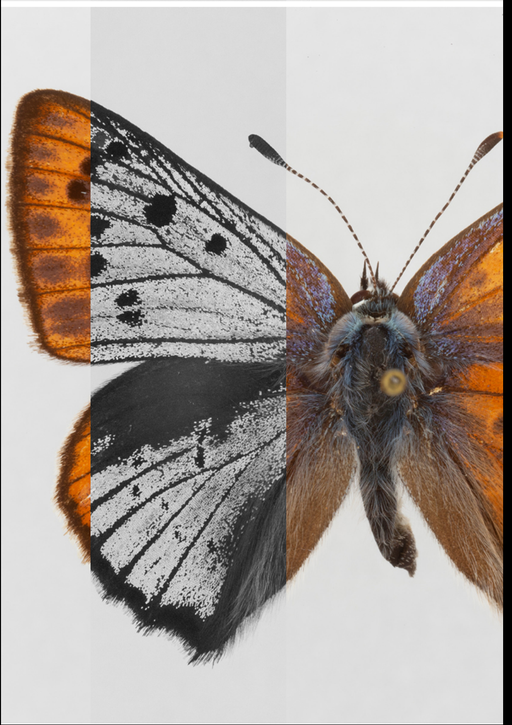
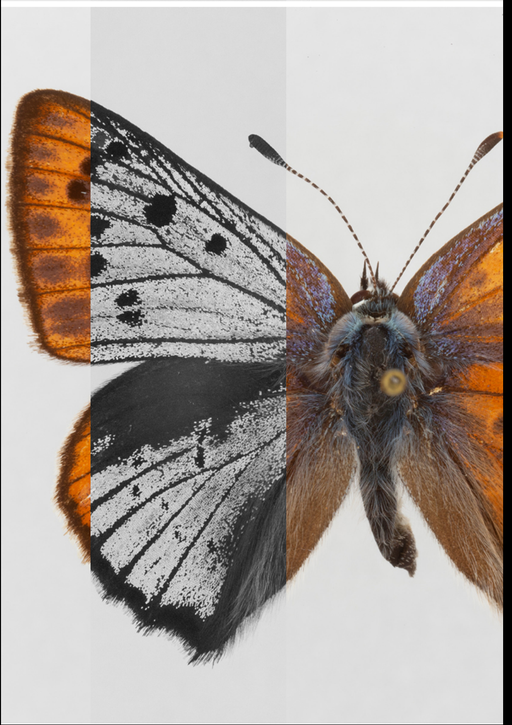


UV-Muster bei Schmetterlingen und standardisierte Fotografie

Gunnar Brehm
Phyletisches Museum Jena

FRIEDRICH-SCHILLER-UNIVERSITÄT JENA

Phyletisches Museum



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Hermann | Musche | Kühn | Brehm

ulmer

SCHMETTERLINGE

Die Tagfalter und Widderchen Deutschlands

3

Settele et al.

Schmetterlinge – Tagfalter und Widderchen

ulmer

♂ ♂ U ♀ ♀ U

Gelbwürfeliger Dickkopffalter (S. xxx) *Carterocephalus palaemon*

Gold-Dickkopffalter (S. xxx) *Carterocephalus silvicola*

Rostfarbiger Dickkopffalter (S. xxx) *Ochlodes sylvanus*

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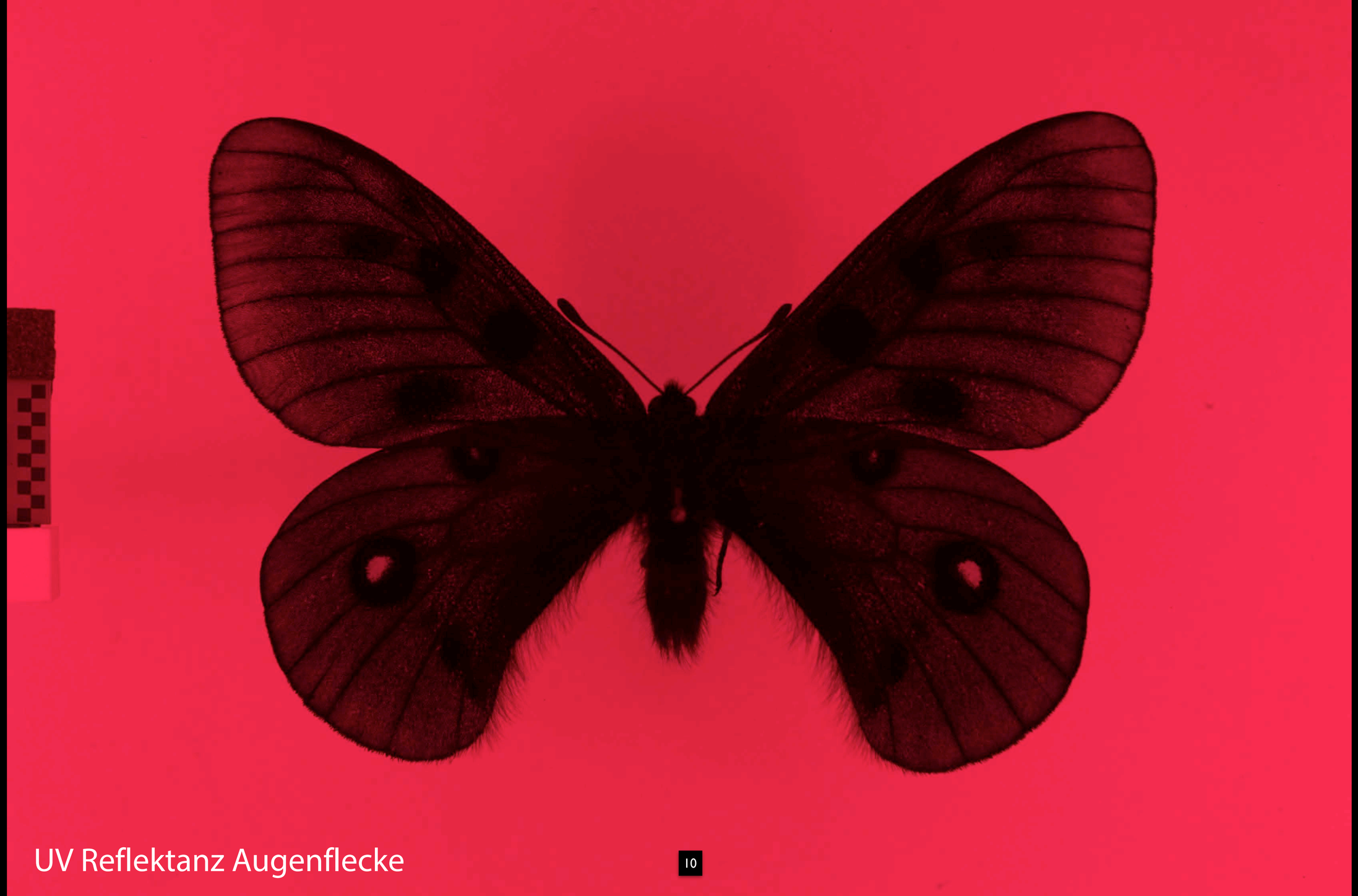
schwache UV Reflektanz

