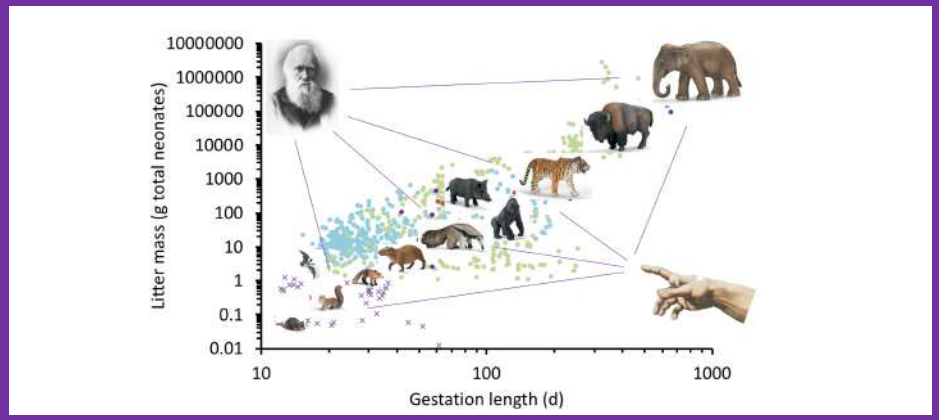
Historical (and psychological) aspects of zoological science:

the power of words, the tenacity of both simple rules and exceptionalism, and how the belief in perfection - not in God - separates creationists from evolutionists



Marcus Clauss

Gent, Sarton Lecture 2023

University of Zurich[UZH]

Clinic
of Zoo Animals, Exotic Pets and Wildlife

Though we are trained natural scientists, we are subject to a vast sphere of un-scientific influence factors, many of which have a historic component.

Semantic history: the words we use

Amylase

Amylase

Vitamin D Receptor (VDR)

How would you feed a ‘carnivore’ ?

How would you feed a ‘carnivore’ ?

How would you feed a ‘carnivore’ ?

Chesney and Hedberg *Journal of Biomedical Science* 2010, **17**(Suppl 1):S36
http://www.jbiomedsci.com/content/17/S1/S36

NSC
The cost of publication in *Journal of Biomedical Science* is borne by the National Science Council, Taiwan

JBS JOURNAL OF BIOMEDICAL SCIENCE

REVIEW Open Access

Metabolic bone disease in lion cubs at the London Zoo in 1889: the original animal model of rickets

Russell W Chesney[1*], Gail Hedberg[2]

How would you feed a ‘carnivore’ ?

Chesney and Hedberg *Journal of Biomedical Science* 2010, **17**(Suppl 1):S36
http://www.jbiomedsci.com/content/17/S1/S36

JBS JOURNAL OF BIOMEDICAL SCIENCE

REVIEW Open Access

Metabolic bone disease in lion cubs at the London Zoo in 1889: the original animal model of rickets

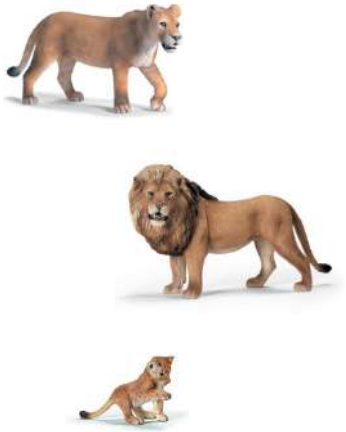
Russell W Chesney[1*], Gail Hedberg[2]

Would this have happened if the animal had been called a ‘prey eater’?

What ***is*** a ‘carnivore’ ?

What ***is*** a ‘carnivore’ ?

What ***is*** a ‘carnivore’ ?



… an animal that eats mainly other animals ?


Palaeontology
The Palaeontological Association
www.palass.org

[Palaeontology, 2022, e12599]

Relative skull size evolution in Mesozoic archosauromorphs: potential drivers and morphological uniqueness of erythrosuchid archosauriforms

by JORDAN BESTWICK[1]*, PEDRO L. GODOY[2,3], SUSANNAH C. R. MAIDMENT[1,4], MARTÍN D. EZCURRA[1,5], MIA WROE[1], THOMAS J. RAVEN[4,6], JOSEPH A. BONSOR[4,7] *and* RICHARD J. BUTLER[1]

> One pattern of particular interest concerns the repeated occupation of terrestrial hypercarnivorous niches (a diet comprising more than 70% meat; Holliday & Steppan 2004)

Paleobiology, 30(1), 2004, pp. 108–128

Evolution of hypercarnivory: the effect of specialization on morphological and taxonomic diversity

Jill A. Holliday and Scott J. Steppan

Of the recognized carnivoran ecomorphs, the niche of the meat specialist, or hypercarnivore, is associated with a diet comprising more than 70% meat, in contrast to the generalist (Van Valkenburgh 1988, 1989), which may eat 50–60% meat with vegetable matter and invertebrates making up the remainder of the diet.

