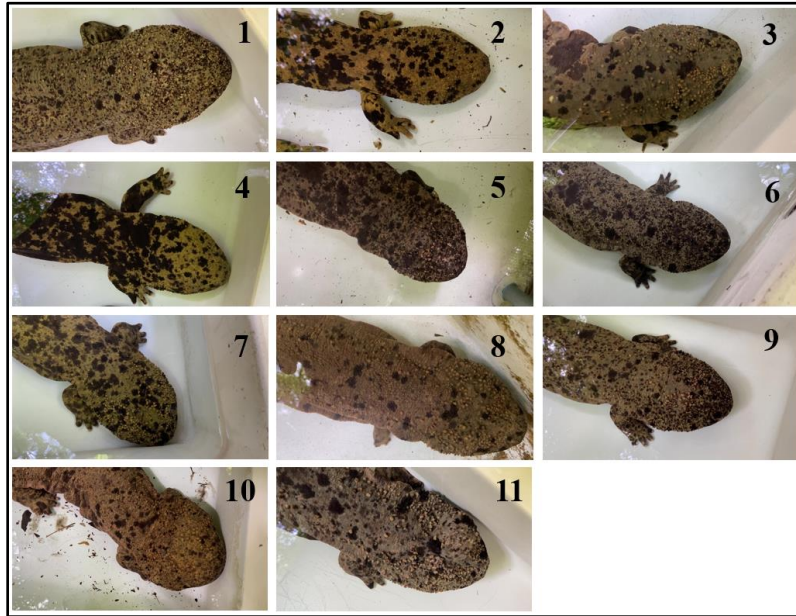


# Individual identification of endangered amphibians using deep learning and smartphone images: case study of the Japanese giant salamander (*Andrias japonicus*)

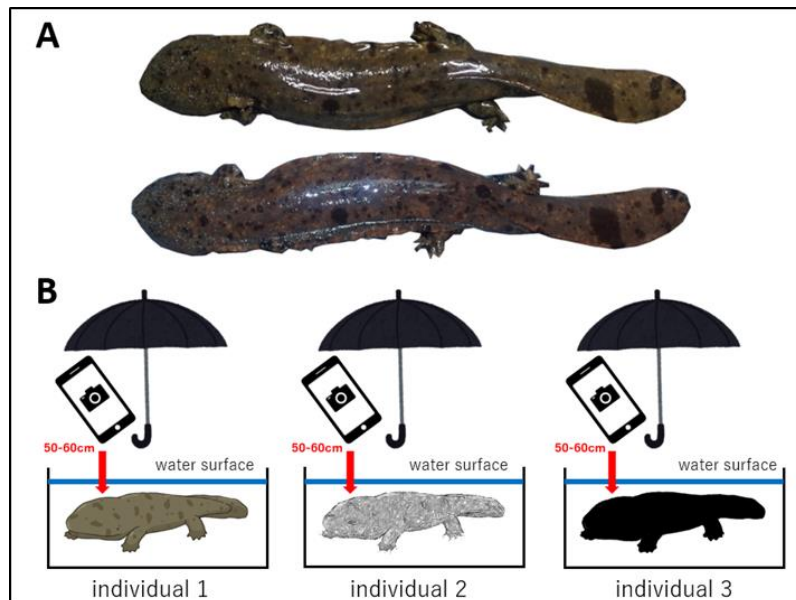
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## Supplementary information



Supplementary Fig. 1. Eleven individuals were used in this study.



Supplementary Fig. 2. Methods of photographing salamanders. A: Body surface reflections differed greatly between images when photographed on land, even for the same individual; B: Photographs of underwater individuals were taken from under the umbrella to reduce reflections on the water's surface. An iPhone11 equipped with a 12-megapixel camera was used for the photo shoot.



Supplementary Fig. 3. Annotation data preparation using the LabelImg annotation tool. The blue rectangles indicate the labeled regions. To detect only the head, the rostrum and head width were labeled.

Supplementary Table 1. Performance comparison of models created with 60% cropped and head image models. Except for the afternoon model, the performance of the model created with the 60% cropped image was better.

|                 | Overall accuracy |             |
|-----------------|------------------|-------------|
|                 | 60% images       | head images |
| Morning model   | 97.04            | 95.84       |
| Afternoon model | 94.36            | 95.10       |
| Evening model   | 86.86            | 70.67       |
| Mixed model     | 99.86            | 98.79       |