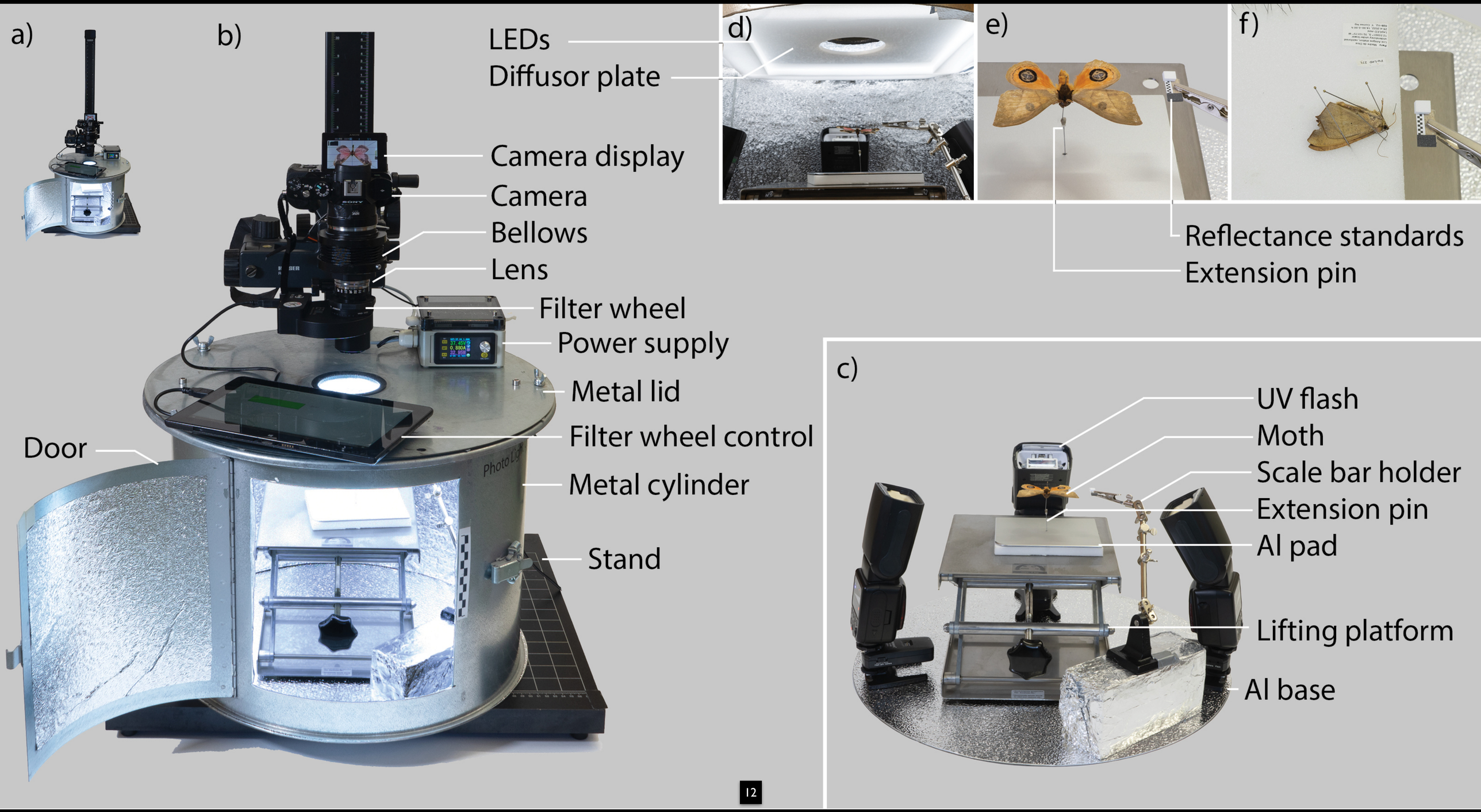
starke UV Reflektanz

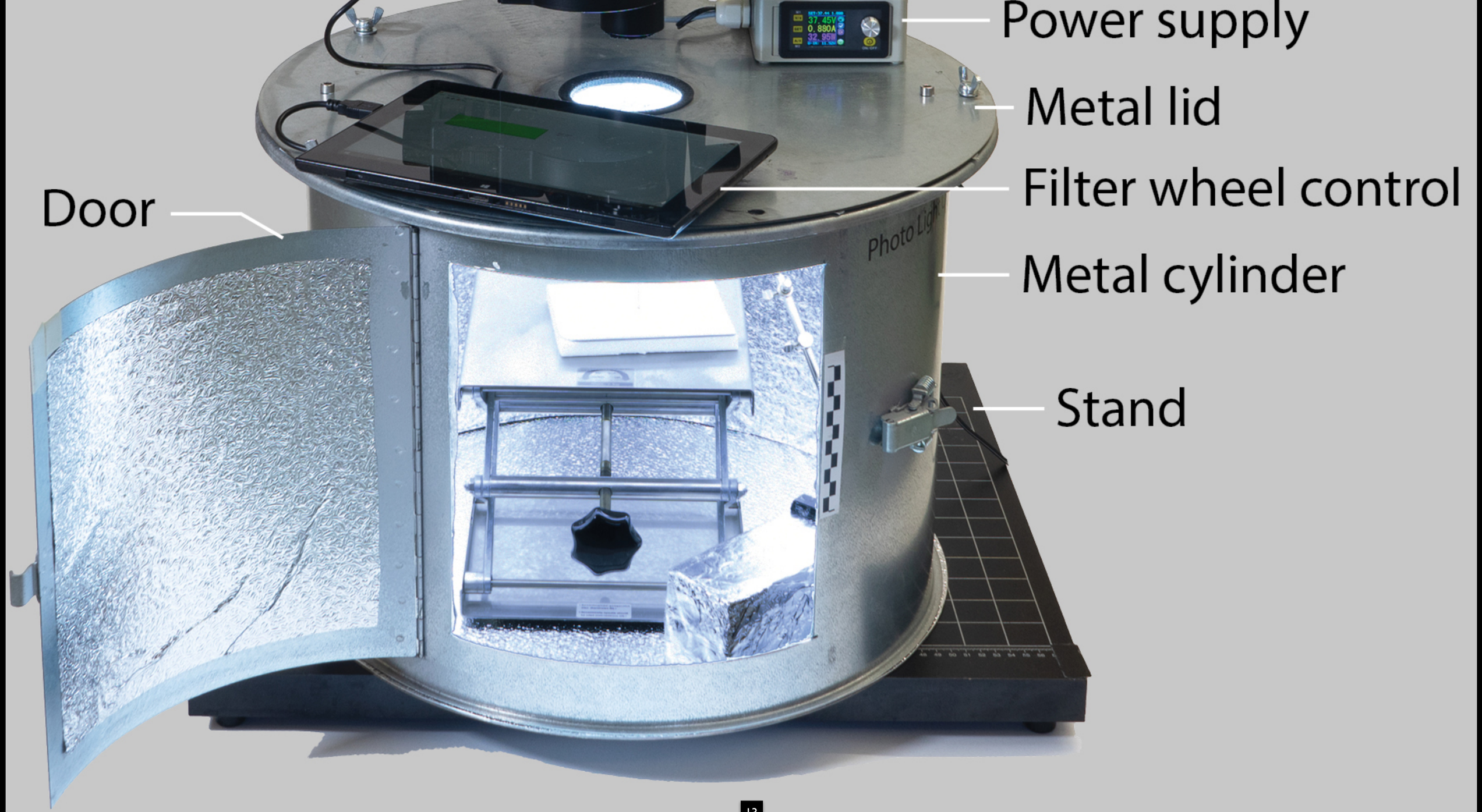


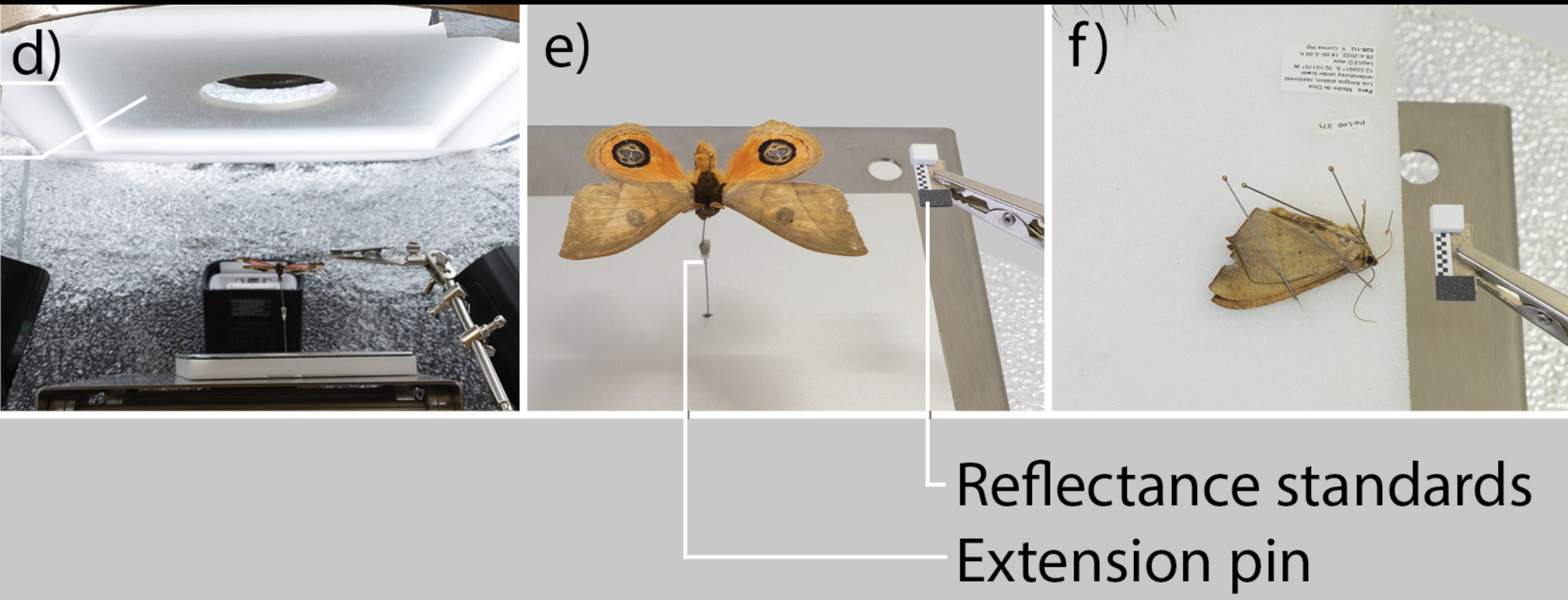
UV Reflektanz Augenflecke

Verwendete Technik

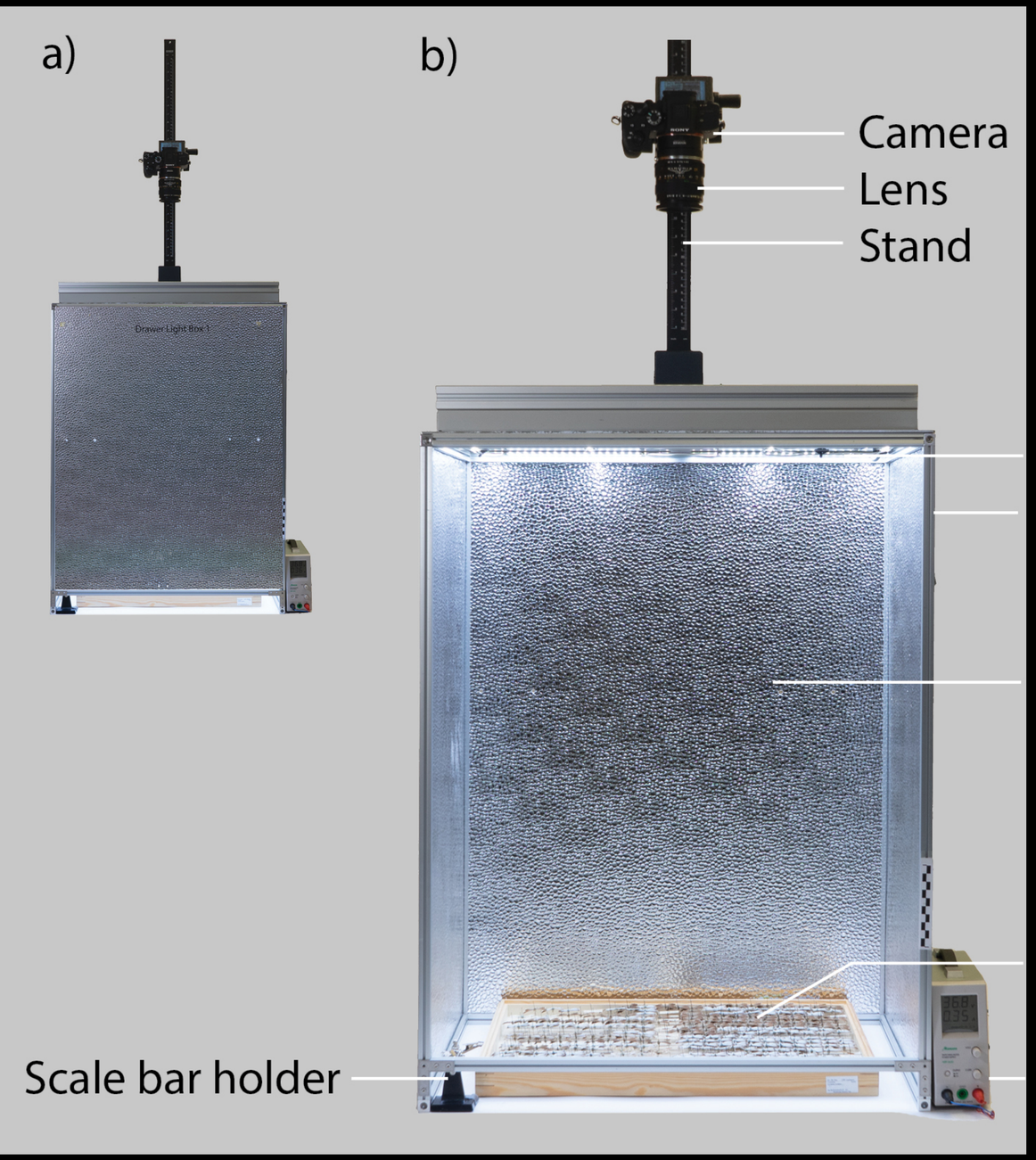
- Lichtzylinder
- Tageslicht LED
- Schattenfrei
- Neutraler Hintergrund
- Manueller Fokus & Hebebühne
- Maßstab unabhängig vom Objekt


a)
b)
LEDs
Diffusor plate
Camera display
Camera
Bellows
Lens
Filter wheel
Power supply
Metal lid
Filter wheel control
Metal cylinder
Stand
Door
d)
e)
f)
Reflectance standards
Extension pin
c)
UV flash
Moth
Scale bar holder
Extension pin
Al pad
Lifting platform
Al base


Power supply
Metal lid
Filter wheel control
Metal cylinder
Stand
Door
Photo Light
37.45V
0.880A
32.95W