Paleobiology, 17(4), 1991, pp. 340–362

Iterative evolution of hypercarnivory in canids (Mammalia: Carnivora): evolutionary interactions among sympatric predators

Blaire Van Valkenburgh

Hypercarnivores are here defined as species, such as living felids, whose diets consist almost entirely of vertebrate flesh.

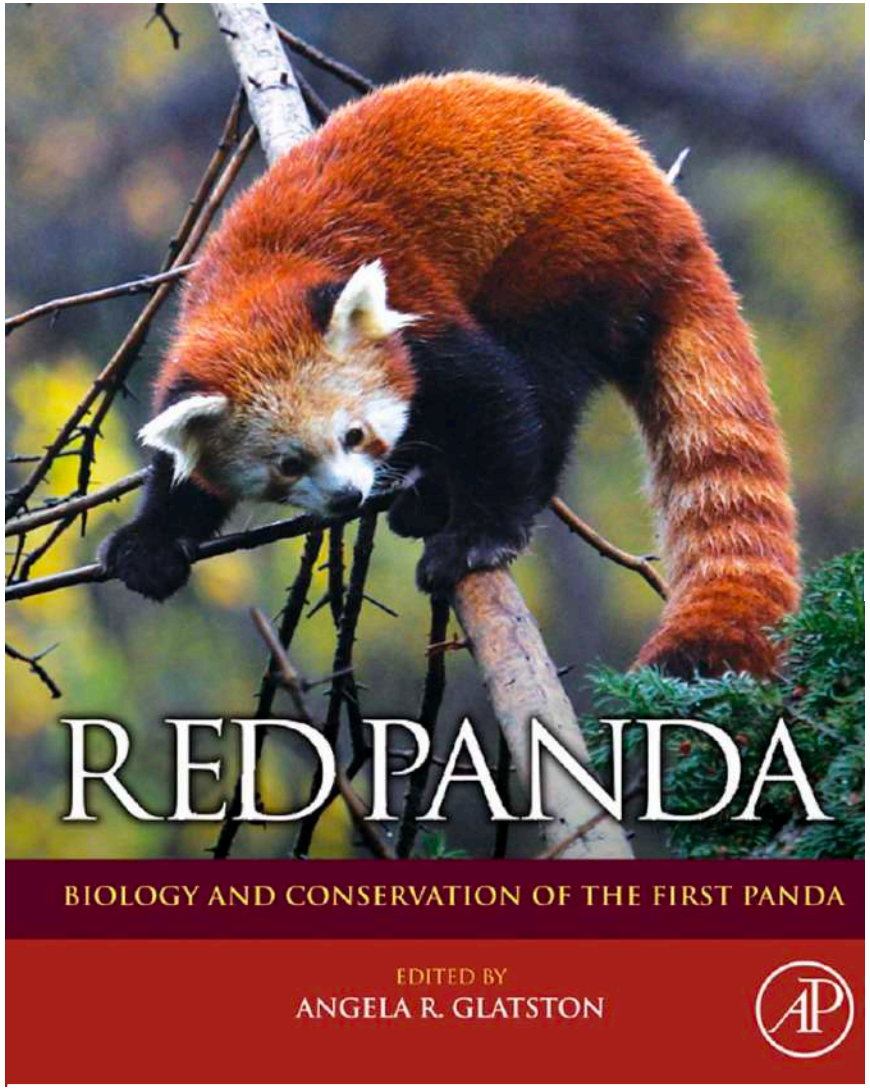
Paleobiology, 17(4), 1991, pp. 340–362

Iterative evolution of hypercarnivory in canids (Mammalia: Carnivora): evolutionary interactions among sympatric predators

