

Garstang's Doggerel in the Context of Natural Selection

Telling the Impossible Stories

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LARVAL FORMS

AND OTHER ZOOLOGICAL VERSES

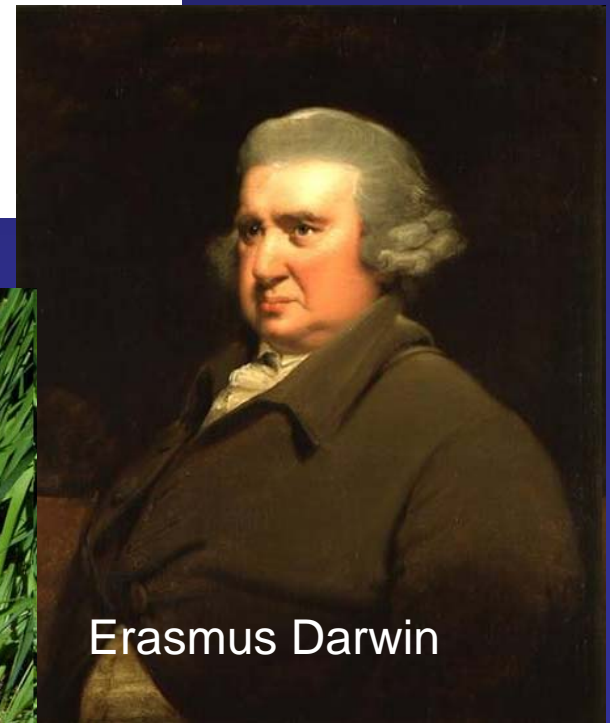


Garstang's Doggerel:

- A pre-Victorian natural history tradition
- Narrative structure of post-Darwinian [natural history] art and literature
- The origin and phylogeny of chordates
- Impossible experiments (stories)
- Communication of big ideas
- C. Darwin's advice to graduate students (and untenured faculty members)

Sopha'd on filk, amid her charm-built towers, 265
Her meads of asphodel, and amaranth bowers,
Where Sleep and Silence guard the soft abodes,
In fullen apathy PAPAVER nods.
Faint o'er her couch in scintillating streams
Pafs the thin forms of Fancy and of Dreams ; 270
Froze by enchantment on the velvet ground
Fair youths and beauteous ladies glitter round ;
On crystal pedestals they seem to figh,
Bend the stiff knee, and lift the unmoving eye.

A pre-
victorian
example of
literature
using nature
as the
subject.



Erasmus Darwin

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Her meads of **asphodel**, and **amaranth** bowers,
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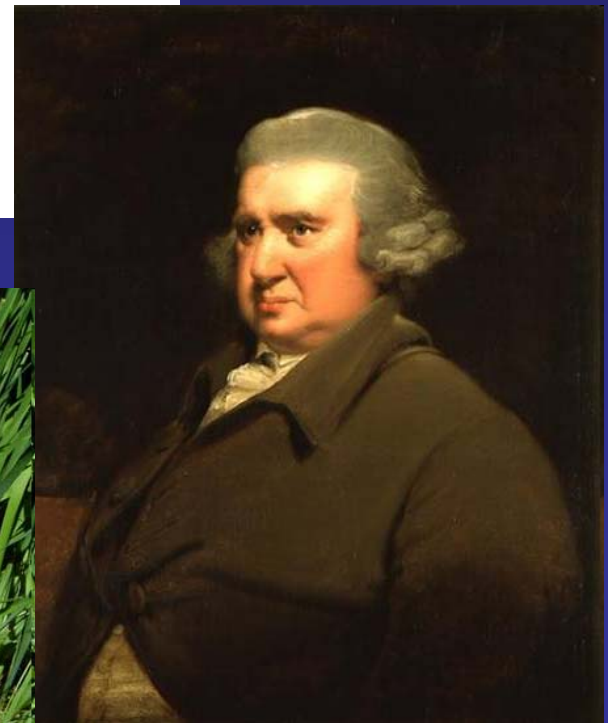


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LEAVES AND FLOWERS FROM NATURE N°8

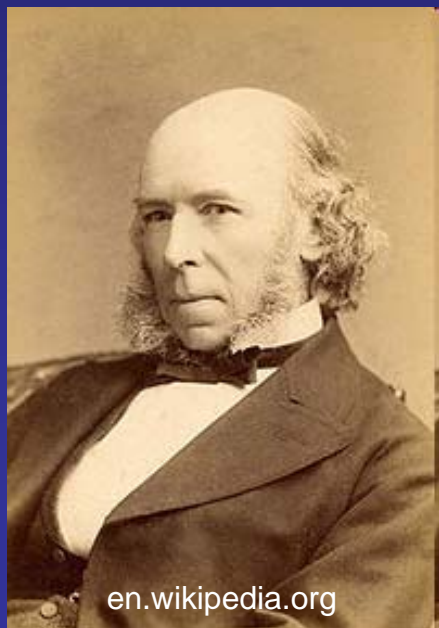
Christopher Dresser, "Various flowers in plan and elevation," in Owen Jones' *The Grammar of Ornament*.

C. Voysey, *Snakes Among Weed* (wallpaper design), 1896, RIBA Library



Louis Sullivan,
Elevator Door;
Chicago Exchange
Building, 1894

“It is . . . difficult to learn from Mr. Sullivan just what he has done. He refers to the work you will see about the stage opening as the differentiation of an absolute truth and something having to do with Spencer’s first principles and Darwin’s doctrine of evolution, with the predicate of a flower and an ordinary staircase for an hypothesis.”

