

PUNCTUATED EQUILIBRIUM



NEO-DARWINISM

- Evolutionary change is both **slow** and **gradual**
- Accumulation of many small genetic changes favoured by natural selection
- Other effects occasionally making small contributions
- **Gradualism.**

Evolution of new species

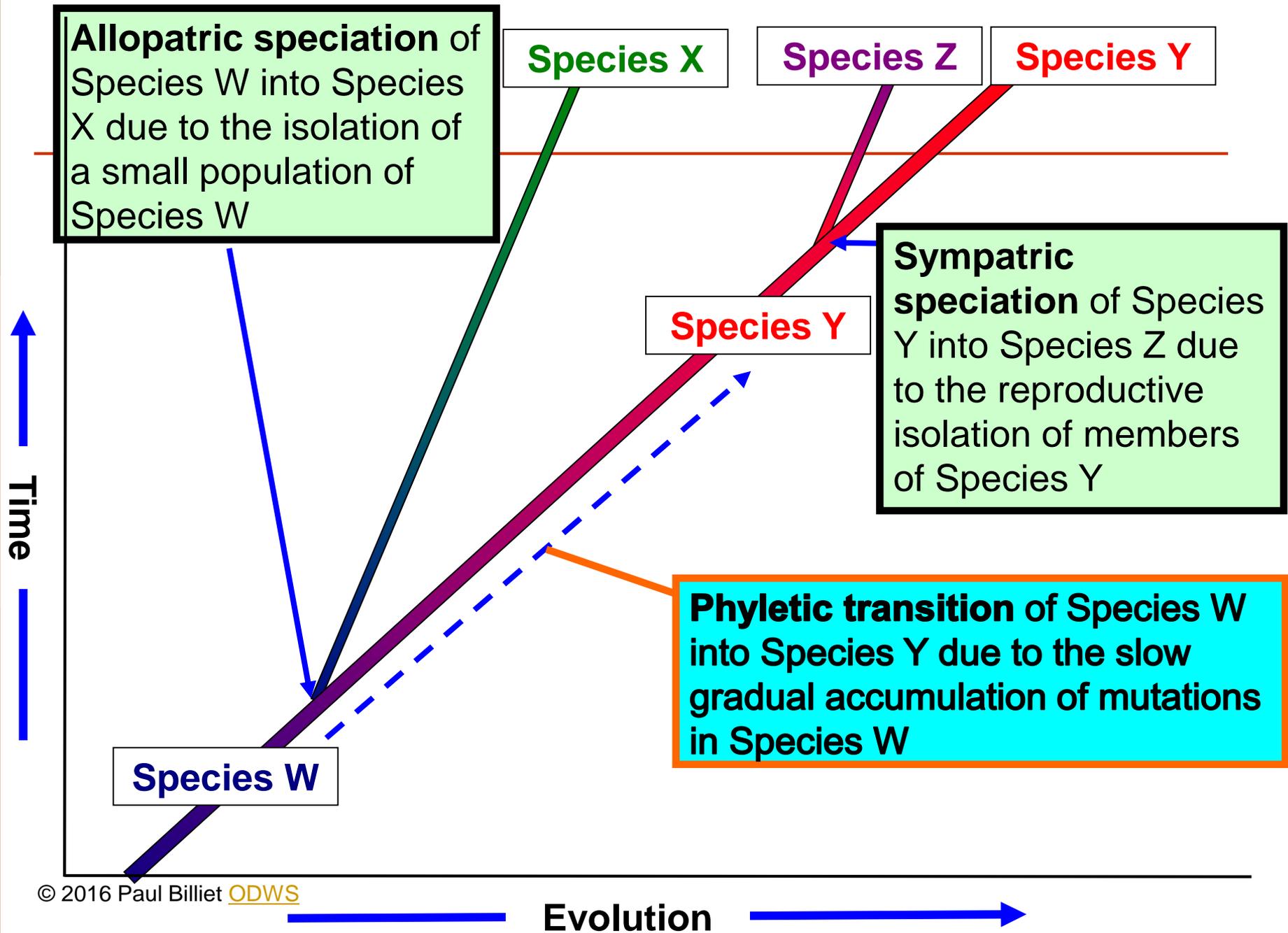
- Two possible ways from gradualism
- **PHYLETIC TRANSFORMATION**
- **ALLOPATRIC or SYMPATRIC SPECIATION.**

PHYLETIC TRANSFORMATION

- ❑ **Gradual accumulation** of small genetic variations preserved by natural selection
- ❑ A whole population imperceptibly evolves into a new species
- ❑ Impossible to draw a clear line between species
- ❑ Long period of intermediate forms.

ALLOPATRIC or SYMPATRIC SPECIATION

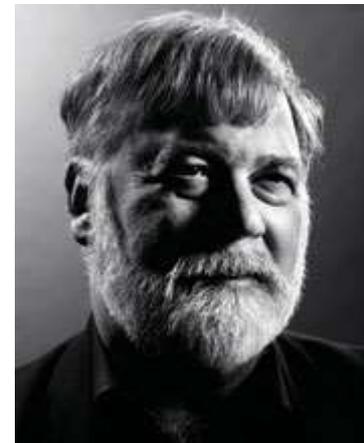
- ❑ Geographical or reproductive **isolation** of a part of the population
- ❑ Allows it to evolve in a different direction
- ❑ Possibly more rapidly than the main population
- ❑ If the isolated population is small, it might be very difficult to find fossils of the intermediate stages.



