

# Egg-Timer -

## A deep-learning approach to staging



THE UNIVERSITY of EDINBURGH  
The Royal (Dick) School  
of Veterinary Studies



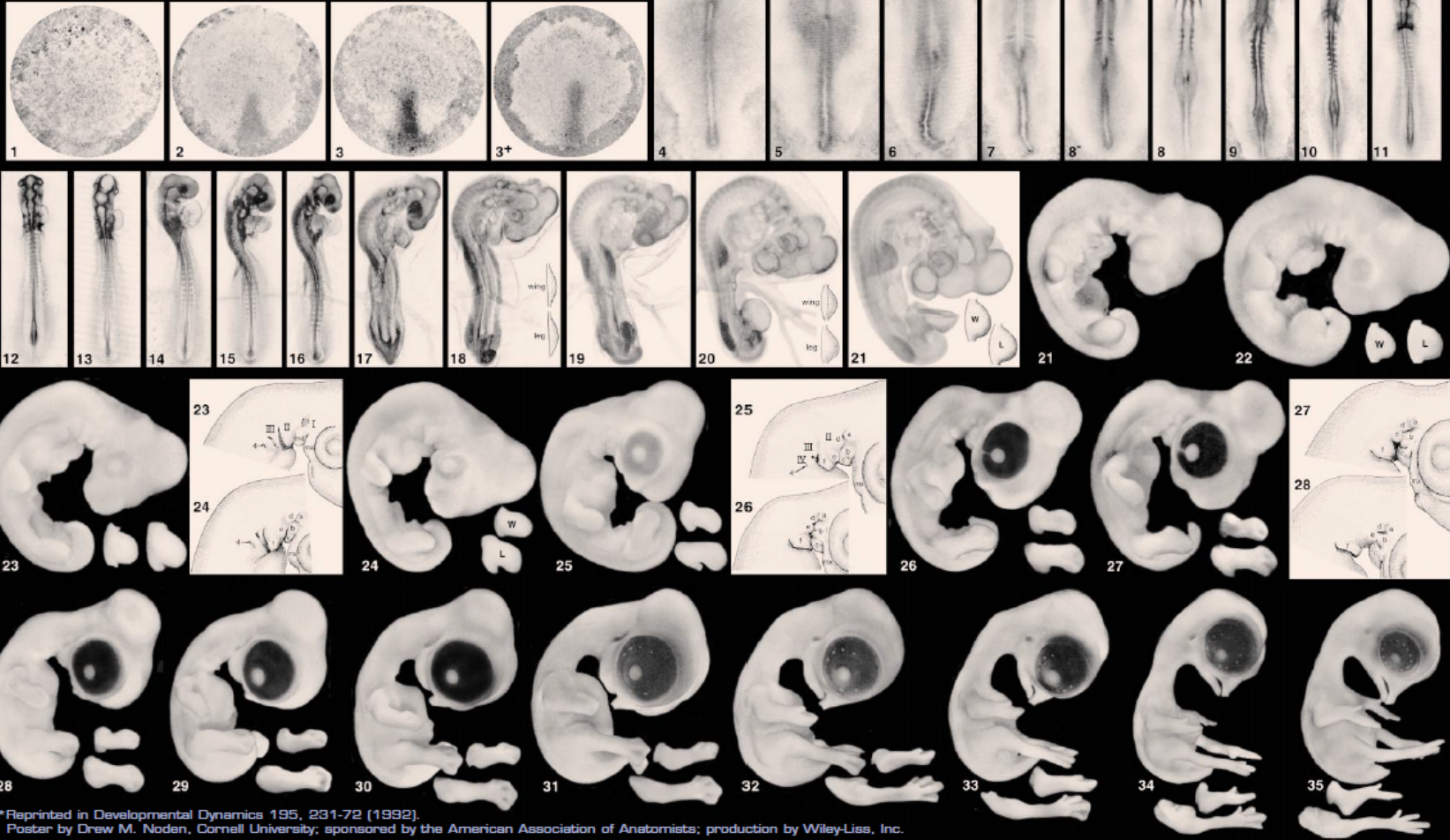
UK Research  
and Innovation

**Chris Banks** and Megan Davey

# Staging past and present...

Hamburger V. Hamilton H.L. 1951.

A series of normal stages in the development of the chick embryo. J Morph 88: 49-92.\*



\*Reprinted in *Developmental Dynamics* 195, 231-72 (1992).  
Poster by Drew M. Noden, Cornell University; sponsored by the American Association of Anatomists; production by Wiley-Liss, Inc.

# Staging future...

- Can we **automatically** and **objectively** identify developmental stage?
- **Deep Neural Networks** are capable of carrying out complex image classification tasks...
- **So why not staging?**

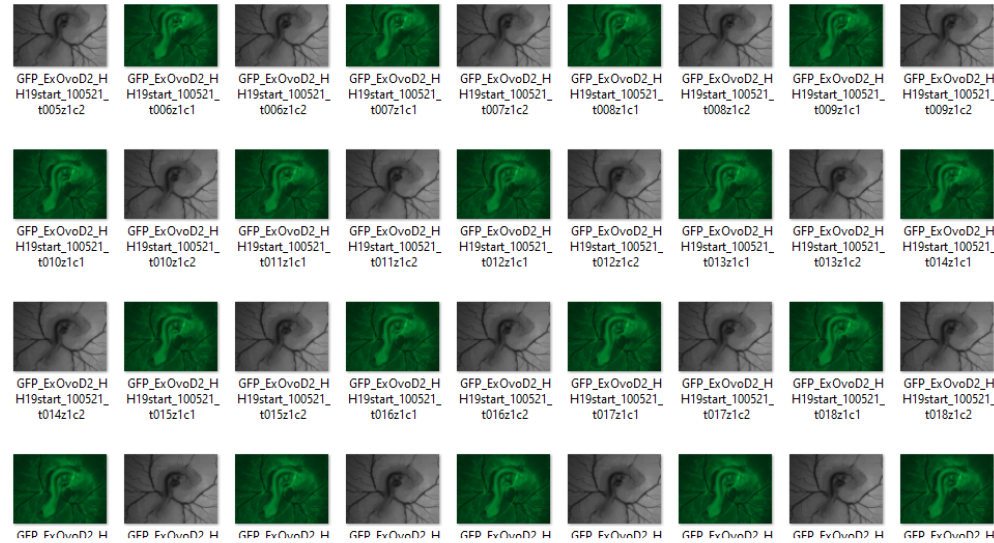


# How? Egg-Timer Training...

- Workshop 1:
  - Train the trainers
  - Learn to stage embryos using HH
- Workshop 2:
  - Tag images
  - Consensus
  - Eat pizza!
- Train the model...
  - We need lots of images and lots of people to tag them

# Then what? (Where's the science?)

- Automated staging of time series
- Establish developmental tempo
  - Stage  $\leftrightarrow$  Time
- Across species / genotype



**Help us!**

**Listen out for upcoming workshops, and**

**Email: [c.banks@ed.ac.uk](mailto:c.banks@ed.ac.uk)**