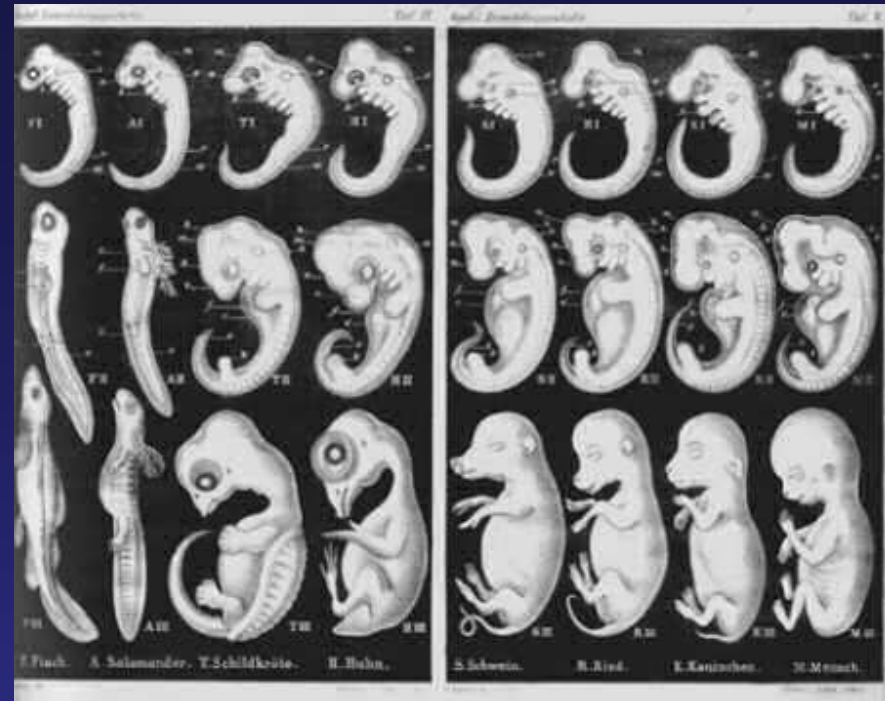


Chicago Daily Inter-Ocean, August 12, 1882 (on Sullivan’s decoration of Hooley’s Theatre.)





Fig. 1. Ernst Haeckel in tropical finery (from Haeckel, 1922, frontispiece).



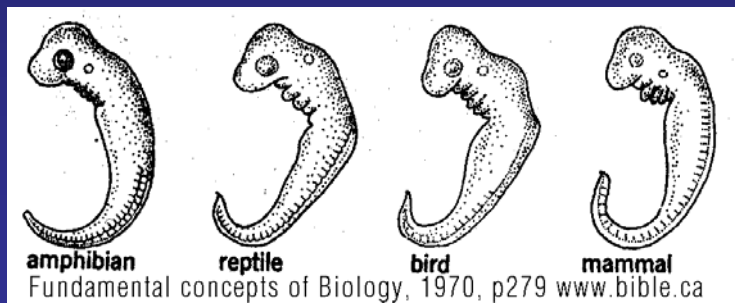
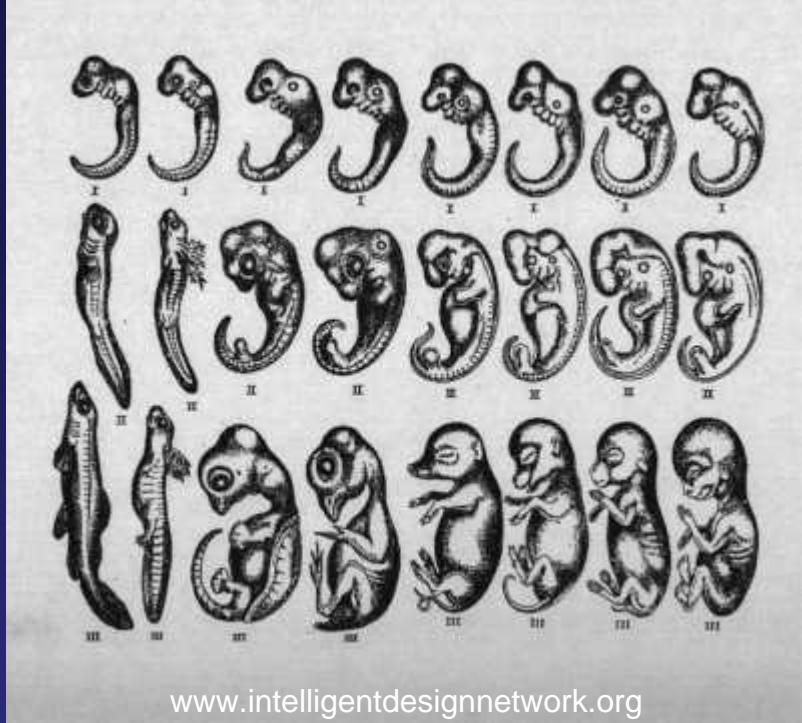
www.noahsarkzooofarm.co.uk

JOURNAL OF MORPHOLOGY 252:2–14 (2002)
DOI 10.1002/jmor.10012

Learning From History: Morphology's Challenges in Germany ca. 1900

Lynn K. Nyhart*

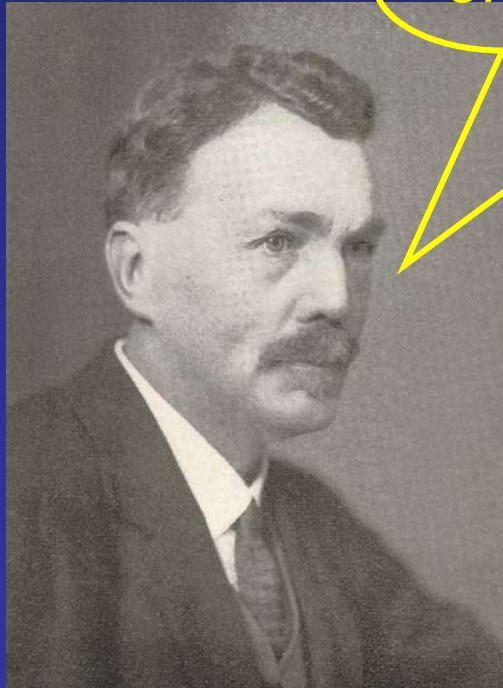
Department of the History of Science, University of Wisconsin-Madison, Madison, Wisconsin 53706-1393
Published online 00 Month 2002

