

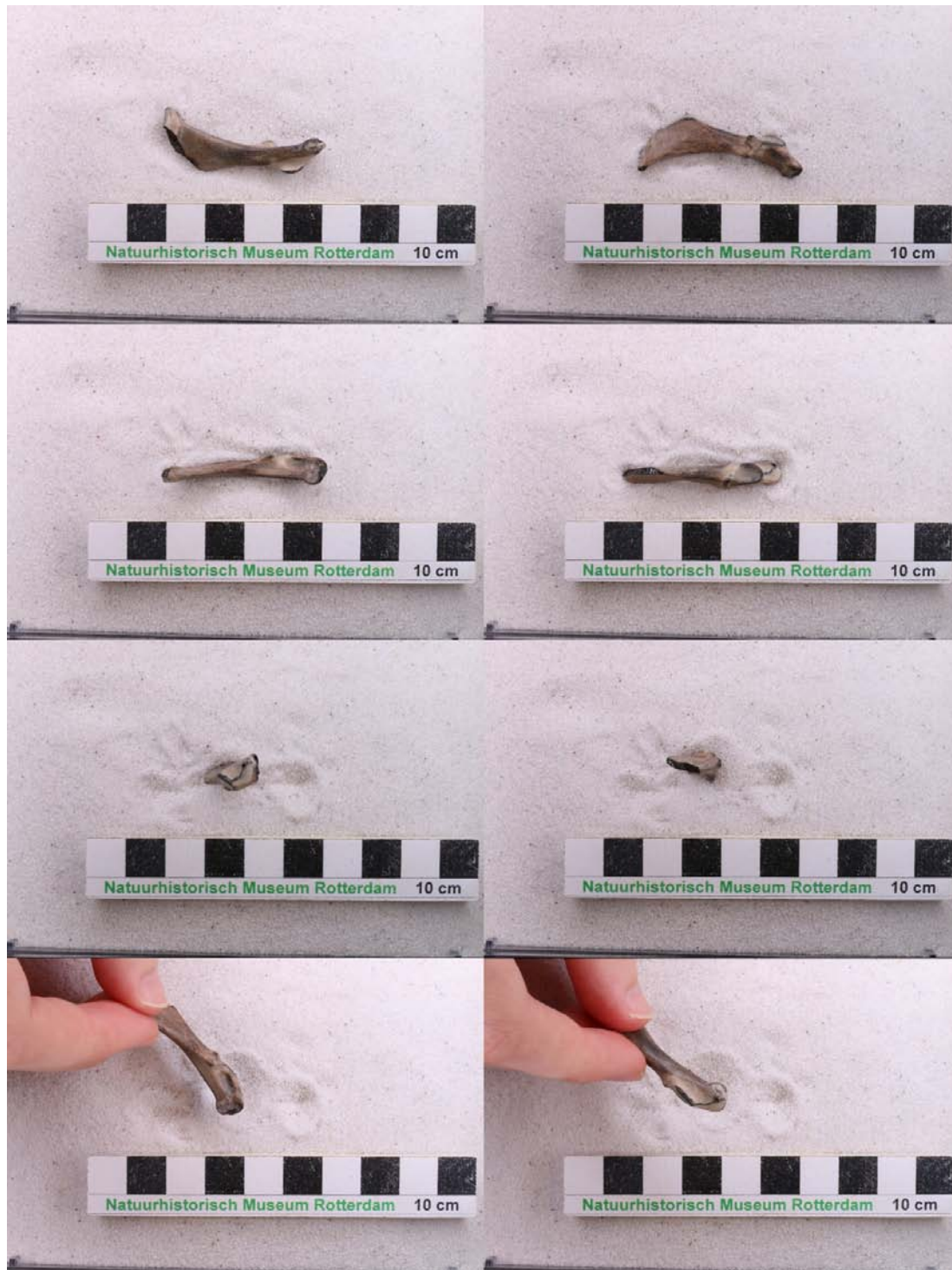
Supplementary online material - A

Appendix 1 – 3

Van der Meer, M., Langeveld, B.W., Eijkelboom, I., & Schulp, A.S. 2025. Getting our ducks in a row, thousands of years later. *Cainozoic Research* 25(2): 149-165.

Appendix 1

Example of photos taken on a single specimen to train the Convolutional Neural Networks. Photos are taken in six standard views and two random views, usually held by hand.



Appendix 2

Data augmentations used to artificially increase the dataset size and improve photo quality.

```
--augment_shear_range 0
--augment_vertical_flip
--augment_brightness_max_delta 0.2
--augment_hue_max_delta 0.2
--augment_contrast_upper 1.2
--augment_contrast_lower 0.8
--augment_saturation_upper 1.2
--augment_saturation_lower 0.8
--augment_zoom_range 0.2
--augment_horizontal_flip
--augment_rotation_range 90
```

Appendix 3.

Descriptions of models and performance metrics.

Table S1. Descriptions of models trained.

Model	Definition
Anatomy	Identification of elements (carpometacarpus, coracoid, humerus).
Taxonomy 1	Taxonomical identification following Table 2.
Taxonomy 2	Taxonomical identification following Table 2, with identifications occurring less than 2 times omitted.
Taxonomy 5	Taxonomical identification following Table 2, with identifications occurring less than 5 times omitted.
Combined 1	Combined identification of element and taxonomical identification following Table 2.
Combined 5	Combined identification of element and taxonomical following Table 2, with identifications occurring less than 5 times omitted.
Tribe 1	Combined identification of element and taxonomical identification at the tribe level.
Tribe 5	Combined identification of element and taxonomical identification at the tribe level, with identifications occurring less than 5 times omitted.

Table S2. Descriptions of performance metrics used.

Metric	Definition
Accuracy	Percentage of correct identifications overall.
Recall	Model's ability to find all instances of the target identification.
Precision	Percentage of model predictions that are correct identifications.
Cohen's Kappa coefficient	Similar to accuracy, but accounts for accidental agreements.