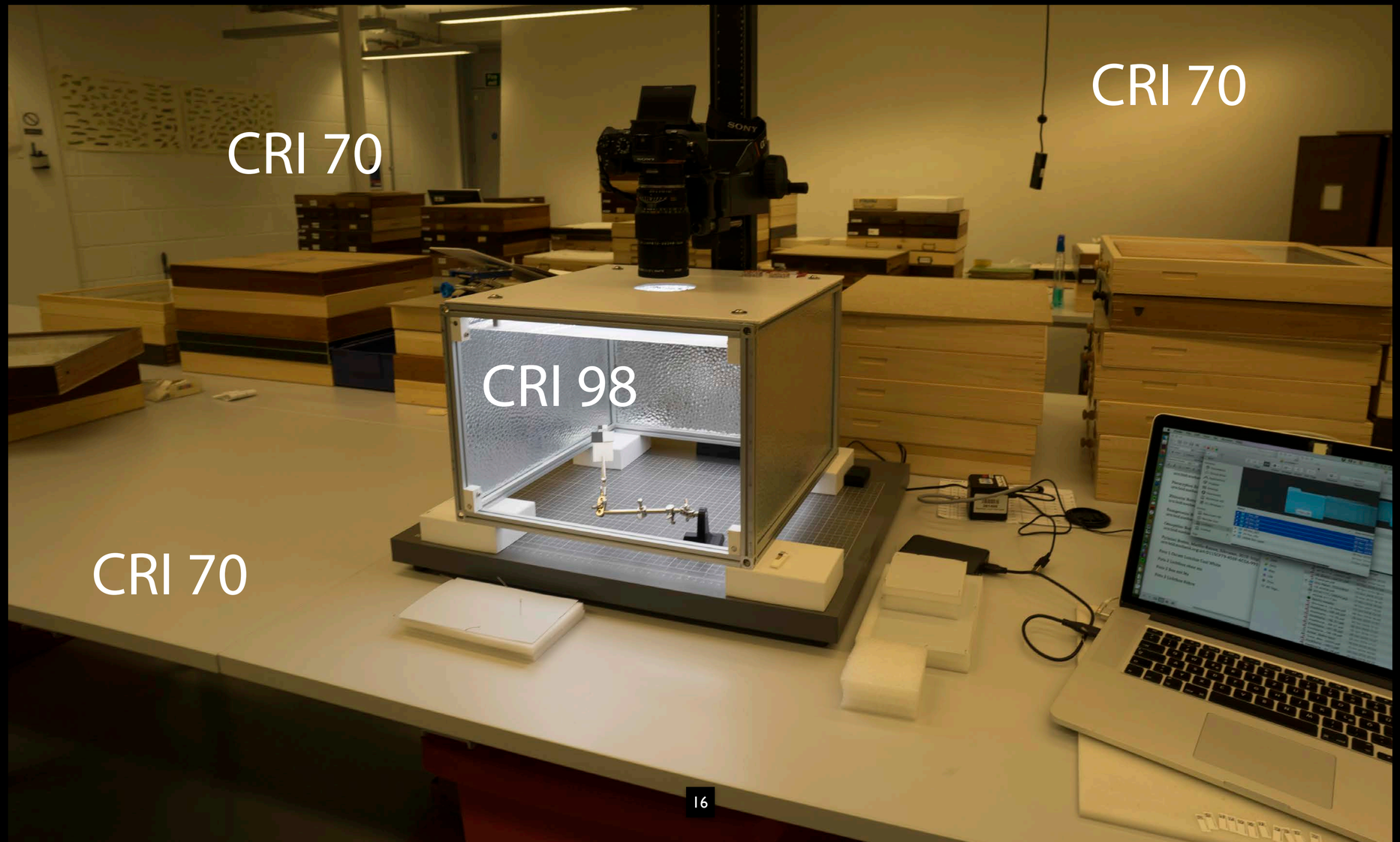


Brehm (im Druck) *Nota lepidopterologica*



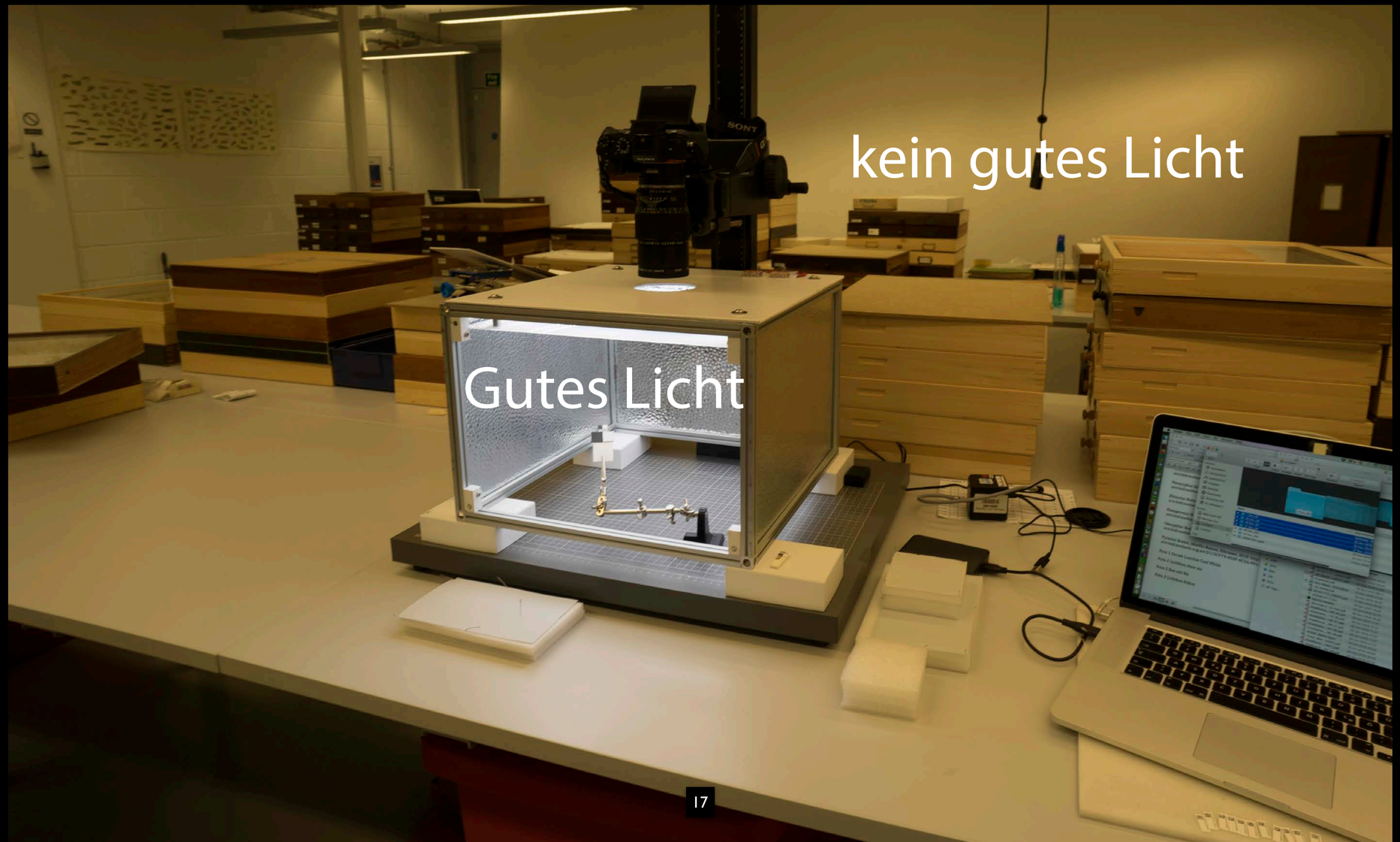
Brehm (im Druck)