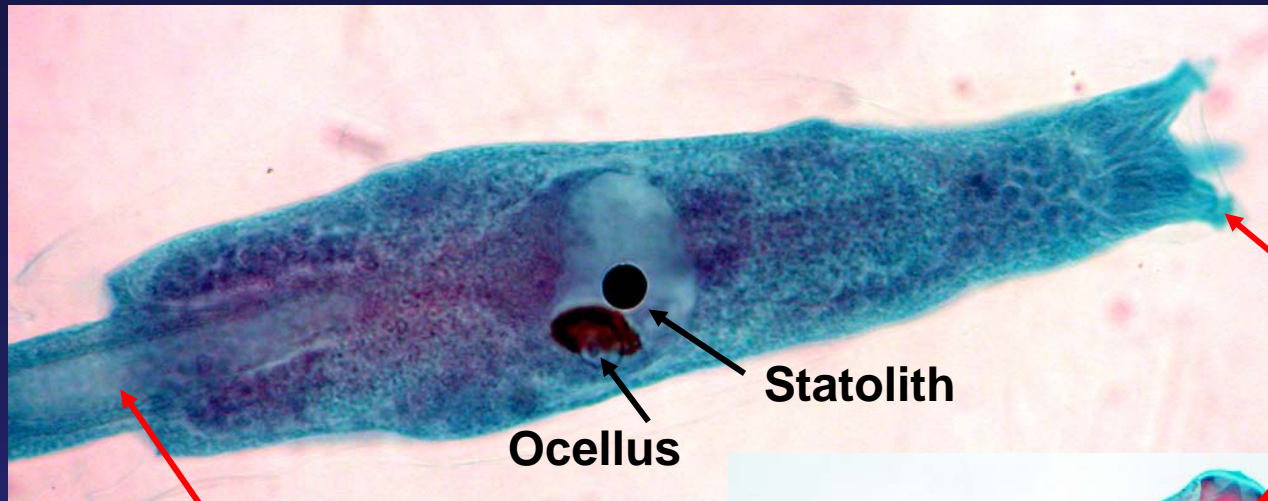




Ontogeny recapitulates
Phylogeny!

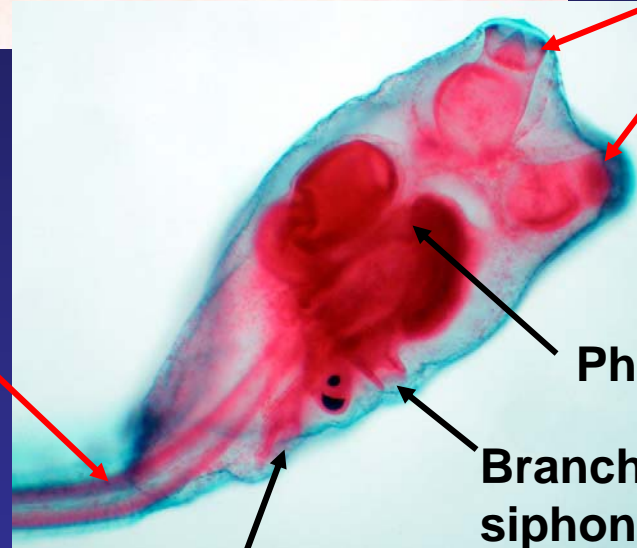
Ontogeny does not
recapitulate
Phylogeny: it
creates it.



