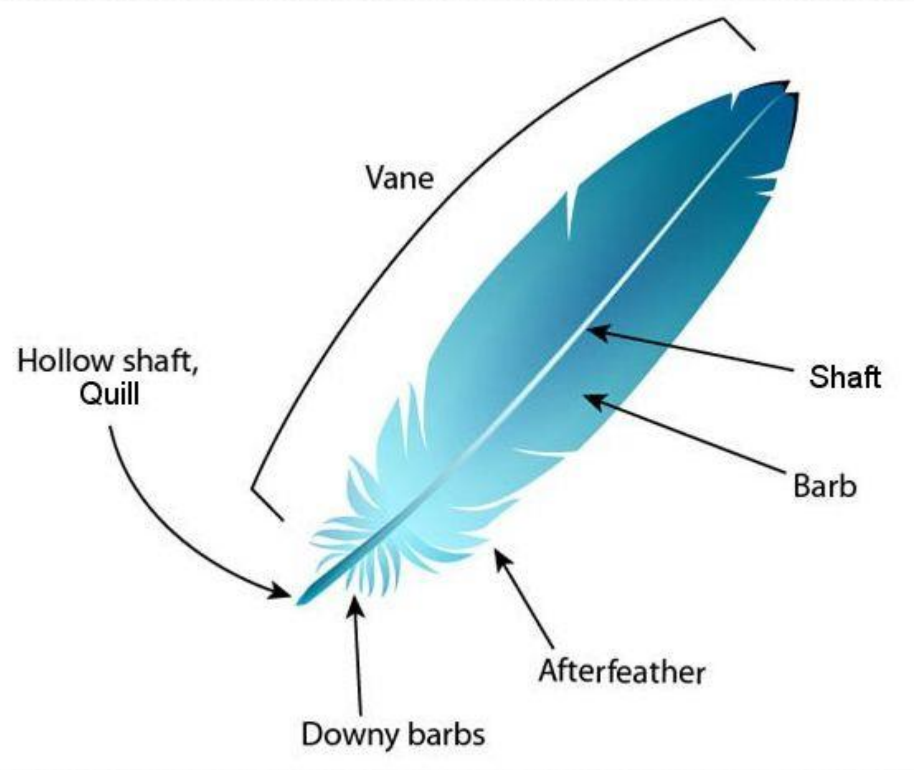
Microscopic analysis of electrocution and burn feathers