Lichtqualität: Hoher CRI



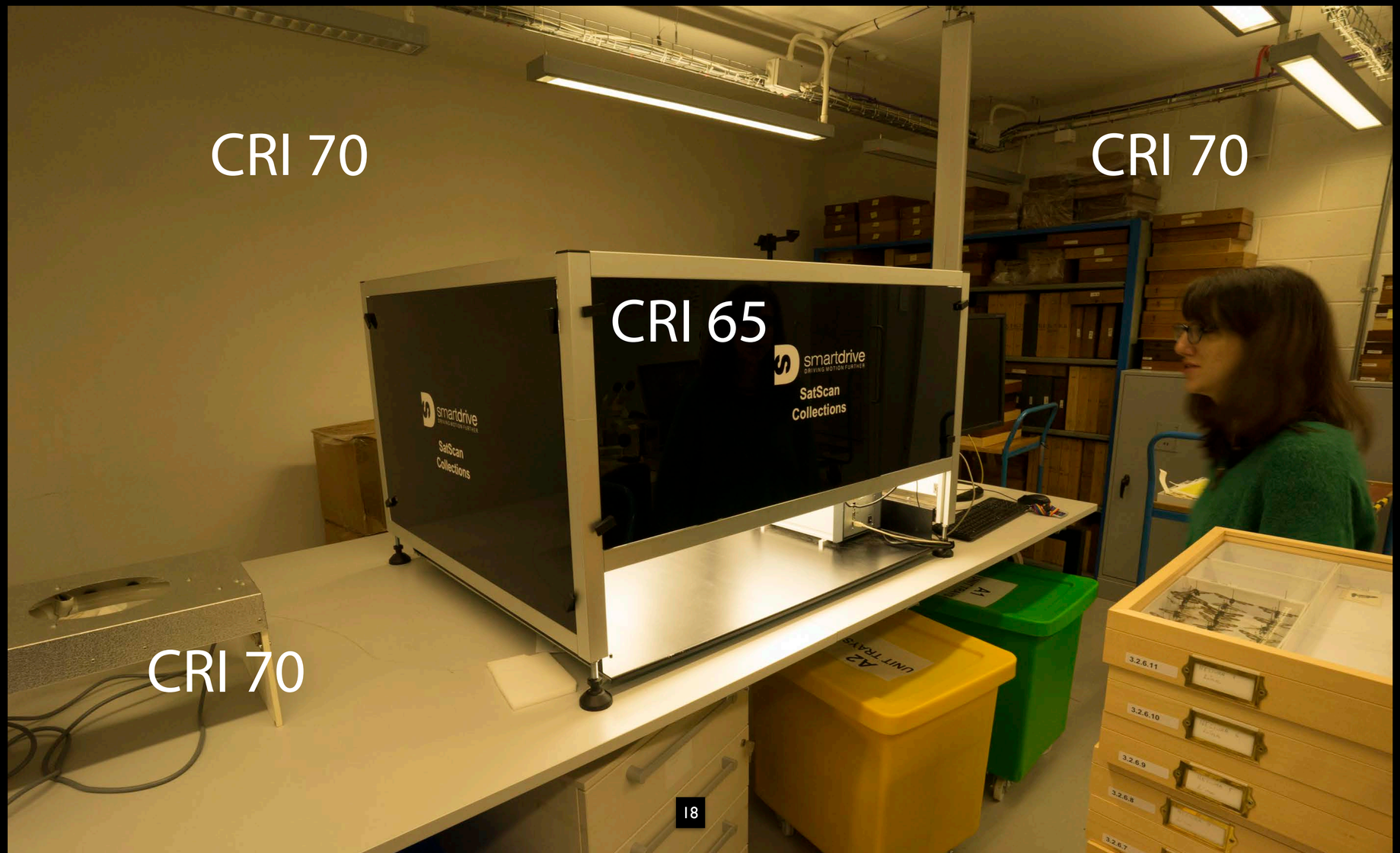
NHM London

Lichtqualität oft nicht gut



NHM London

Lichtqualität oft nicht gut

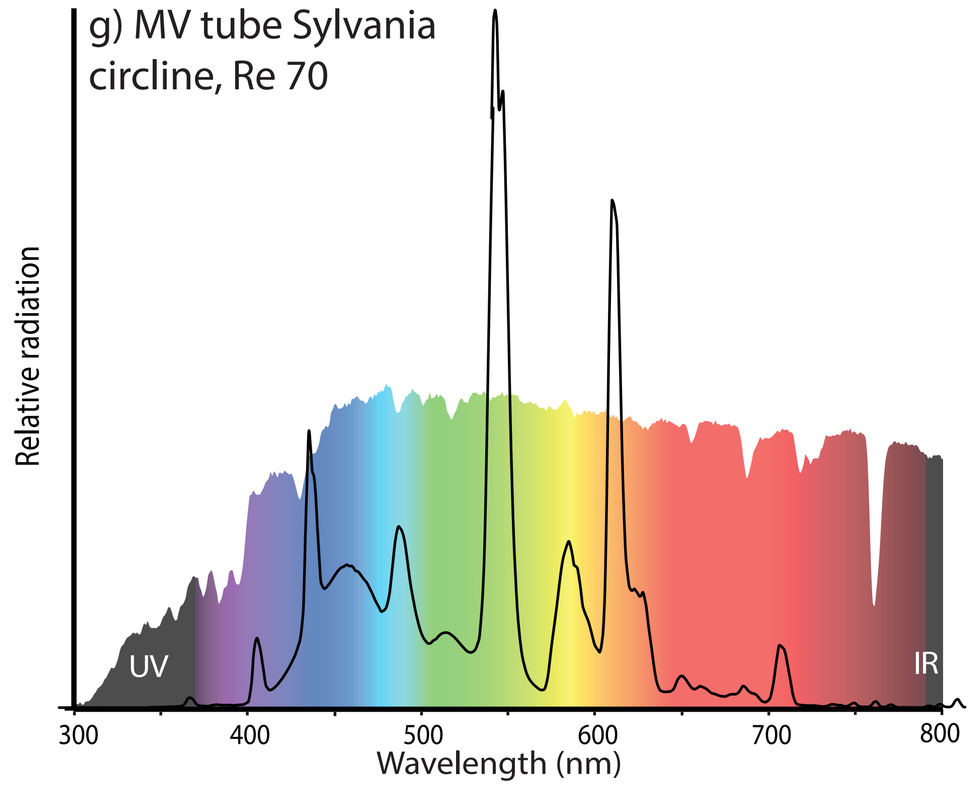


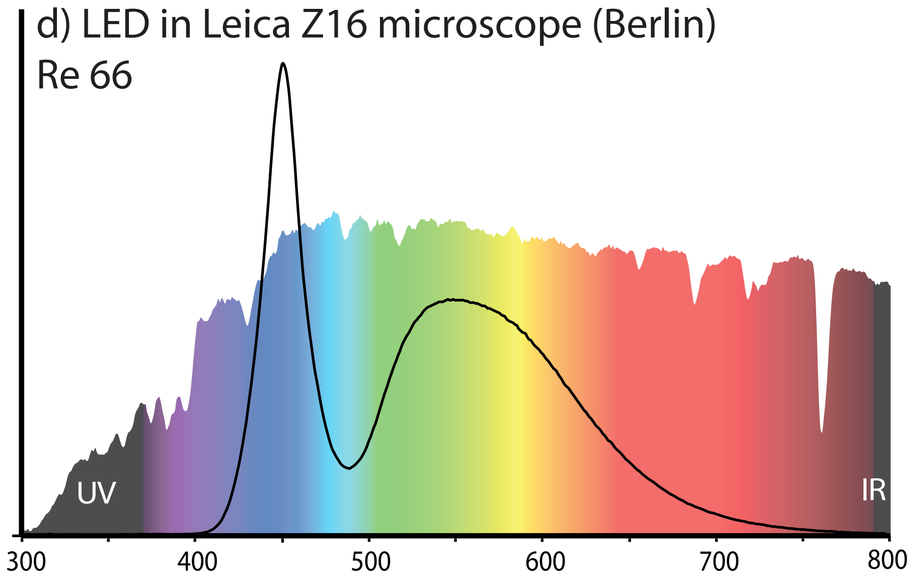
NHM London

…auch nicht in der Digitalisierung

NHM London

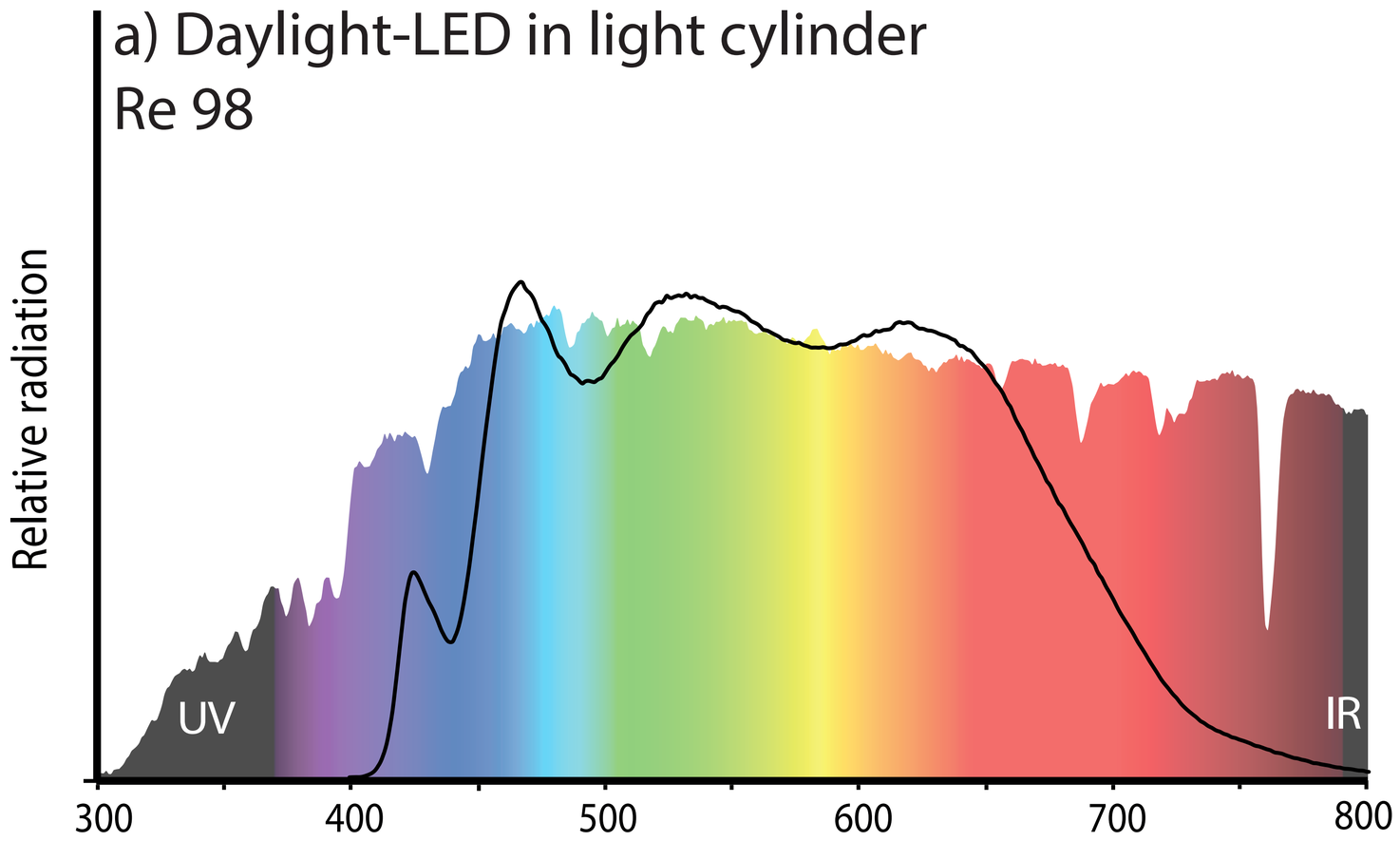
Spektrum ungleichmäßig, Rot schwach





Brehm (im Druck)

Tageslicht LED



Brehm (im Druck)

Schwache Farbdarstellung etc.

Tageslicht LED

Hg Dampf
in Satscan

Blitz

Brehm (im Druck)

Warum ist UV wichtig?

Brehm (im Druck)

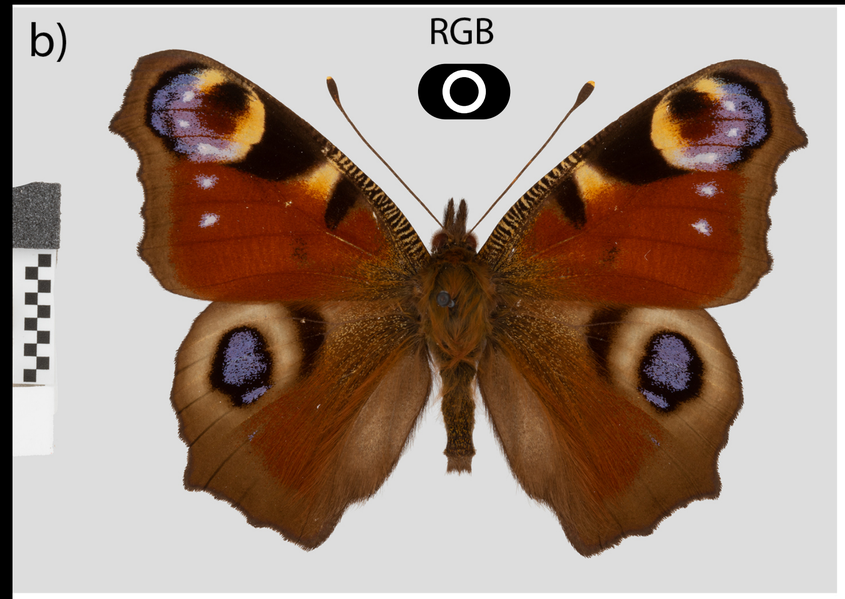
Warum ist UV wichtig?

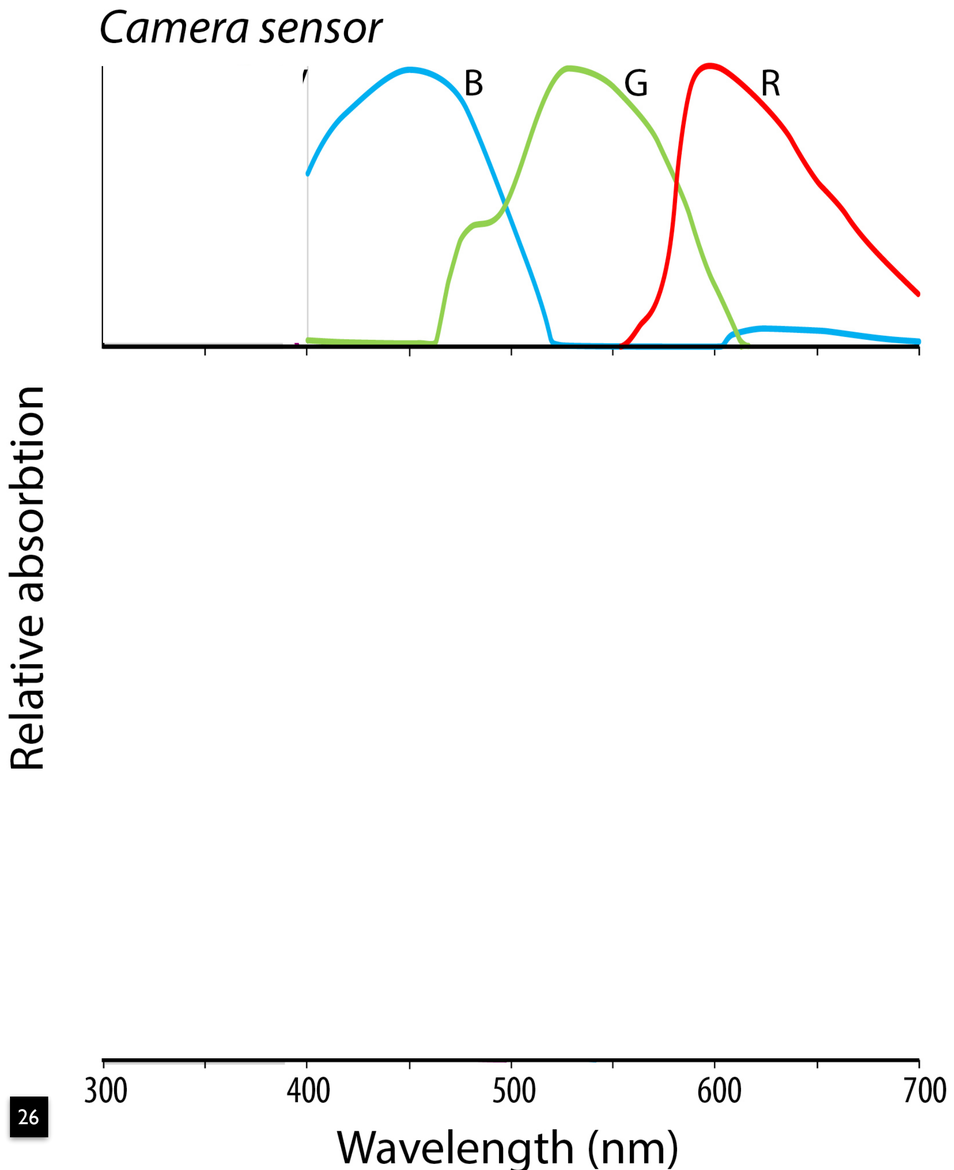
Brehm (im Druck)

Warum ist UV wichtig?