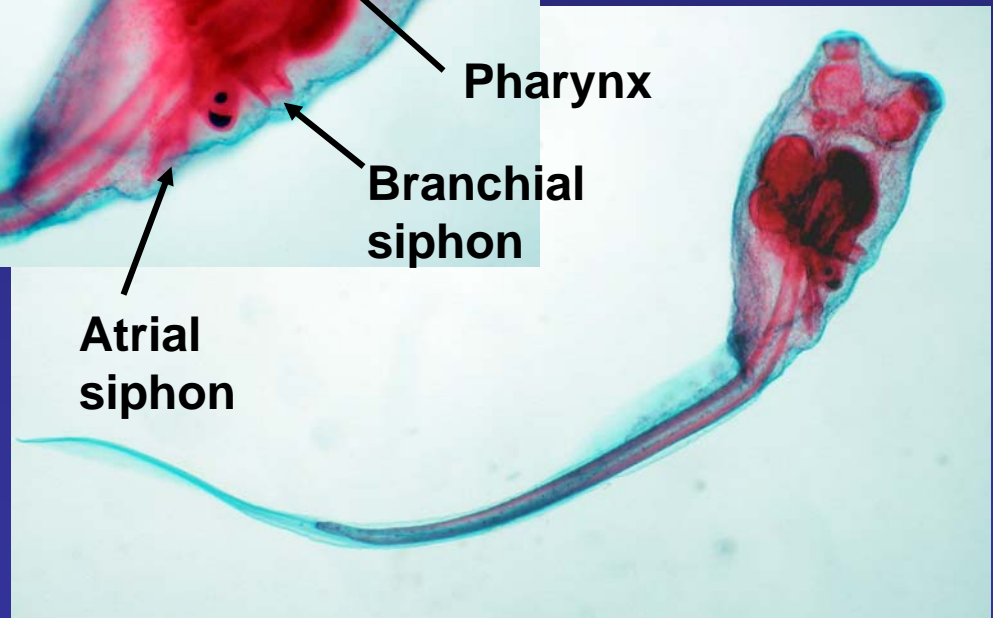


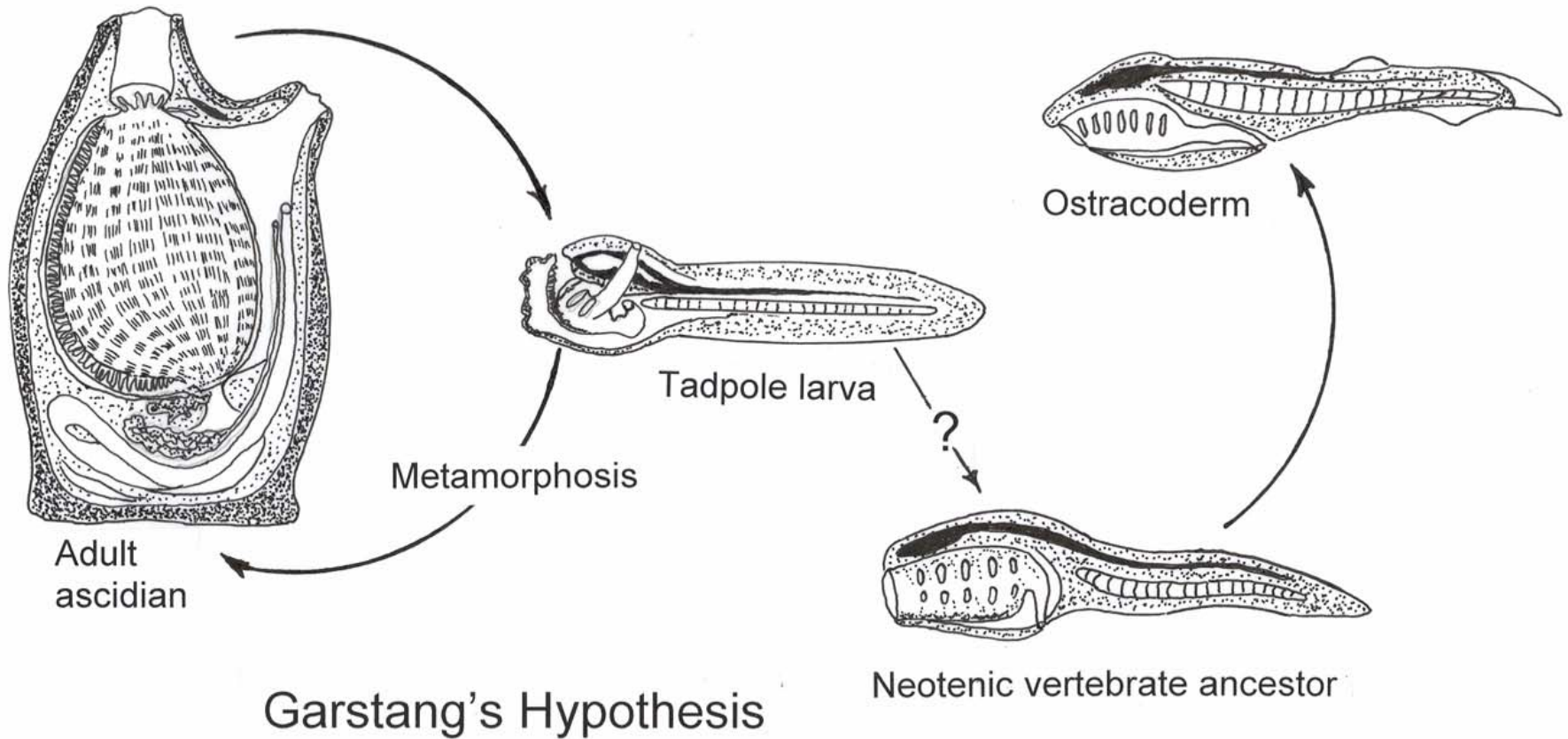
**Adhesive
papillae**

Notochord



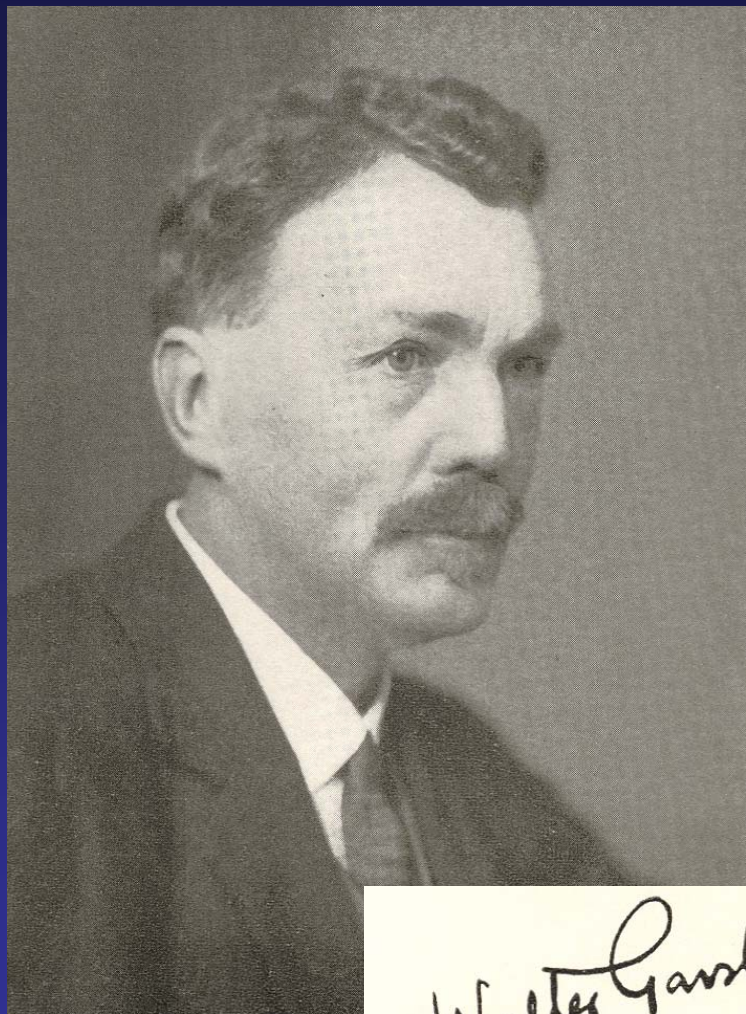
**Atrial
siphon**





Typical introductory biology textbook diagram of Garstang's contribution to evolutionary theory.

Redrawn from Hickman et al., *Integrated Principles of Zoology*



Walter Garstang

LARVAL FORMS

AND OTHER ZOOLOGICAL VERSES

BY THE LATE

WALTER GARSTANG

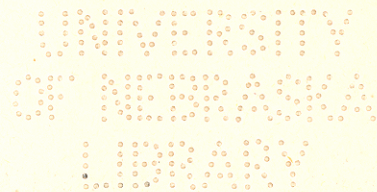
M.A., D.Sc. (Oxon)

Emeritus Professor of Zoology in the University of Leeds
and one time Fellow of Lincoln College, Oxford

WITH AN INTRODUCTION BY

ALISTER C. HARDY, M.A., D.Sc., F.R.S.

Linacre Professor of Zoology and Comparative Anatomy
and Fellow of Merton College, Oxford