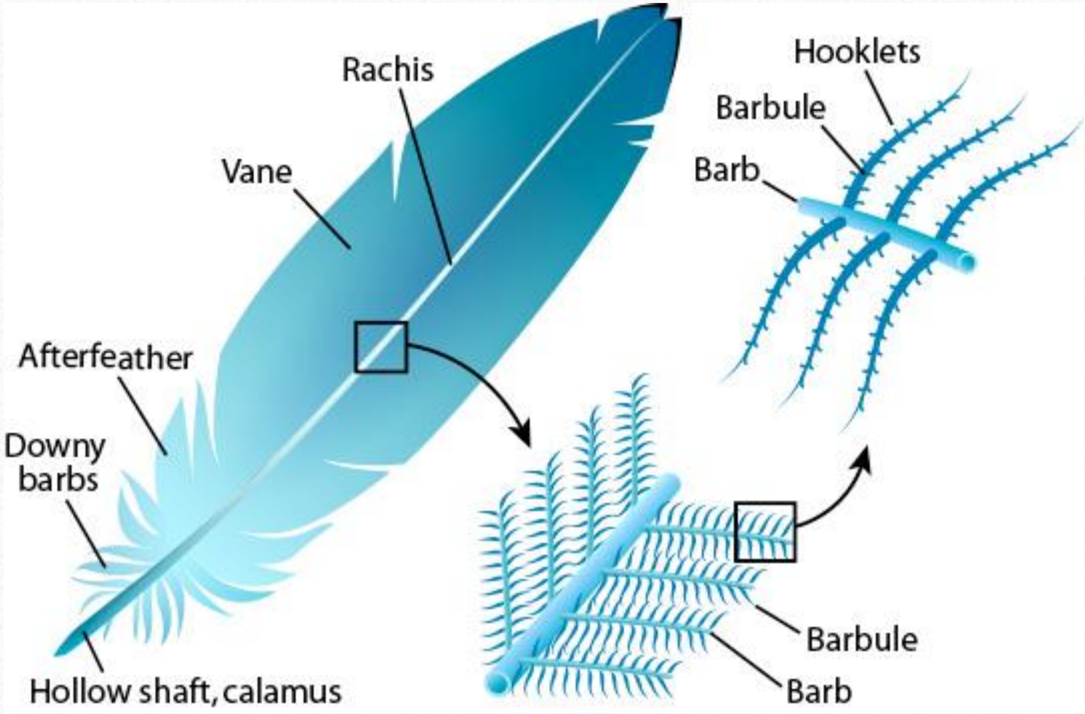
Kind of feathers



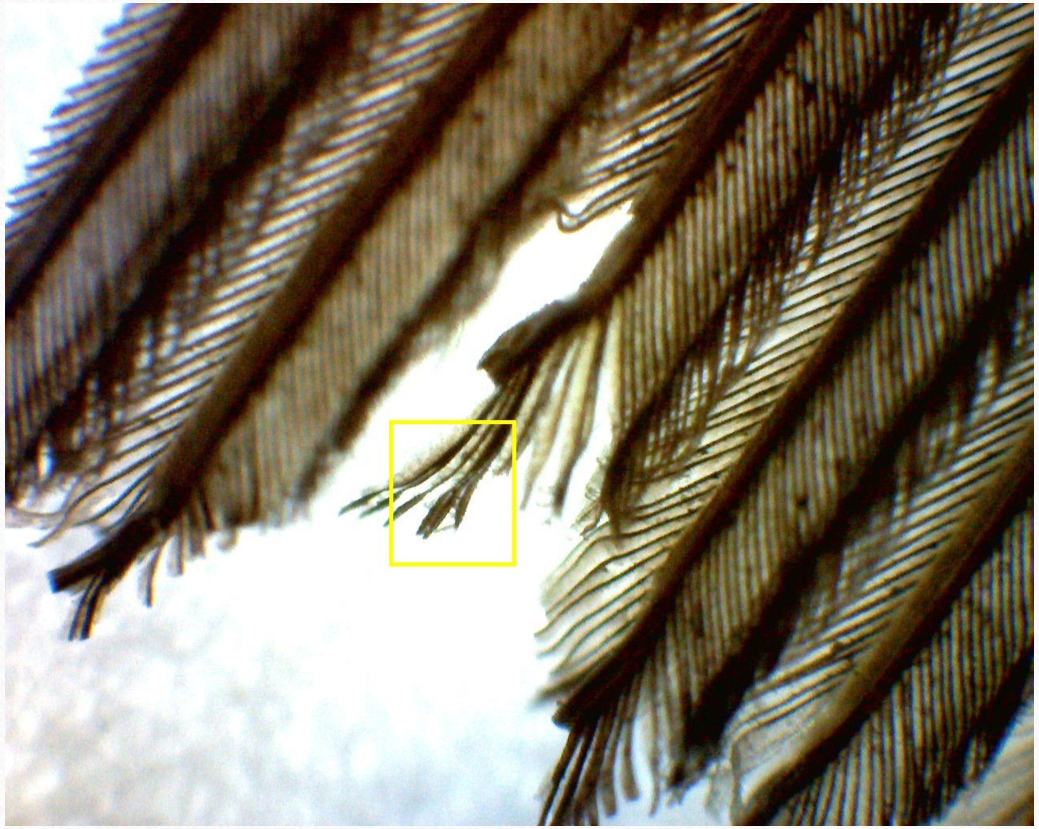


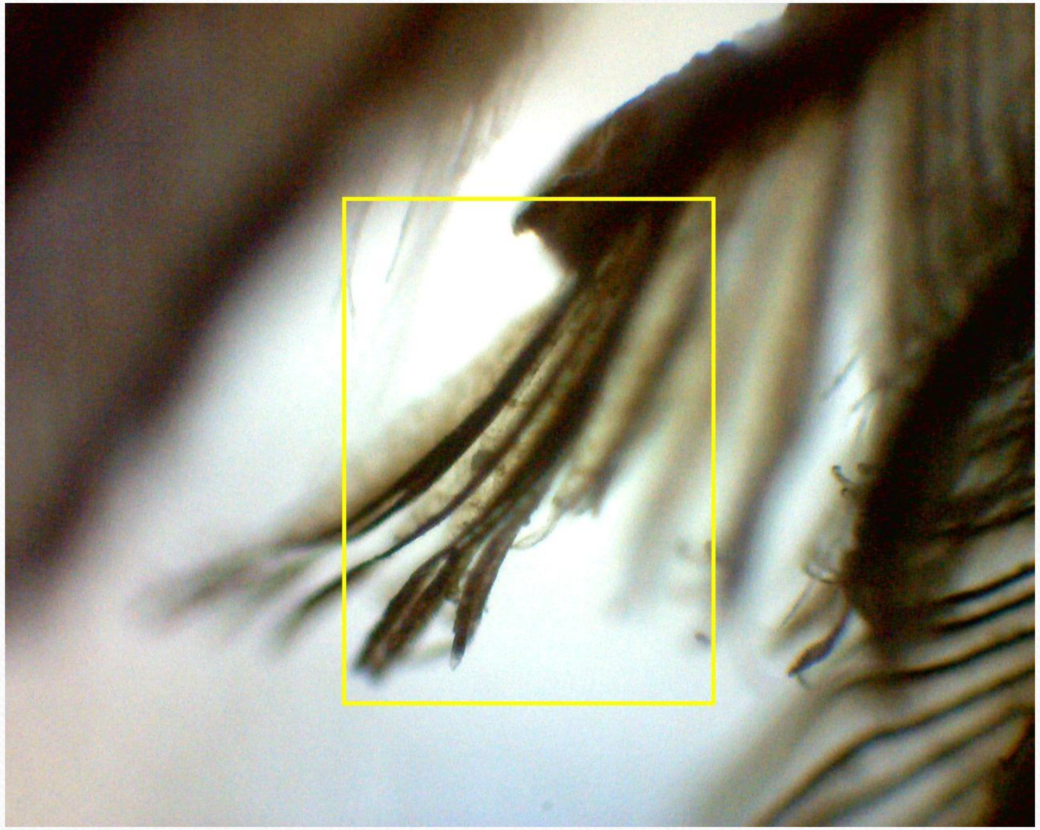
Anatomy of a feather





