

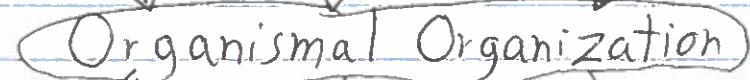
Wagner, Pavlicev, Cheverud

The road to modularity 2007

Biological Modularity

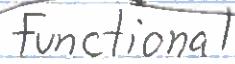
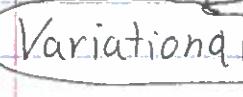
Parts interact within modules

Modules relatively independent



Hierarchy

Heterogeneous



traits vary

parts work together

pattern formation

- covariation
- integration
- independence

- Functional
- task specialization
- physiological units

- Developmental pathways
- quasi-autonomous embryonic regions

Ex

skull traitsets covary

Ex

Brain → information processing

Ex

embryonic tissue regions structure

Reduced phylogenetic constraint

trait independence
allows separate evolution

Genetic & Evolutionary Consequences

Modularity shapes response to natural selection

capacity to evolve
(Evolvability)

constraints influence variation

functional organization

OUTCOME

Organisms evolve as sets of semi-independent

Change → modules

Variation

development