Brehm (im Druck)

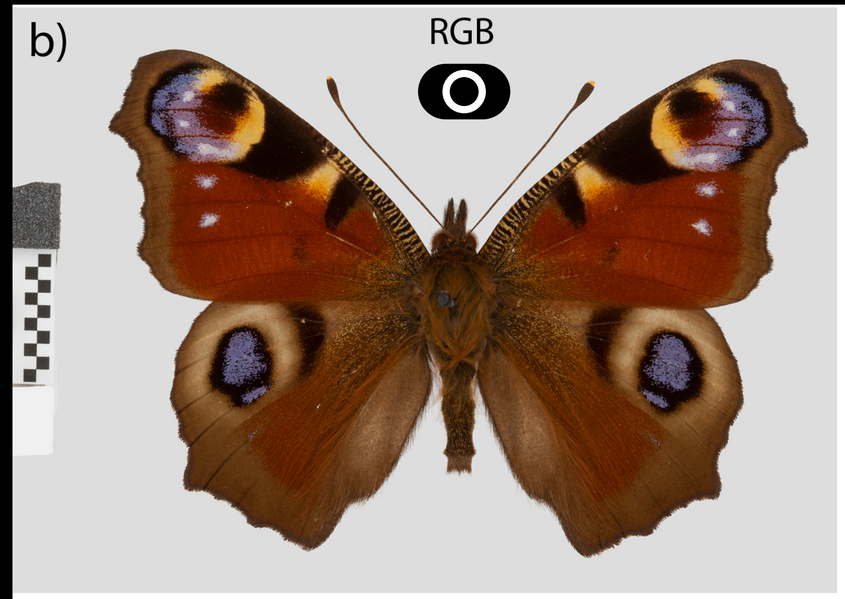
Warum ist UV wichtig?