THE PUNCTUATED EQUILIBRIUM MODEL

- ❑ The fossil record gives a different picture for the evolution
- ❑ There were long periods of **stasis** (4-10 million years) involving little evolutionary change
- ❑ Then occasional **rapid formation of new species**
- ❑ As little as 5,000 - 50,000 years.

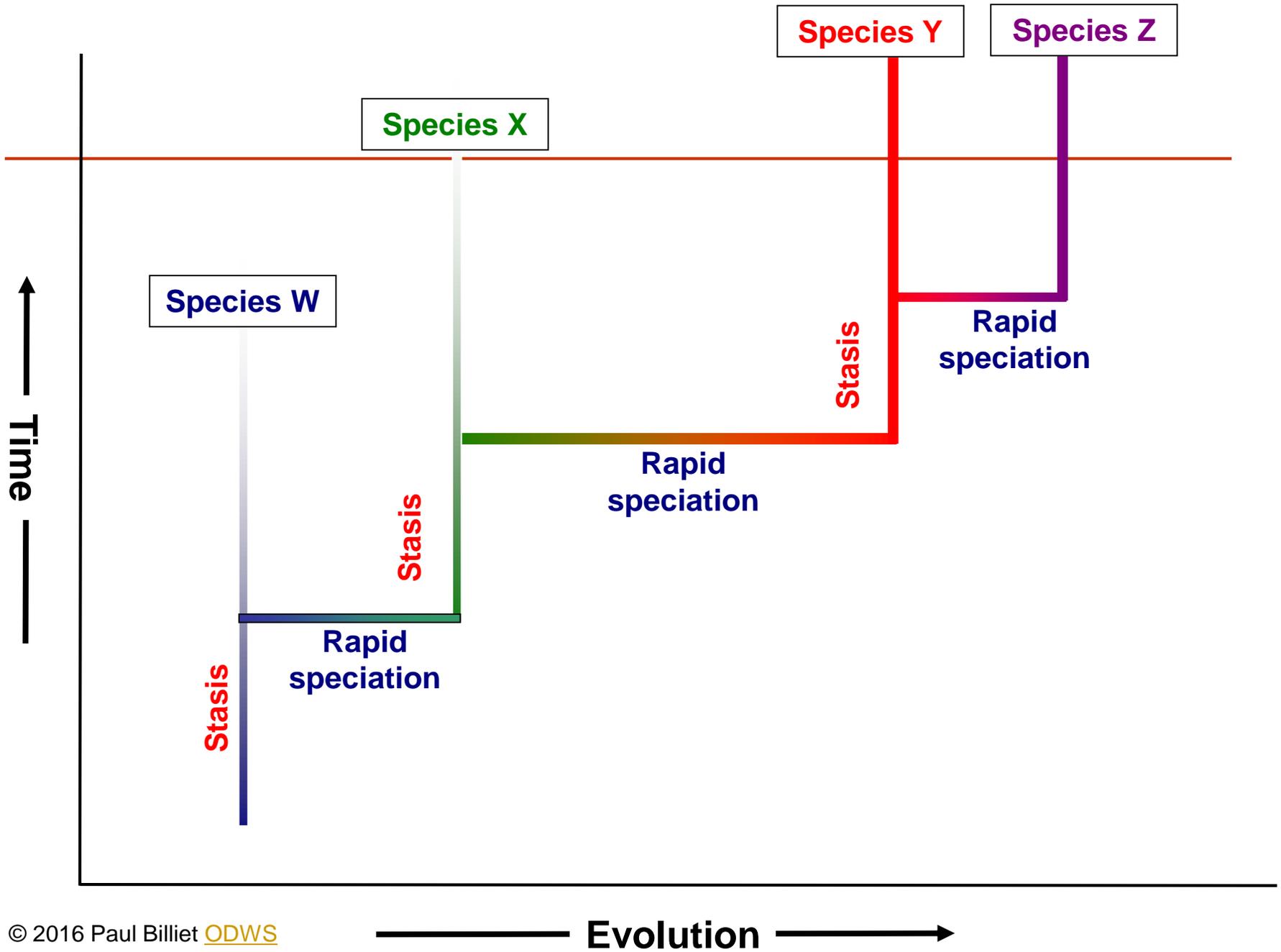
Stephen J Gould



Niles Eldredge

Stasis and change

- ❑ A species resists evolutionary change
- ❑ A species would rather move to a new area where it can find its niche than adapt to a new one
- ❑ If a small population of a species should get isolated in an area where its habitat does not exist
- ❑ Or a major change occurs in their native environment (e.g. climate change)...
- ❑ ...rapid change could take place to bring the population back to equilibrium (stasis)
- ❑ But it is no longer the same species
- ❑ because the niche is different...
- ❑ so the selective pressures are different.



Mechanisms

1. **Rapid natural selection** in isolated populations or after a crisis
2. **Genetic drift** in small isolated populations
3. **Hopeful monsters.**

Criticisms

- ❑ **What is a species?**
- ❑ **How rapid is rapid?**
- ❑ **The incomplete fossil record.**

COMPILED BY KOUSIK GHOSH
FROM DIFFERENT SOURCES

THANK YOU