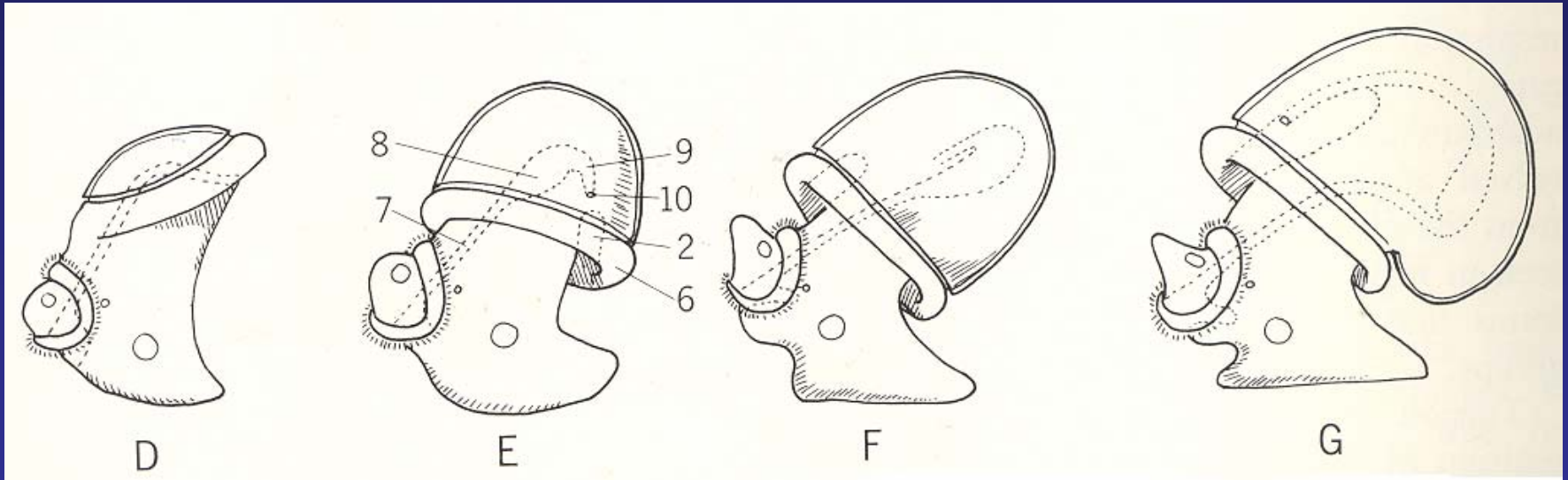
BASIL BLACKWELL
OXFORD

1951

THE BALLAD OF THE VELIGER

or

HOW THE GASTROPOD GOT ITS TWIST



Paludina vivipara: torsion in early stage veliger

(from Meglitsch, *Invertebrate Zoology*)

THE BALLAD OF THE VELIGER

or

HOW THE GASTROPOD GOT ITS TWIST

The Veliger's a lively tar, the liveliest
afloat,
A whirling wheel on either side propels
his little boat;
But when the danger signal warns his
bustling submarine,
He stops the engine, shuts the port, and
drops below unseen.

(Garstang's doggerel)

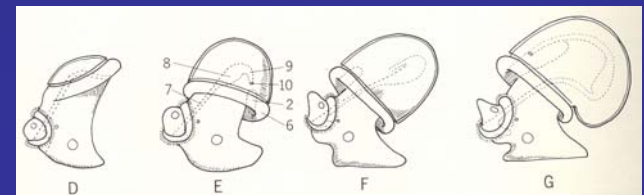
THE BALLAD OF THE VELIGER

or

HOW THE GASTROPOD GOT ITS TWIST (cont'd)

A fleet of fry turned out one day, eventful
in the sequel,
Whose head-and-foot retractors on the
two sides were unequal:
Their starboard halliards fixed astern ran
only to the head,
While those aport were set abeam and
served the foot instead.

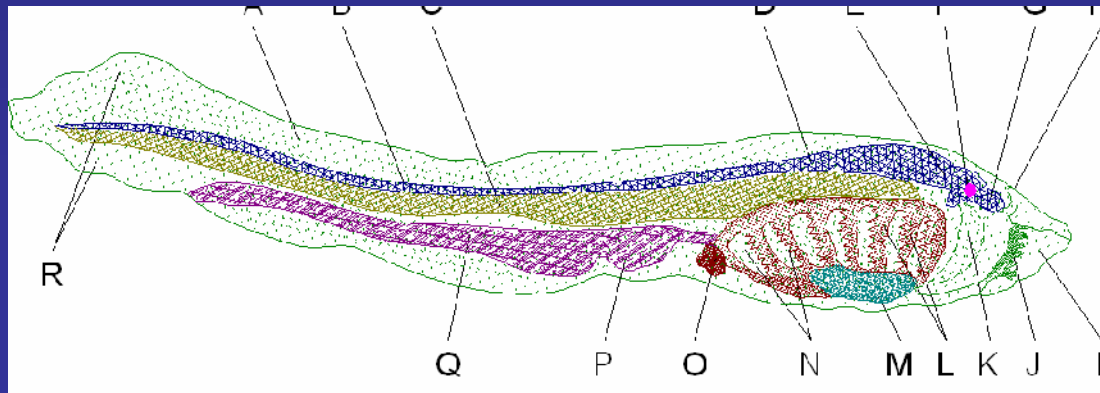
(Garstang's doggerel with evo-devo)



THE ANCESTRY OF VERTEBRATES

Gill-slits, Tongue-bars, Synapticulae,
Endostyle and Notochord: all these you will agree
Mark the Protochordate from the fishes in the sea,
And tell alike for them and us our lowly pedigree.

Thyroid, Thymus, Subnotochordal Rod:
These we share with Lampreys, the Dogfish, and the Cod,--
Relics of the food-trap that served our early meals,
And of Tongue-bars that multiplied the primal water-wheels.

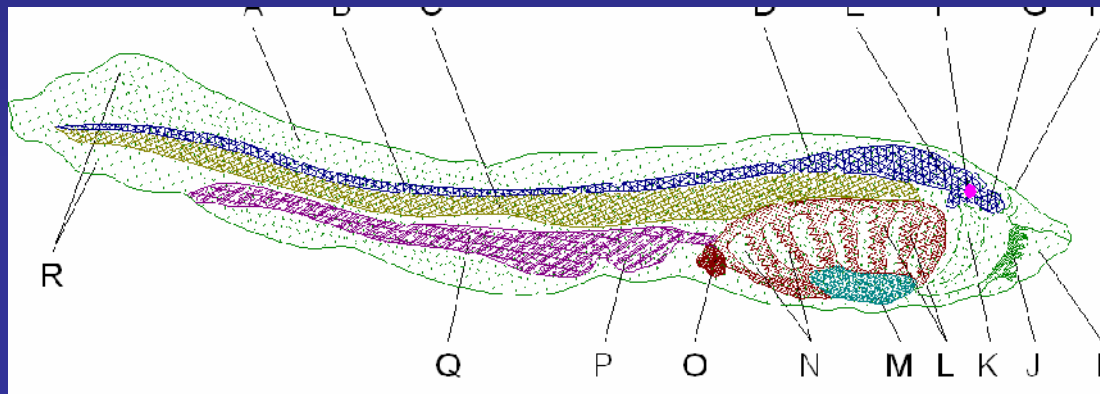


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THE AXOLOTL AND THE AMMOCOETE

And news Perennibranchiate have gone from bad to worse:
They think aquatic life is bliss, terrestrial a curse.
They do not even contemplate a change to suite the
weather,
But live as tadpoles, breed as tadpoles, tadpoles
altogether!