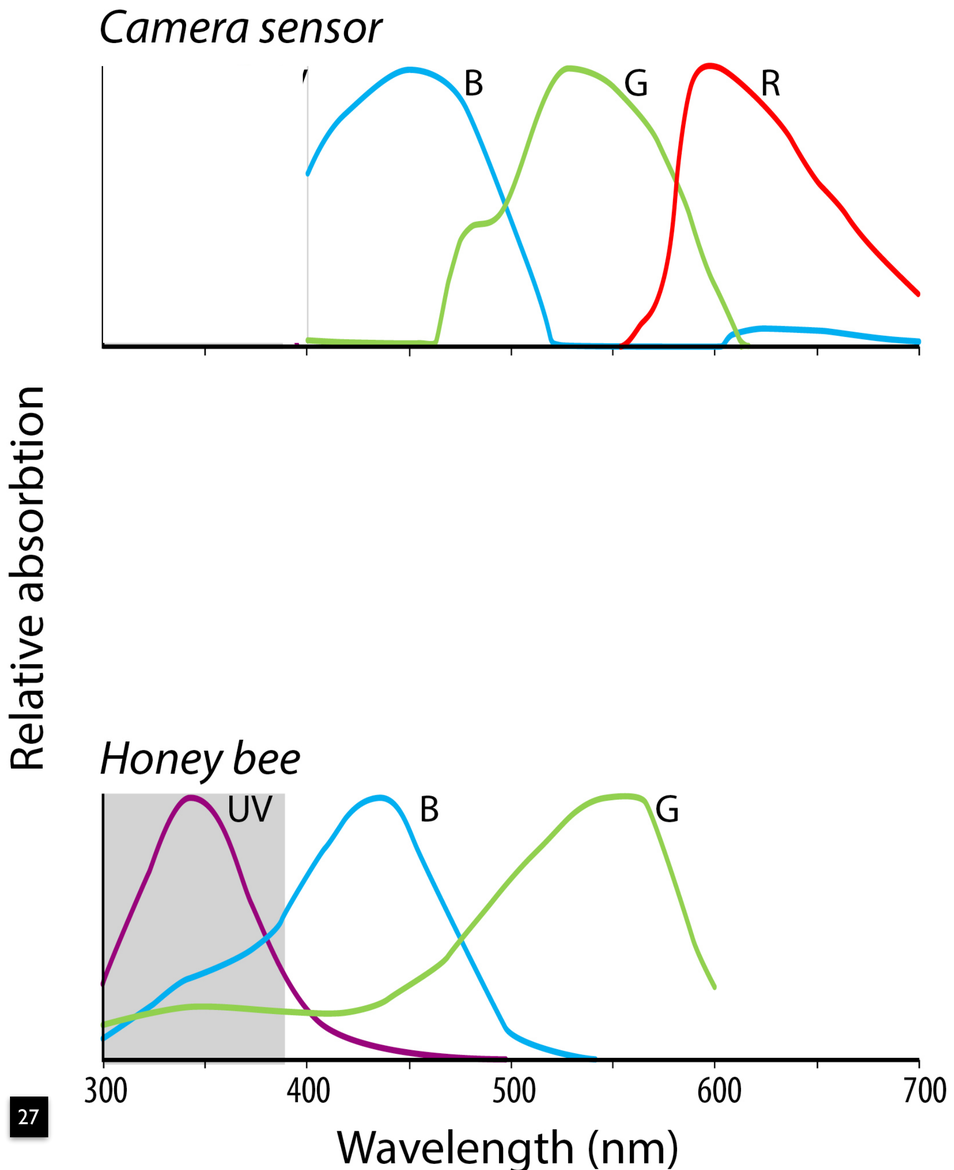




Brehm (im Druck

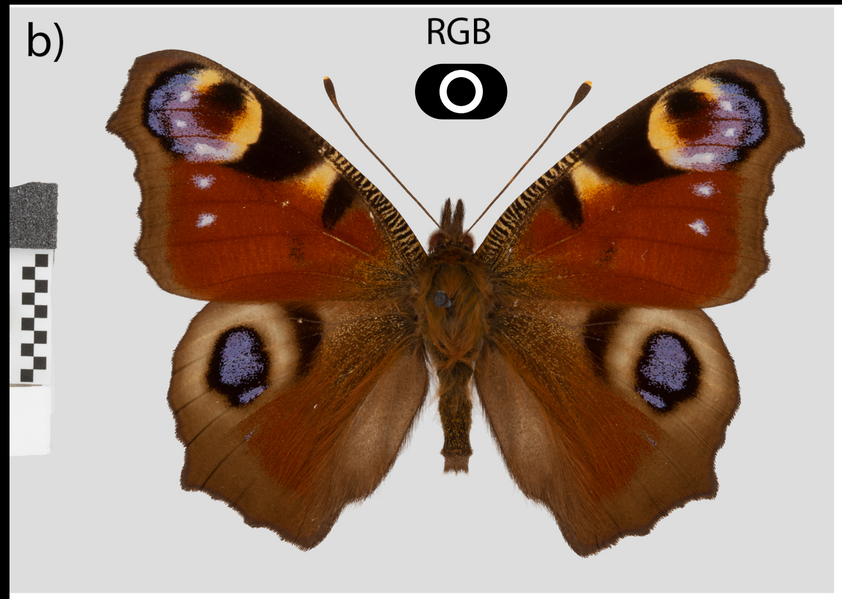
Die meisten Tiere sehen UV

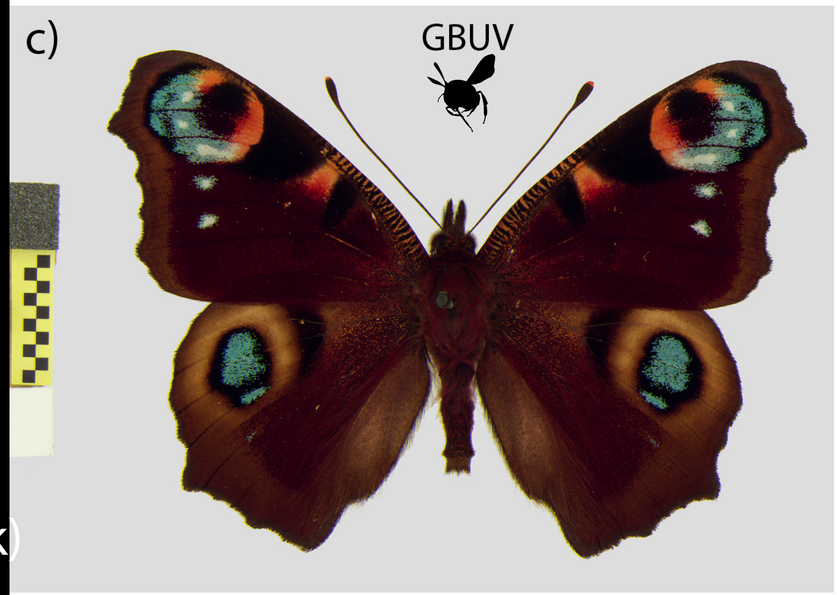


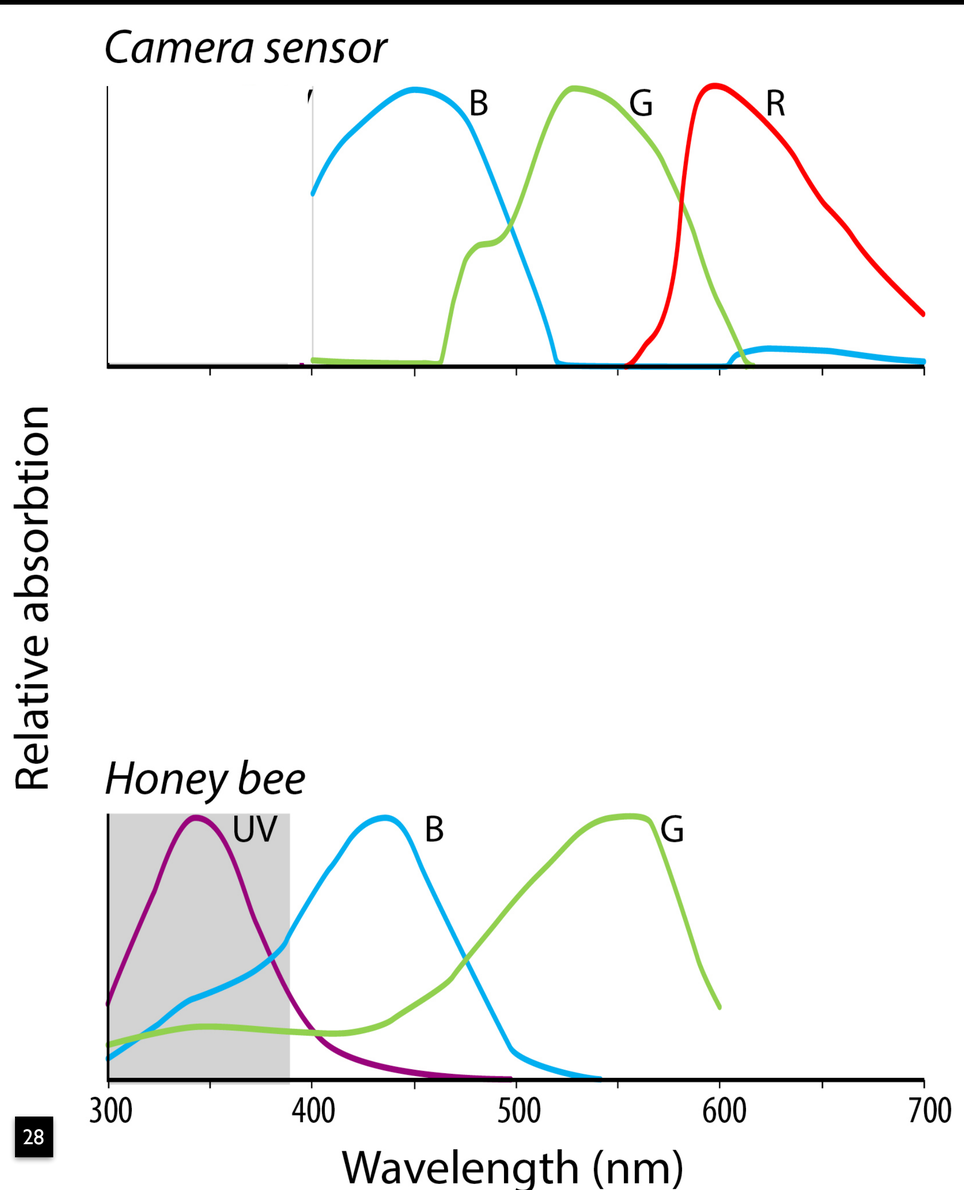


Brehm (im Druck

Falschfarben illustrieren Insektensicht

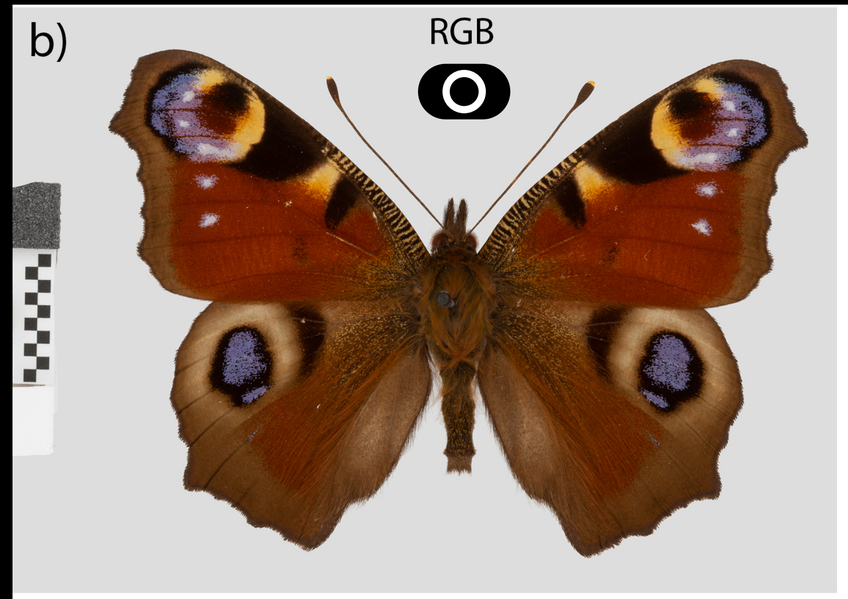


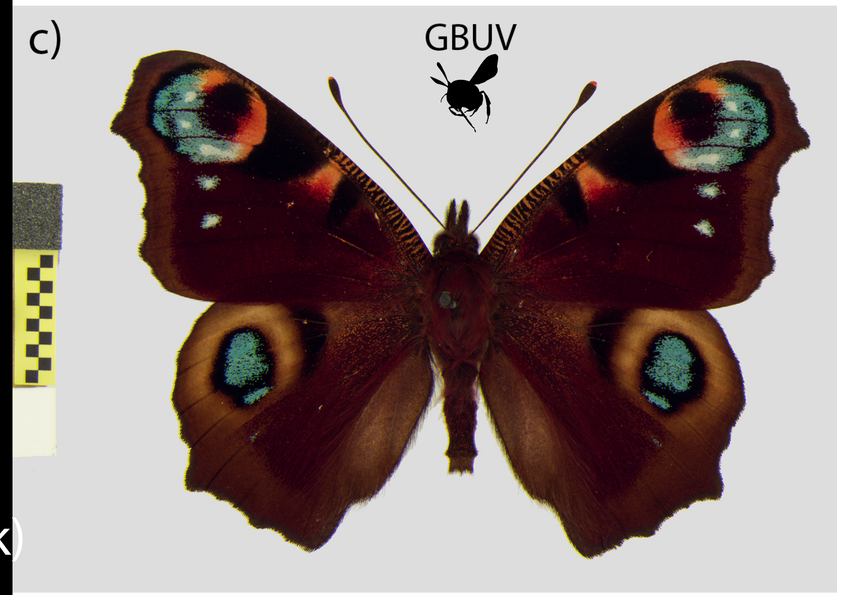


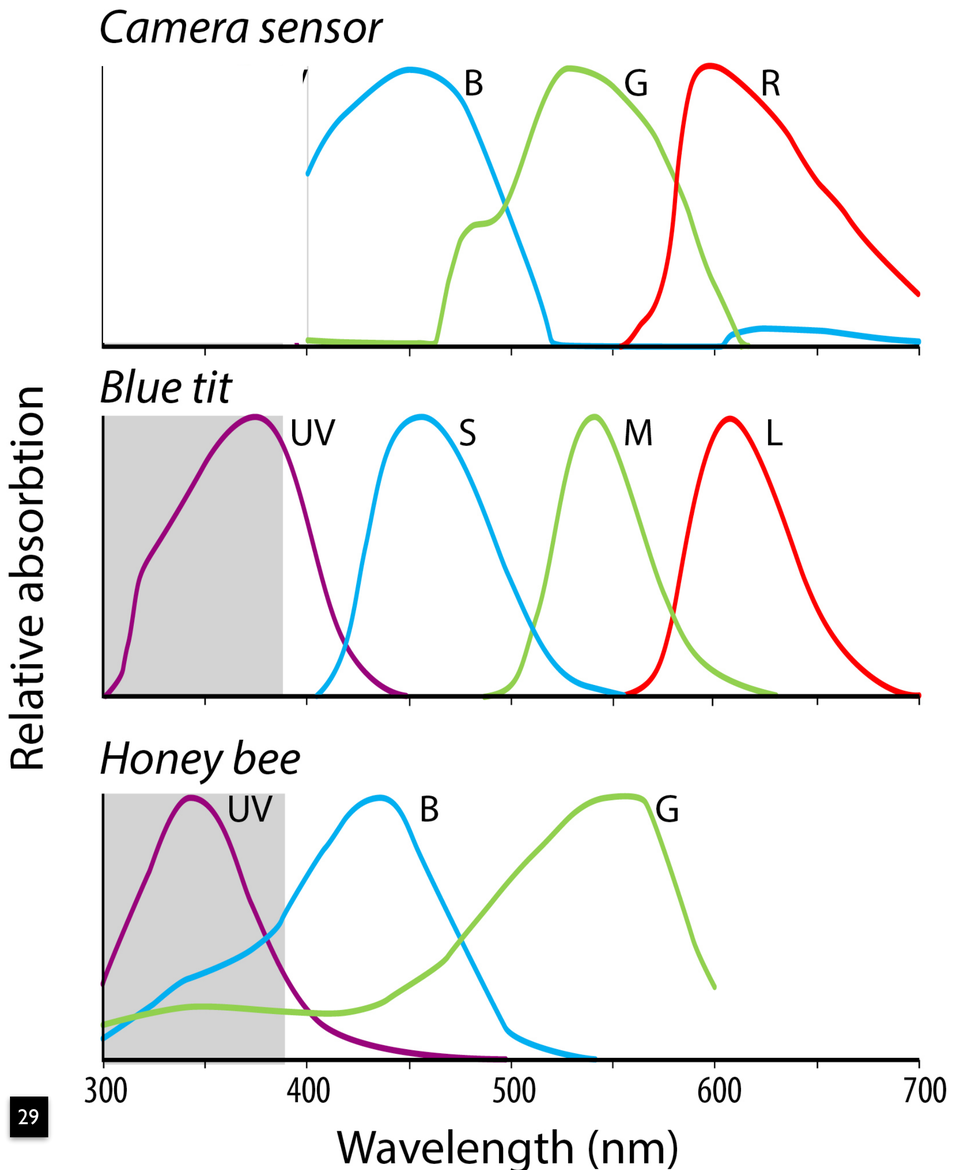


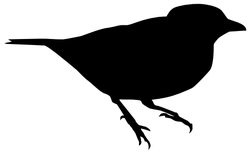
Brehm (im Druck)

Vögel haben vier Farbkanäle





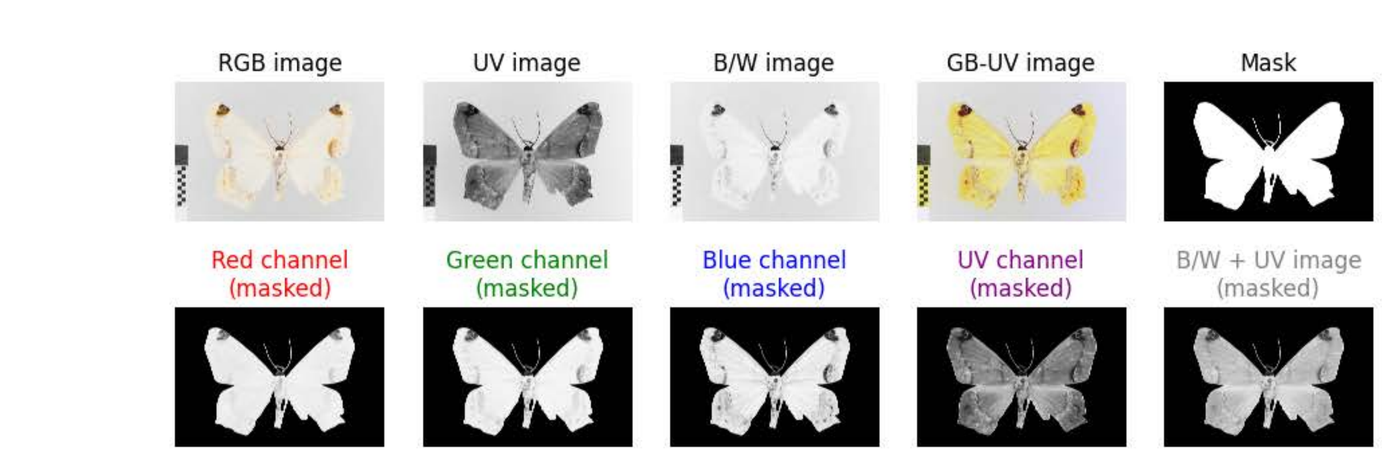


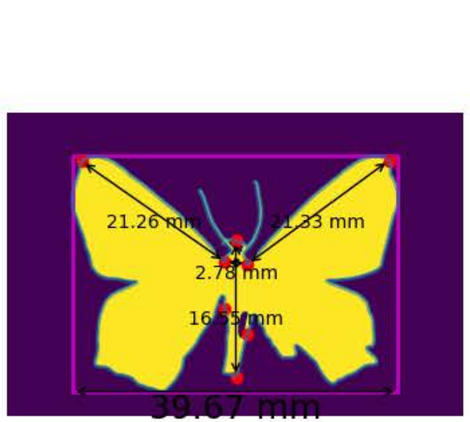


Brehm (im Druck)

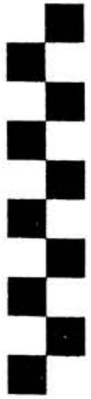
Anwendung standardisierter Fotografie

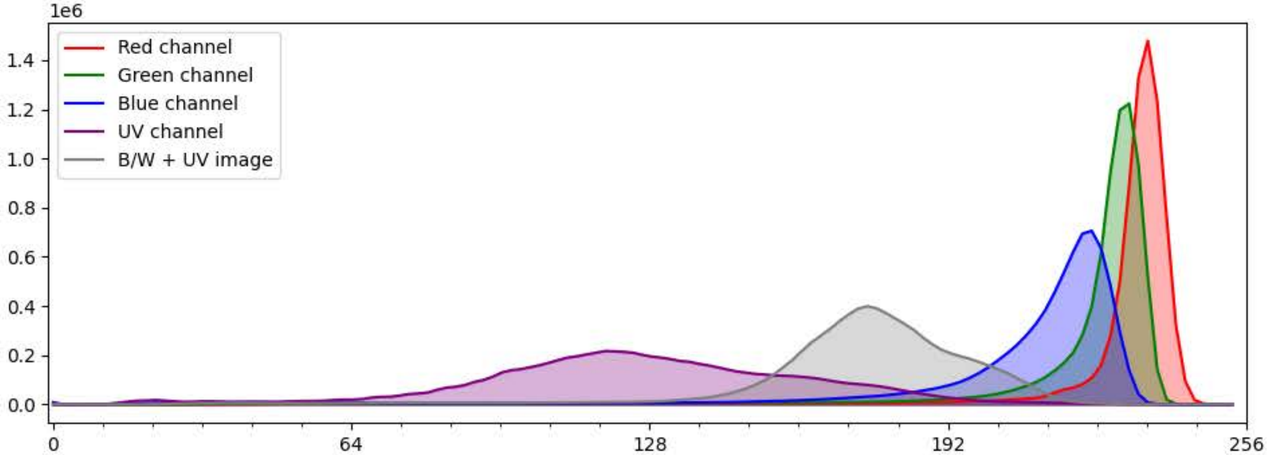
Automatisierte Messungen mit LEPY

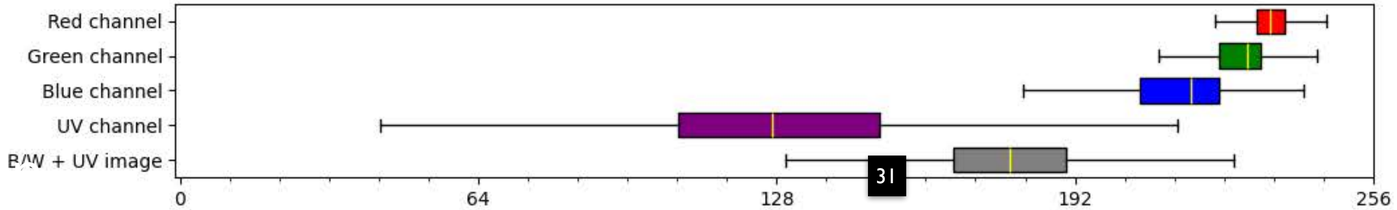




Detected scalebar:
108.00 px/mm







Left FWL	21.26	mm
Right FWL	21.33	mm
Body width	2.78	mm
Body length	16.55	mm
Wing span	39.67	mm
Left wing area	326.87	mm²
Right wing area	311.44	mm²
Body area	38.89	mm²