Osprey feather at 40X and 100X Magnification





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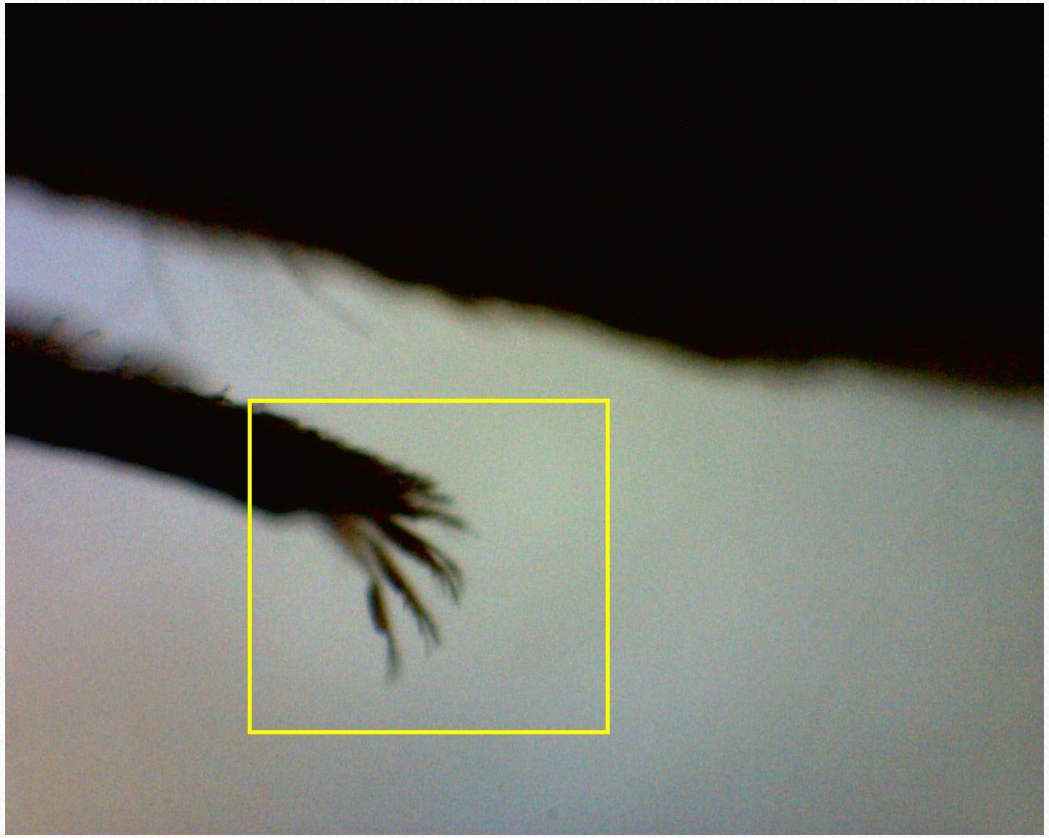

Burrowing owl feathers at 100X Magnification