

## Measuring caecilians from digital images

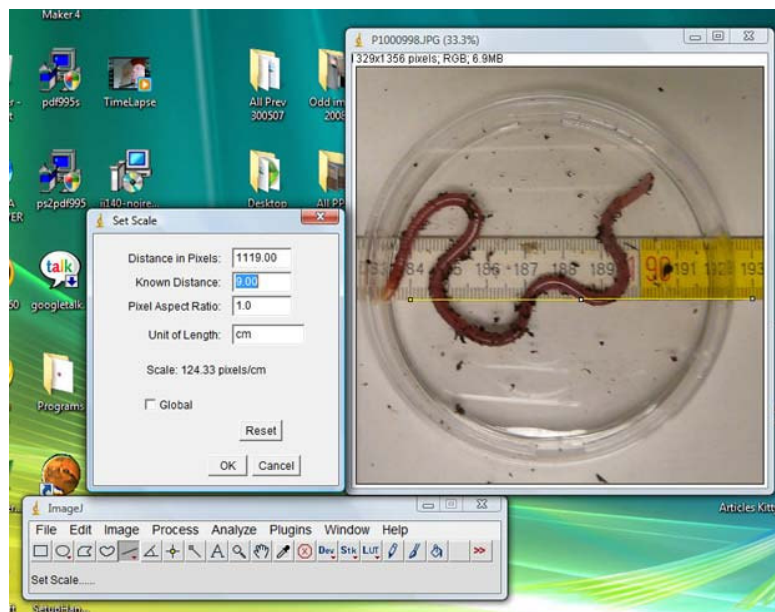
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This method uses ImageJ™ freeware available at <http://rsb.info.nih.gov/ij/>

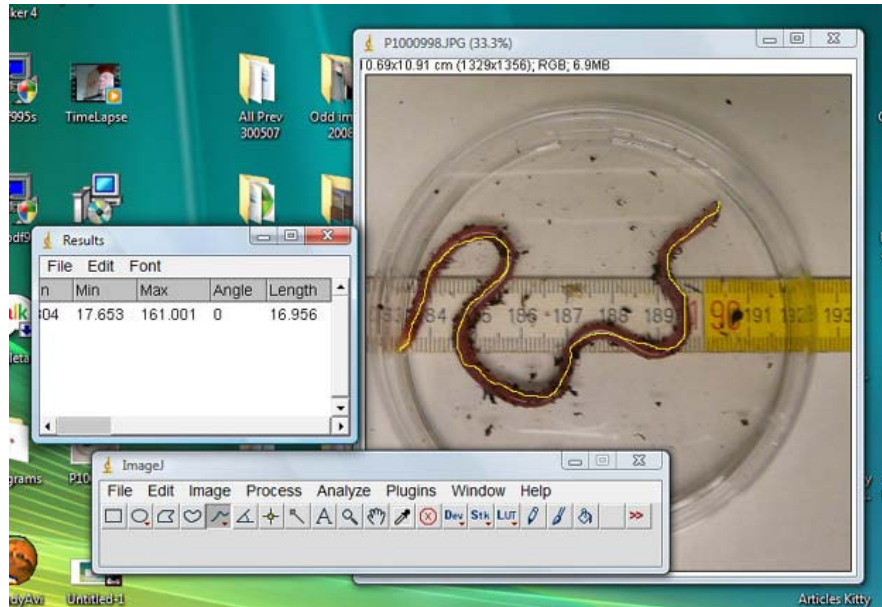
Caecilians can be hard to measure because of their constant motion and dislike at being stretched out. Excessive handling of any amphibian is stressful. The following method enables both the weighing and measuring of caecilians with very little stress. First of all weigh a moist Petri Dish with lid on. Place the caecilian in the dish and cover with lid. Weigh the combination and calculate the caecilian weight.

Then put the Petri dish over any metric ruler.

1. Take image of caecilian with ruler with centimetres in photo. The precision of the results depends on the number of pixels per cm, and the accuracy of the scale but can be easily to 0.01mm. In Figure 1 the ruler is accurate to 1mm.
2. Make sure ruler is horizontal in image or rotate image with program until image is horizontal
3. The number of resolution of the image and the length of the caecilian will decide the accuracy of the measurement
4. Open ImageJ™ program
5. File > Open
6. Select “straight line” from icon bar
7. Draw line along known number of cm on ruler. ie 9 cm.
8. Analyse > set scale
9. The set scale window will appear with distance in pixels of the drawn line
10. In the box for known distance put the length of the drawn line. ie. 9cm



11. Go back to “straight line” form icon bar and right click
12. Three choices appear “straight line”, “segmented lines” and “freehand lines”
13. Select freehand lines
14. Draw line along curved path of caecilian
15. Go to “Analyse” > “Measure”



16. The length is to the right of the results (in this case 16.96 cm)

The accuracy of the results is normally within 3% as completed above.

Discussion of the precision and accuracy of other methods of measuring caecilians are found in:  
 Measey GC, Silva JB, Di-Bernardo M. 2002. Testing for Repeatability in Measurements of Length and Mass in *Chthonerpeton indistinctum* (Amphibia: Gymnophiona), Including a Novel Method of Calculating Total Length of Live Caecilians.  
<http://john.measey.com/pdf/Measey.techs.pdf>