Q25	Median	Q75	IQR	Shannon Idx	Simpson Idx
231	234	237	6	0.58	0.94
223	229	232	9	0.64	0.95
206	217	223	17	0.74	0.97
107	127	150	43	0.89	0.99
166	178	190	24	0.77	0.98

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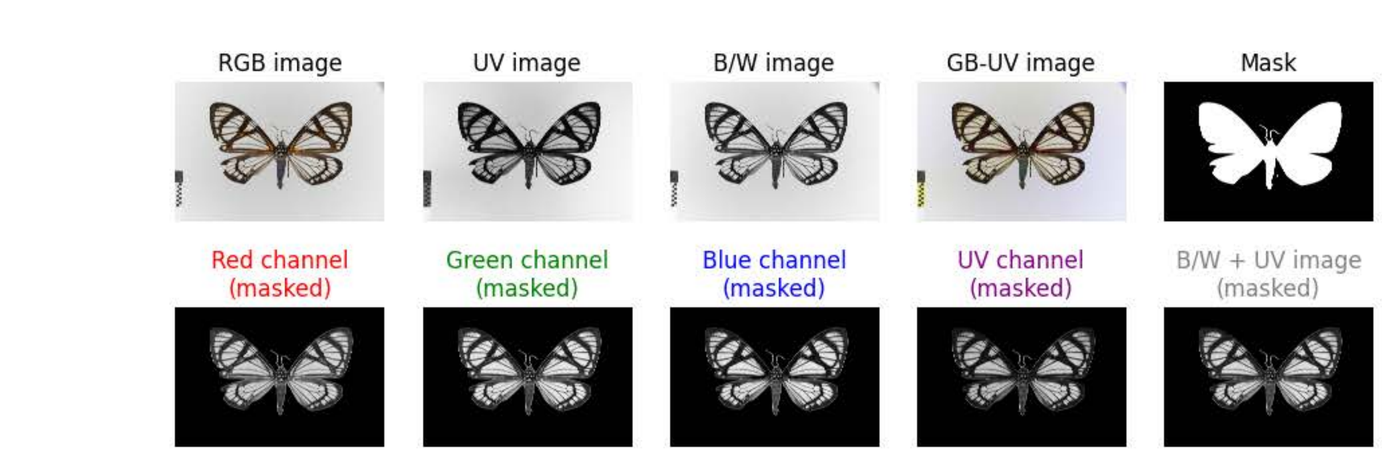
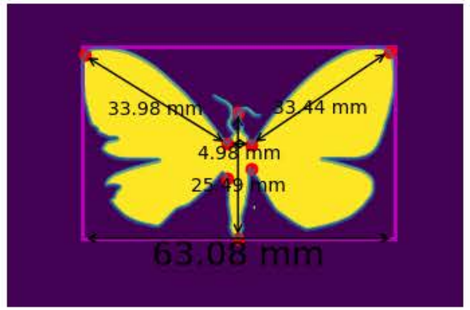
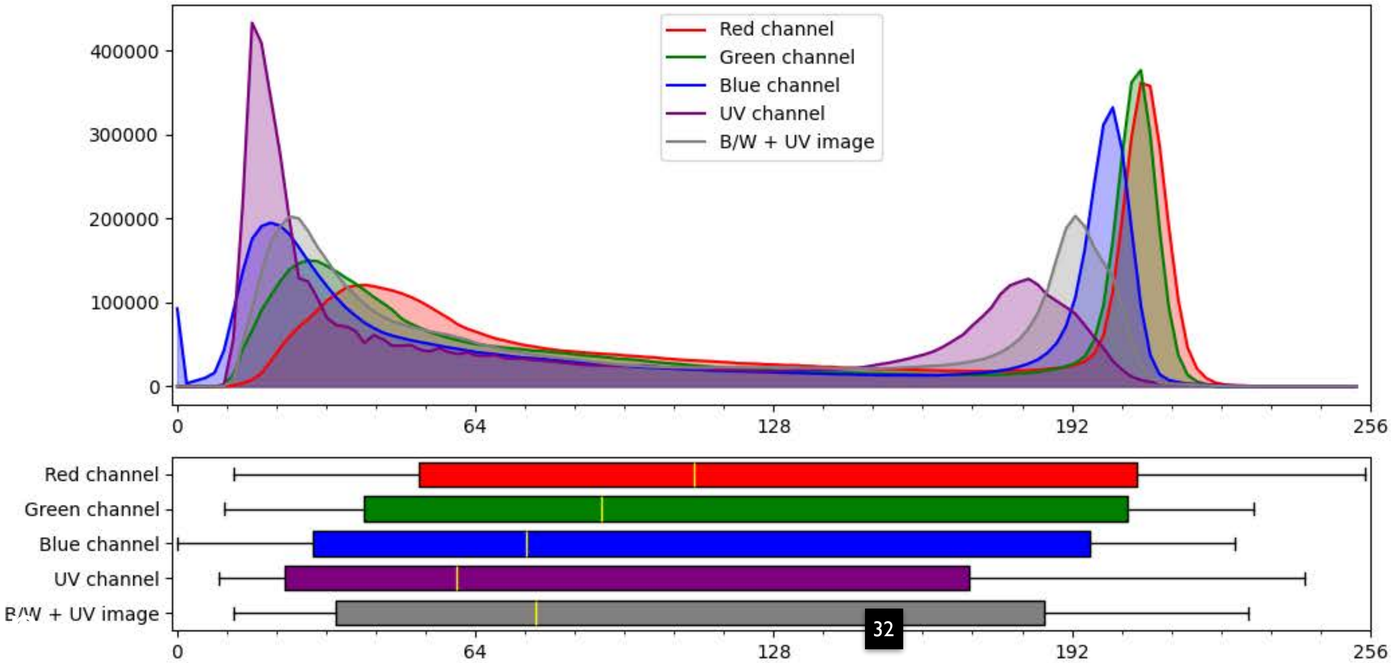
Automatisierte Messungen mit LEPY





Detected scalebar:
65.00 px/mm

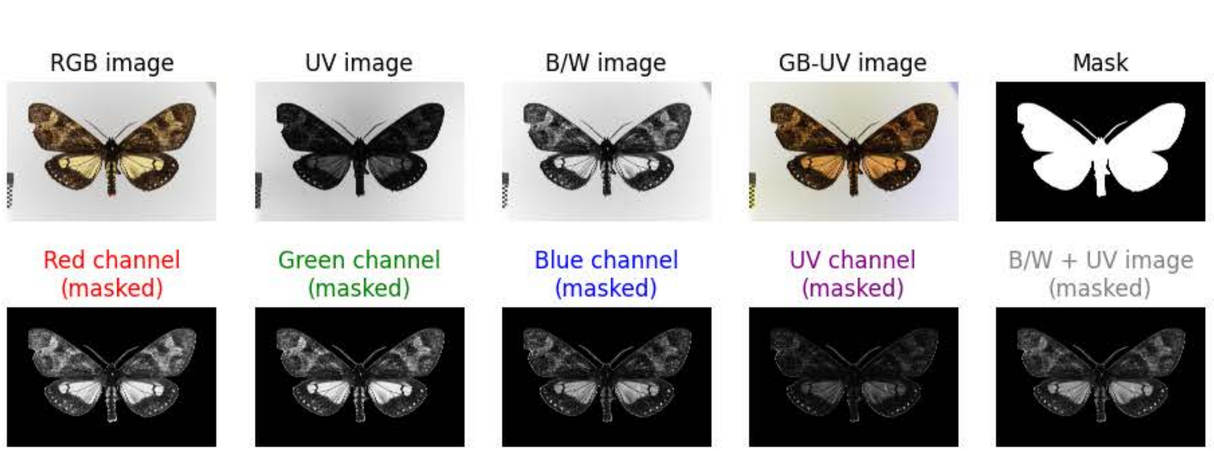


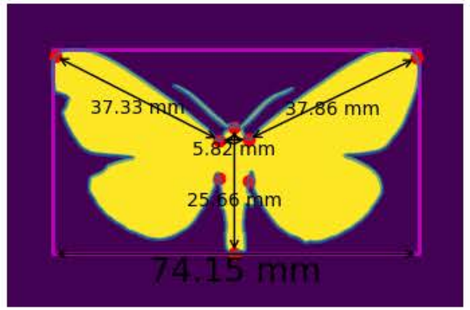
Left FWL	33.98	mm
Right FWL	33.44	mm
Body width	4.98	mm
Body length	25.49	mm
Wing span	63.08	mm
Left wing area	653.98	mm²
Right wing area	705.33	mm²
Body area	86.67	mm²

	Q25	Median	Q75	IQR	Shannon Idx	Simpson Idx
Red channel	52	111	206	154	0.89	0.99
Green channel	40	91	204	164	0.88	0.99
Blue channel	29	75	196	167	0.88	0.99
UV channel	23	60	170	147	0.88	0.99
B/W + UV image	34	77	186	152	0.87	0.99

Correa et al. in pr

Automatisierte Messungen mit LEPY





Detected scalebar:
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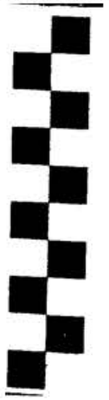
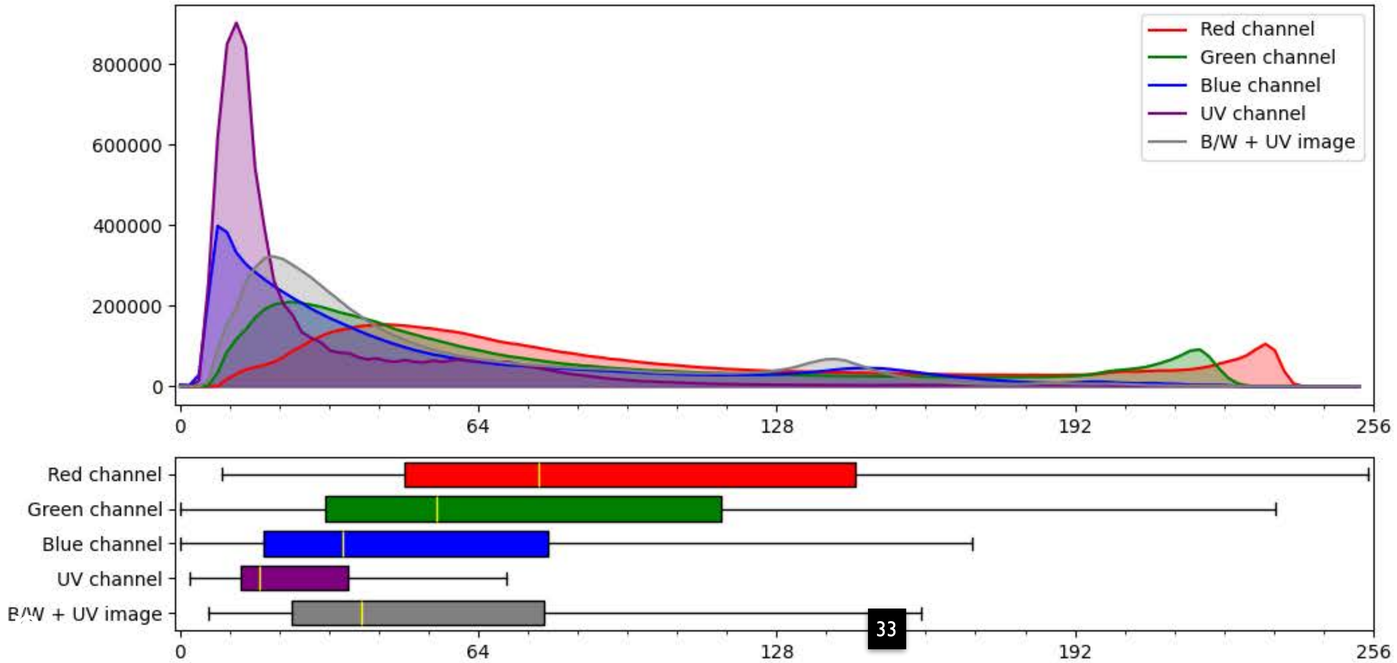