Now look at *Ammocoetes* there, reclining in the mud,
Preparing thyroid-extract to secure his tiny food:
If just a touch of sunshine more should make his gonads
grow,
The Lancelet's claims to ancestry would get a nasty blow!

Garstang, W. 1922. The theory of recapitulation: a critical re-assessment of the biogenetic law. *Zoological Journal of the Linnean Soc.* 35:81-101.

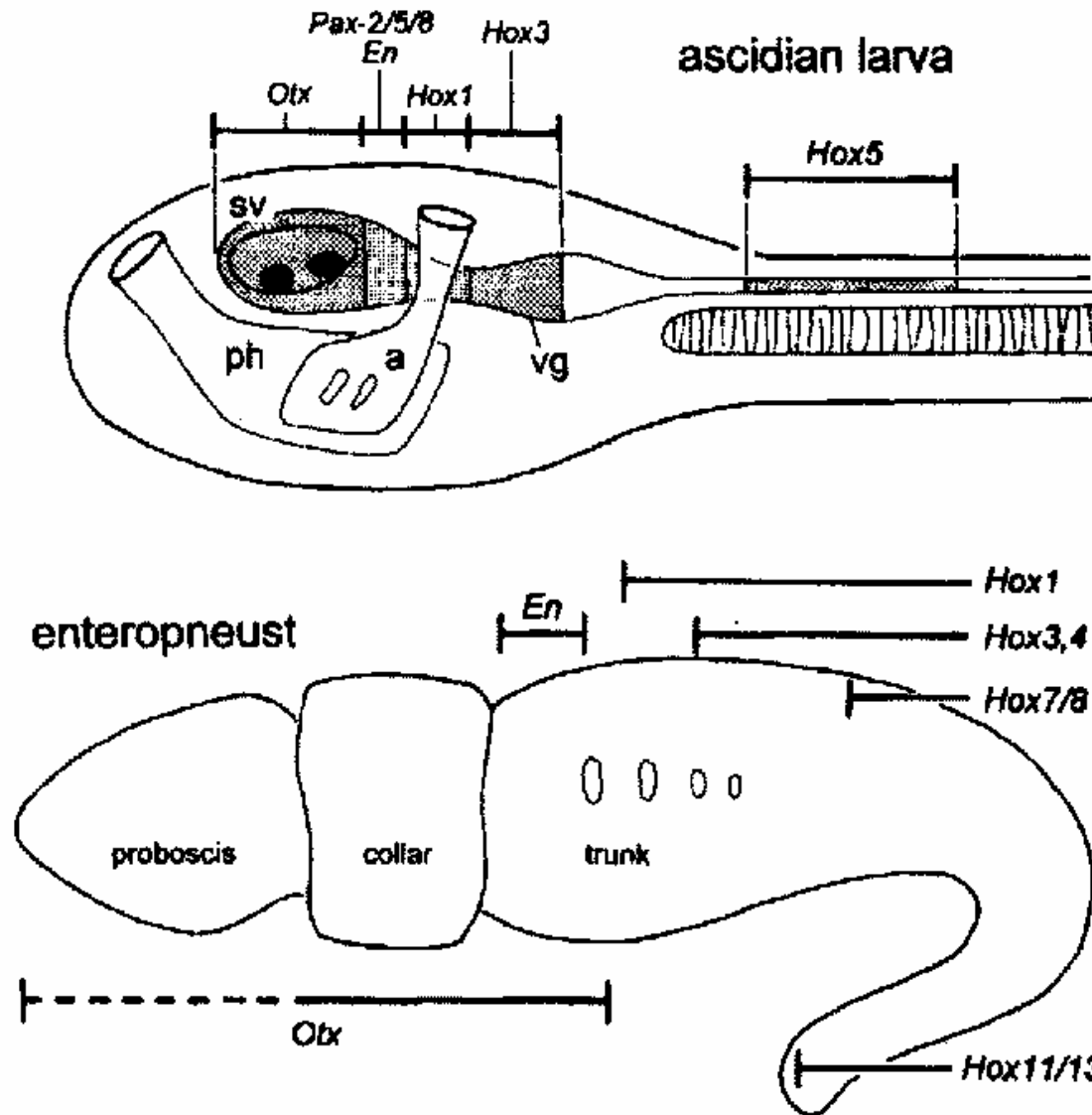
Garstang, W. 1928. The morphology of the Tunicata, and its bearing on the phylogeny of the Chordata. *Quarterly Journal of Microscopical Science* 62:51-187.

Garstang, W. 1922. The theory of recapitulation: a critical re-assessment of the biogenetic law. *Zoological Journal of the Linnean Soc.* 35:81-101.

- Flagellate protozoa
- Coelenterates
- Ctenophores
- Crustacea
- Geometrid moths (several species)
- Sphingidae
- Scolopendroids
- Coleoptera
- Isopods
- Several pages on echinoderm paleontology
- Birds and reptiles
- *Ceratodus*
- *Drosophila*
- Comatulids
- Lamellibranchs
- Crinoids
- Pleuronectid fishes
- *Amphioxus*
- Stegocephalans
- Ammonites
- Cystoids and blastoids