Blaire Van Valkenburgh

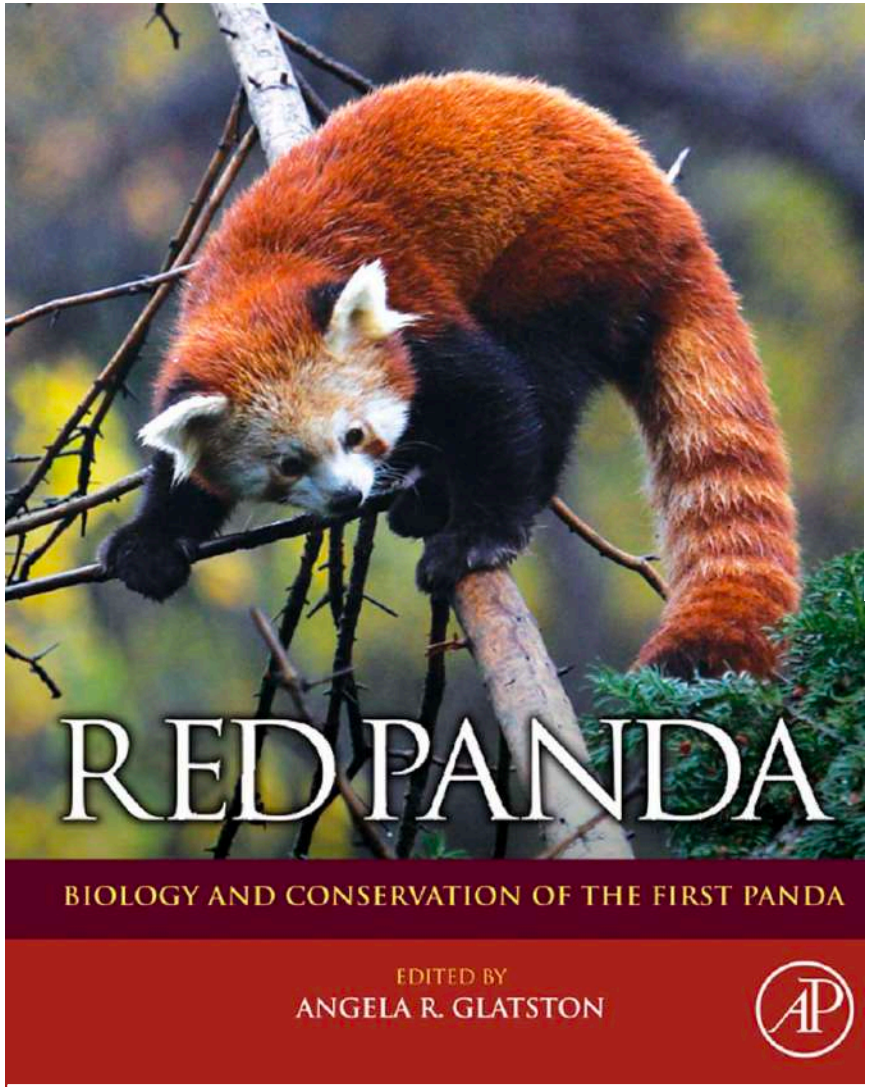
What about us normal carnivores?

Hypercarnivores are here defined as species, such as living felids, whose diets consist almost entirely of vertebrate flesh.