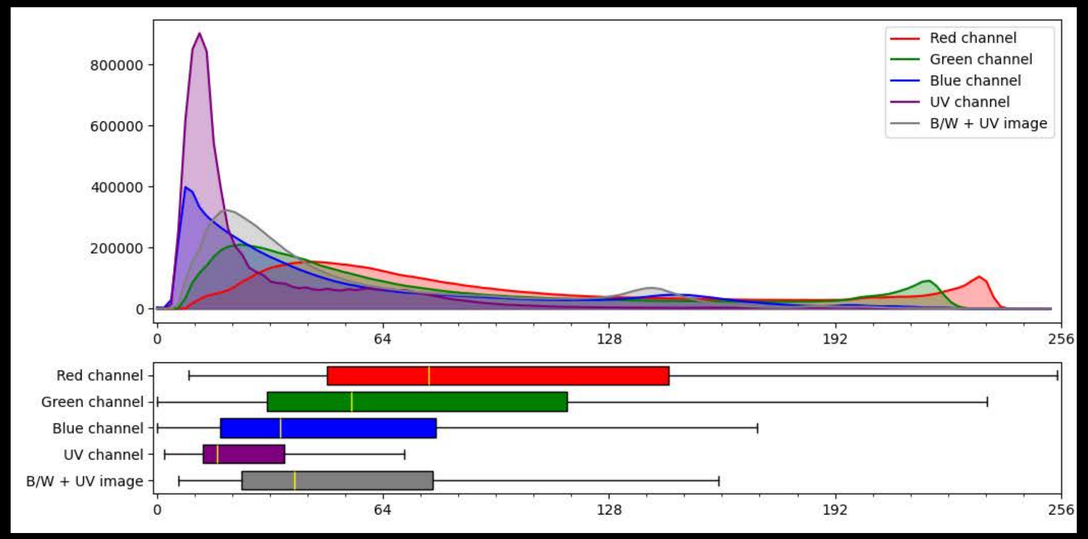
Left FWL	37.33	mm
Right FWL	37.86	mm
Body width	5.82	mm
Body length	25.66	mm
Wing span	74.15	mm
Left wing area	797.39	mm²
Right wing area	840.95	mm²
Body area	125.64	mm²

Q25	Median	Q75	IQR	Shannon Idx	Simpson Idx
48	77	145	97	0.95	0.99
31	55	116	85	0.92	0.99
18	35	79	61	0.87	0.99
13	17	36	23	0.73	0.97
24	39	78	54	0.84	0.99

Correa et al. in pr

LEPY Algorithmus

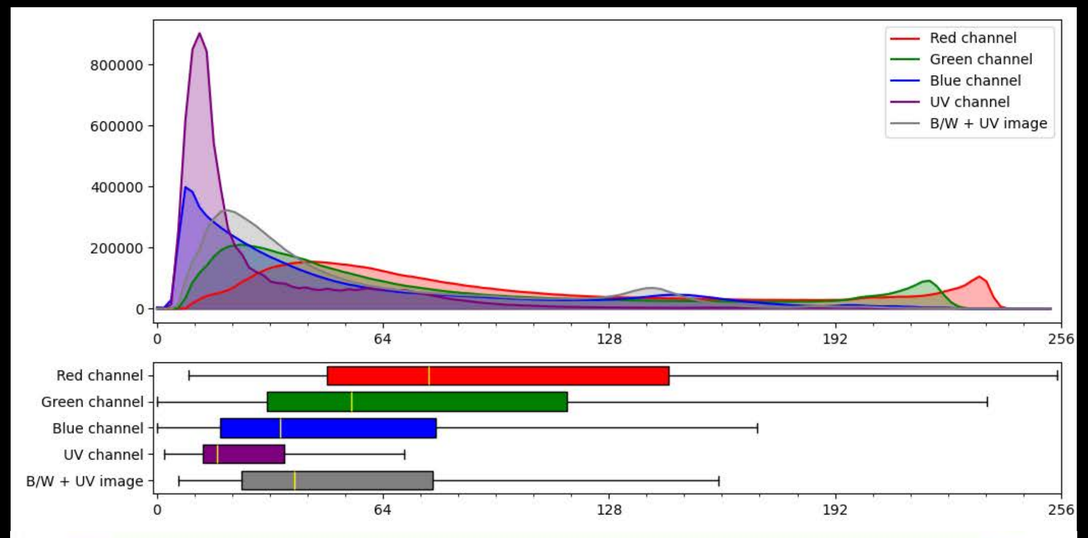
- Vier Farbkanäle
- Quantifiziert Helligkeit
- Quanitifiziert Kontrast

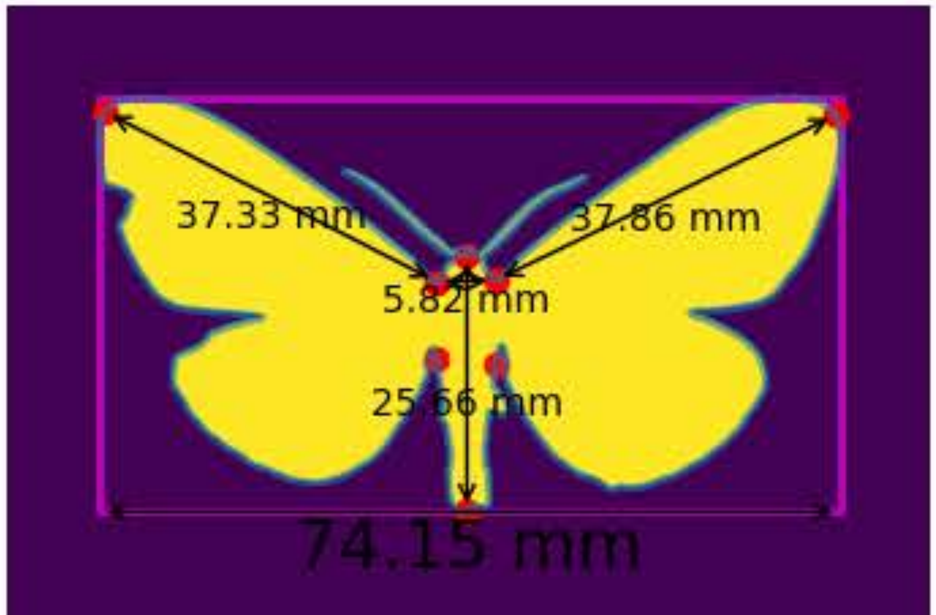


Correa et al. in prep

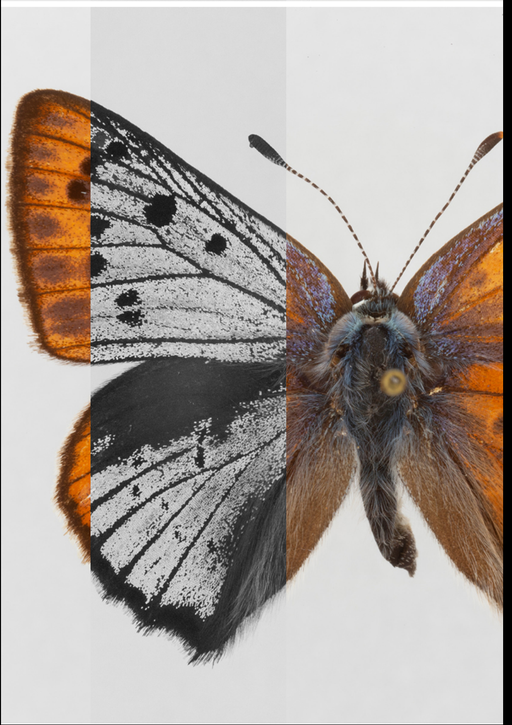
LEPY Algorithmus

- Vier Farbkanäle
- Quantifiziert Helligkeit
- Quanitifiziert Kontrast
- & Größe





Correa et al. in prep



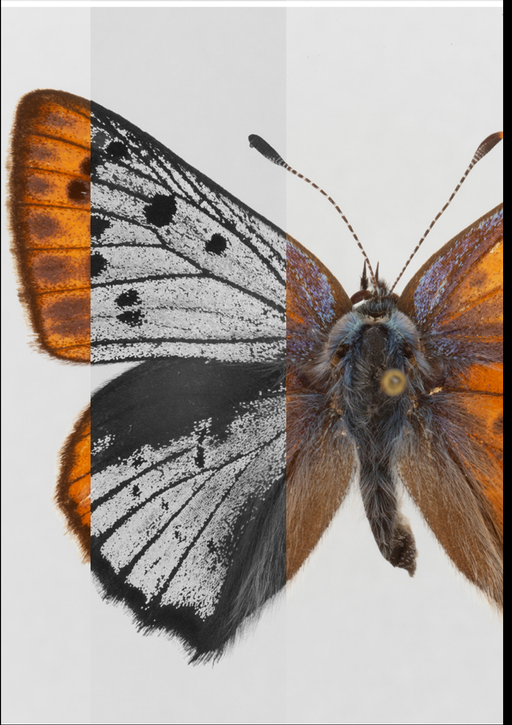
Veröffentlichungen

Fotografie & Licht: im Druck

Light in standardised insect photography and description of lighing devices, including the UV range. Nota lepidopterologica

LEPY: Preprint in Kürze

Correa Carmona et al. LEPY: A Python-based pipeline for automated size and colour trait analysis of Lepidoptera images

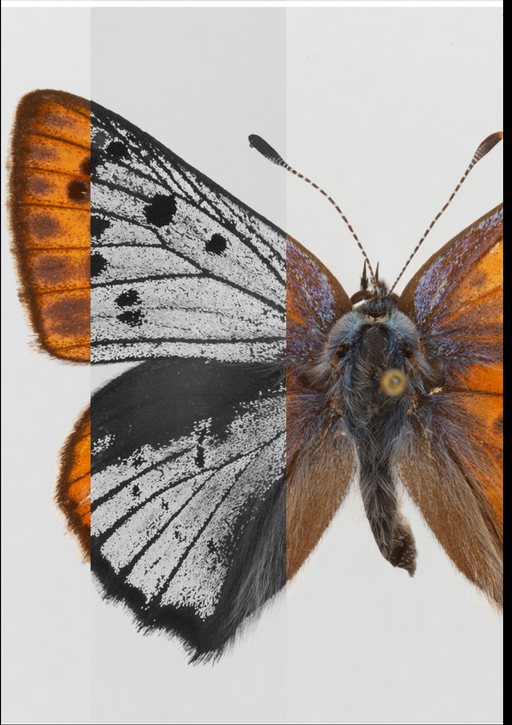


Datensätze & Kooperation

z.B. Fotos & Daten: Größe und 4 Kanal-Farben aller Tagfalter Deutschlands

Verknüpfung z.B. möglich mit:

- Verbreitungsdaten
- Höhenvorkommen
- weiteren Merkmalen



Vielen Dank!

DFG Deutsche Forschungsgemeinschaft

Bundesministerium für Bildung und Forschung

FRIEDRICH-SCHILLER-UNIVERSITÄT JENA

ONTOGENIE PHYLOGENIE

Phyletisches Museum

Daniel Veit
Dimitri Korsch
Yenny Correa
Dennis Böttger

www.gunnarbrehm.de