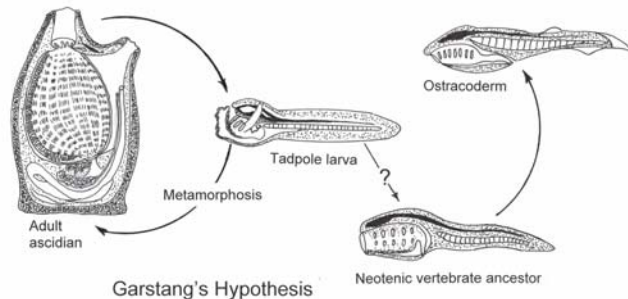
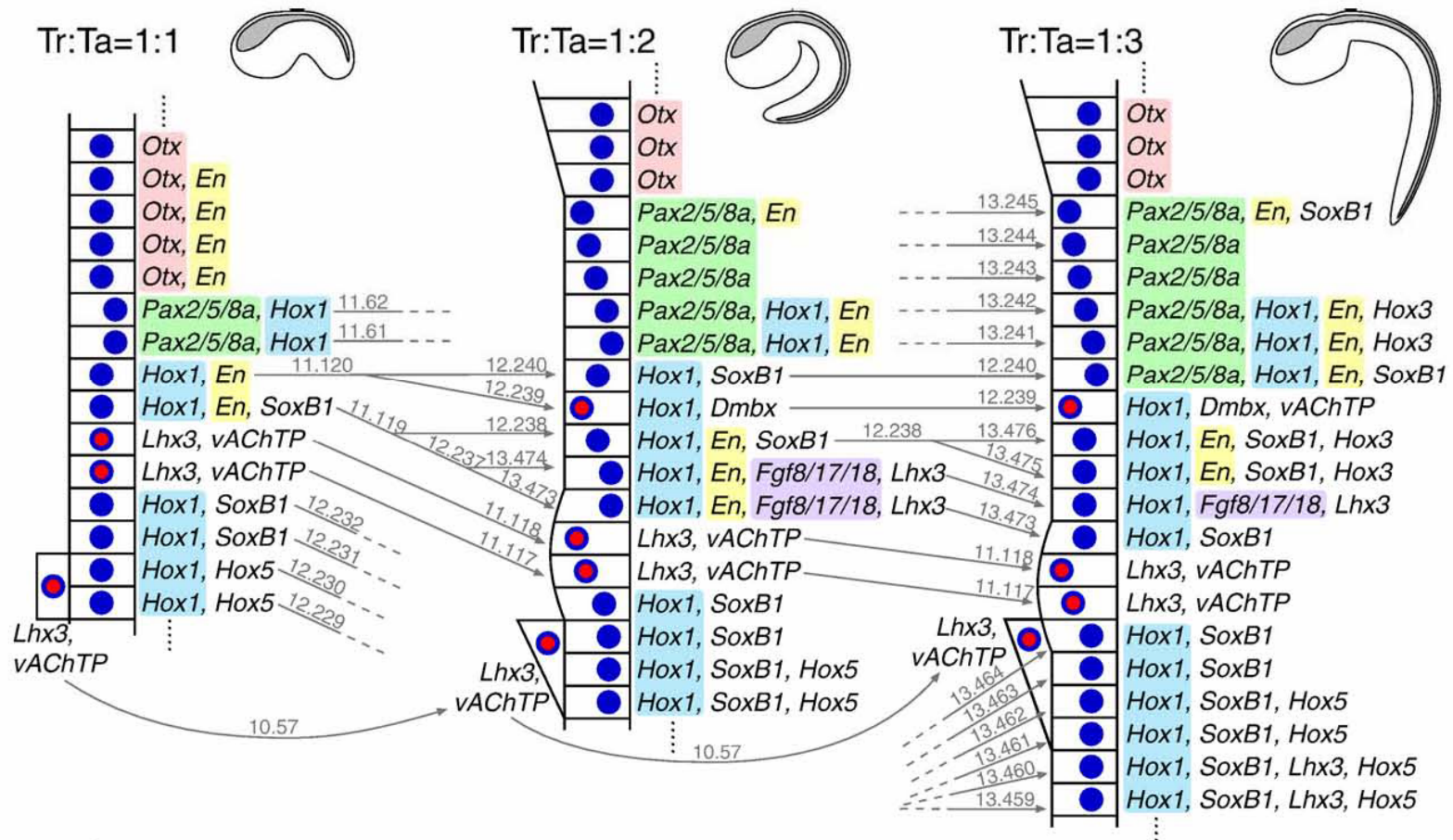
The evolution of Garstang's hypothesis.



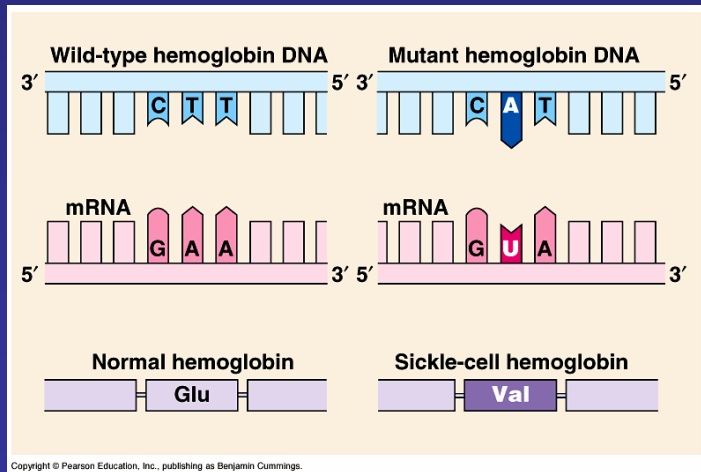
Lacalli, T. 2005. Protochordate body plan and the evolutionary role of larvae: old controversies resolved? *Can. J. Zool.* 83:216-224.

Ikuta, T., and H. Saiga. 2007. Dynamic change in the expression of developmental genes in the ascidian central nervous system: revisit to the tripartite model and the origin of the midbrain-hindbrain boundary region. *Developmental Biology* 312:631-643.

- Hair cells
- Otx
- Pax2/5/8a
- En
- Eya
- Fgf8/17/18
- Dmbx
- Lhx3
- HOX genes
- Neurogenic placodes
- Neural crest
- Six1, Six4
- Tachykinin
- Tachykinin receptor
- PPTA
- Ci-TK-R
- COX isozymes
- Prostaglandin synthesis
- MHB
- Classical complement pathway
- Lamprey ortholog



Regardless of how sophisticated this evo-devo work is, it's still largely inferential, especially compared to . . .

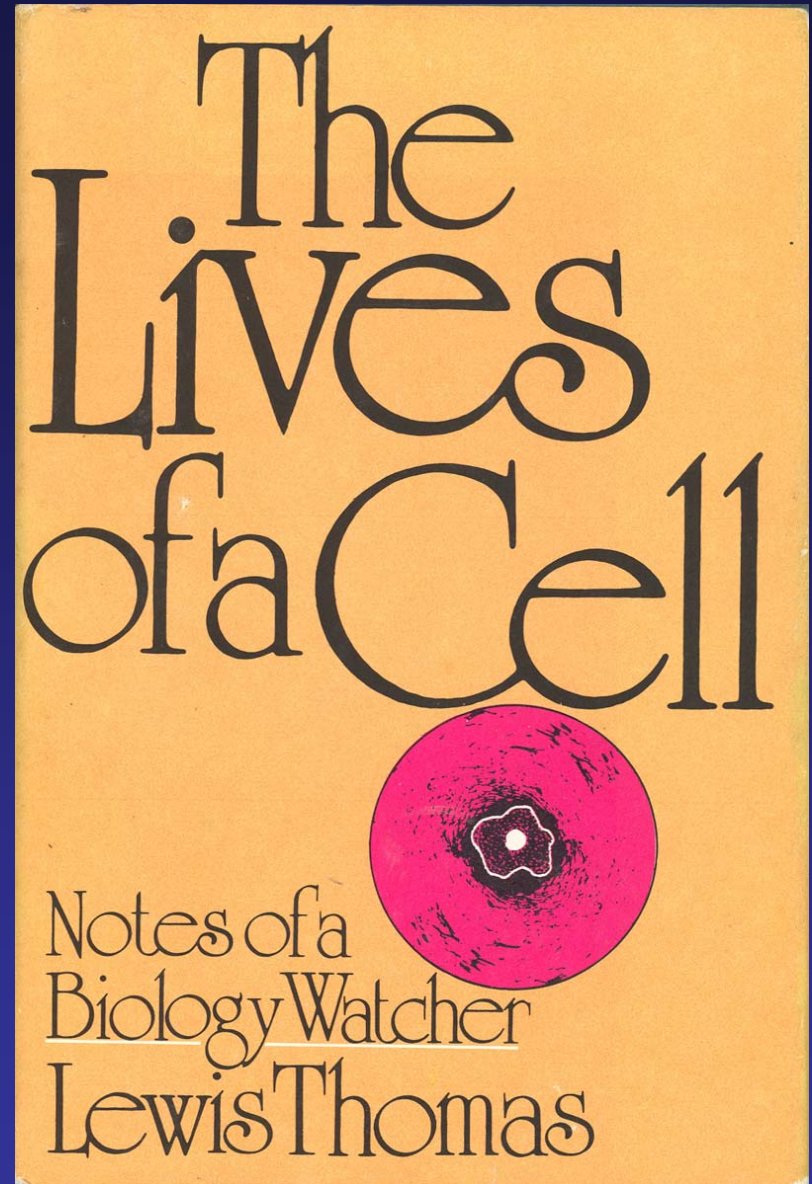
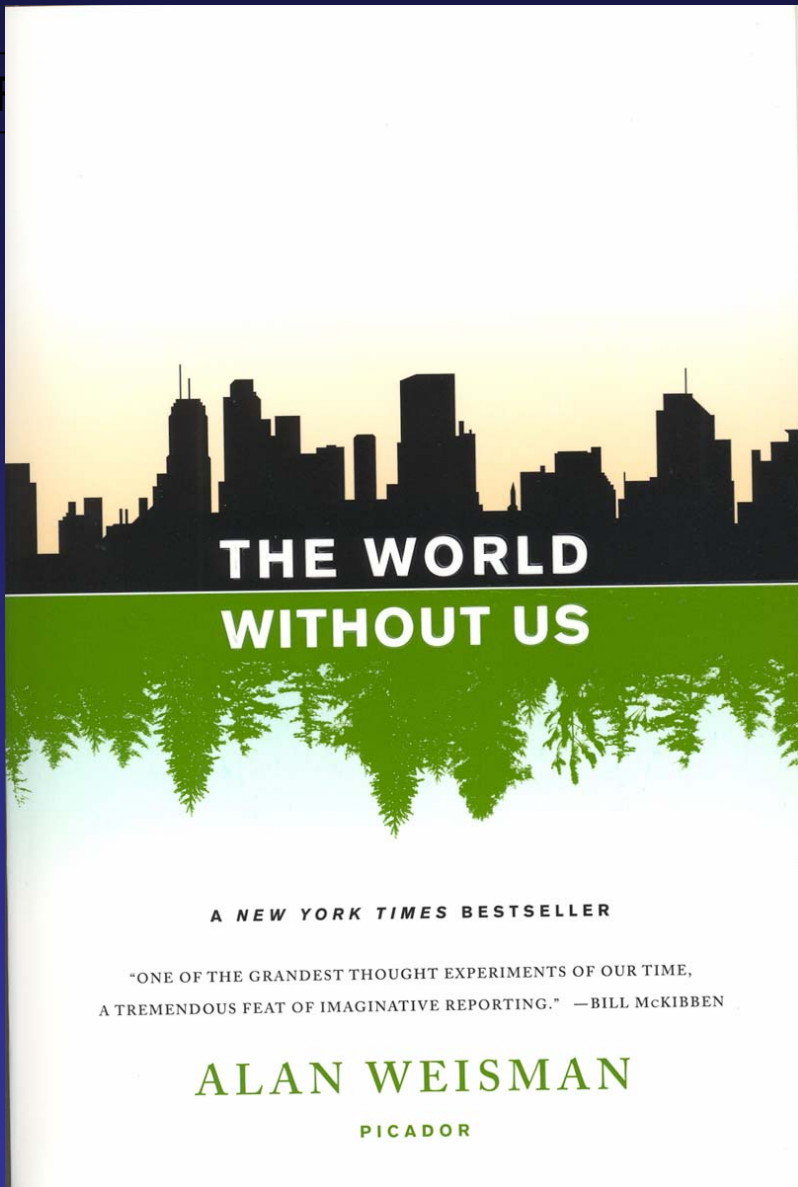


All from Campbell and Reece, BIOLOGY, 6th Ed.

“Of course none of Garstang’s speculations can ever be established by experiment—they can never be proved as can an hypothesis in physiology. Many of them may be entirely wide of the mark. But the point I want to make is one which is independent of the fact that any particular one of them is true or false. It is this: Garstang with his concept of paedomorphosis has altered our whole outlook on the process of evolution”



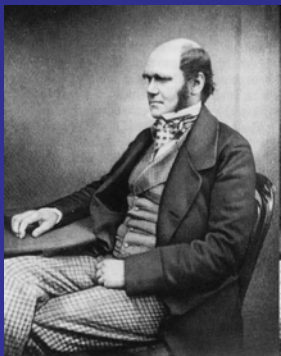
Alister Hardy – from his
Introduction to *Larval Forms*



Communicating big ideas – the power of literature and the essay as a weapon

“ . . . if I had to live my life again I would have made a rule to read some poetry and listen to some music at least once every week; for perhaps the parts of my brain now atrophied could thus have been kept active through use. The loss of these tastes is a loss of happiness, and may possibly be injurious to the intellect, and more probably to the moral character, by enfeebling the emotional parts of our nature.”

- C. Darwin (*The Autobiography*)



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Her meads of alphodel, and amaranth bowers;
Where Sleep and Silence guard the soft abodes,
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