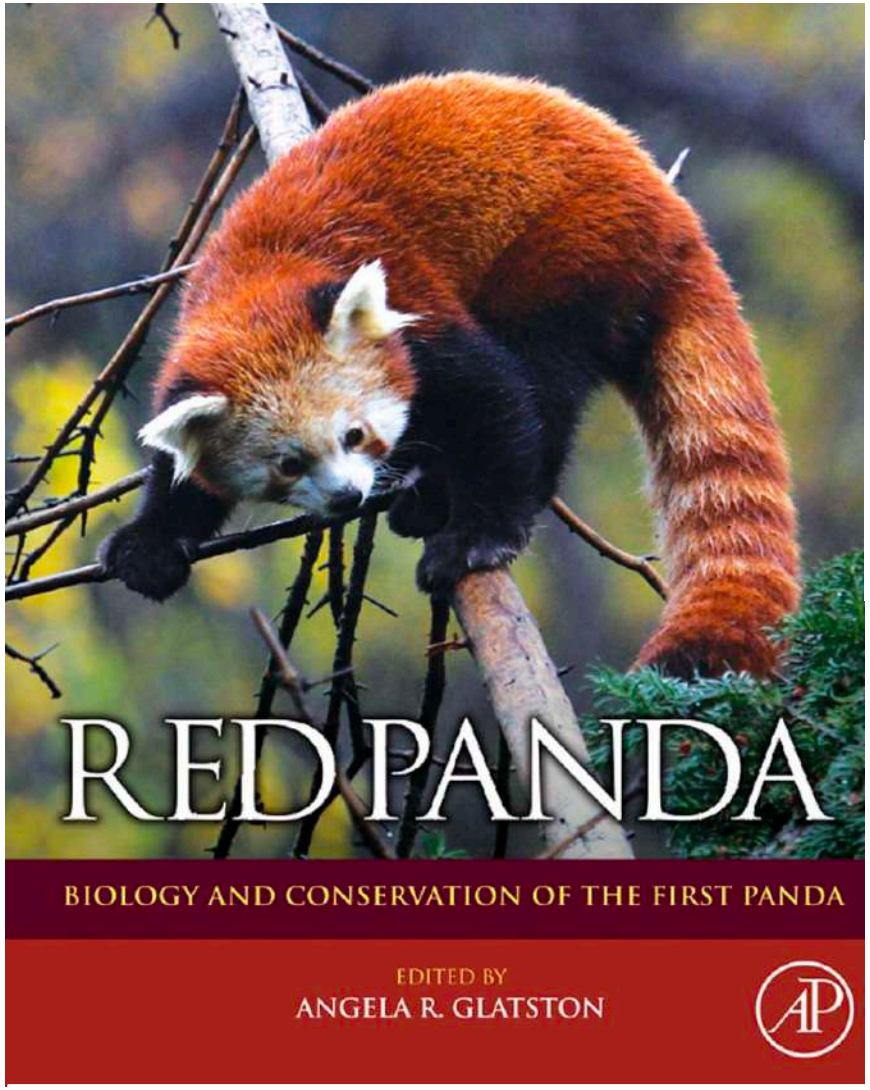
Advanced Members of the Ailuridae (Lesser or Red Pandas – Subfamily Ailurinae)

Steven C. Wallace



Advanced Members of the Ailuridae (Lesser or Red Pandas – Subfamily Ailurinae)

Steven C. Wallace



Advanced Members of the Ailuridae (Lesser or Red Pandas – Subfamily Ailurinae)

Steven C. Wallace

Though the early ailurids are typically carnivorous, with a tendency towards hypercarnivory (eating exclusively meat like a lion or a polar bear), the ailurines exhibit a trend towards hypocarnivory (eating mostly or only vegetation).

A hyper-robust sauropodomorph dinosaur ilium from the Upper Triassic–Lower Jurassic Elliot Formation of South Africa: Implications for the functional diversity of basal Sauropodomorpha

Blair W. McPhee [a, b, *], Jonah N. Choiniere [a, b]

Journal of African Earth Sciences 123 (2016) 177–184

A hyper-robust sauropodomorph dinosaur ilium from the Upper Triassic–Lower Jurassic Elliot Formation of South Africa: Implications for the functional diversity of basal Sauropodomorpha

Blair W. McPhee [a, b, *], Jonah N. Choiniere [a, b]

Journal of African Earth Sciences 123 (2016) 177–184

basal Sauropodomorpha managed the inherited behavioural and biomechanical challenges of increasing body-size, hyper-herbivory, and a forelimb primarily adapted for use in a bipedal context.

Achieving Landscape-Scale Deer Management for Biodiversity Conservation: The Need to Consider Sources and Sinks

KRISTIN WÄBER,[1] *School of Environmental Sciences, University of East Anglia, Norwich NR4 7TJ, UK*

JONATHAN SPENCER, *Principal Adviser Natural Environment, Forestry Services, Forestry Commission England, 620 Bristol Business Park, Bristol BS16 1EJ, UK*

PAUL M. DOLMAN, *School of Environmental Sciences, University of East Anglia, Norwich NR4 7TJ, UK*

The Journal of Wildlife Management 77(4):726–736; 2013;

ABSTRACT Hyper-herbivory following predator removal is a global issue.

Achieving Landscape-Scale Deer Management for Biodiversity Conservation: The Need to Consider Sources and Sinks

KRISTIN WÄBER,[1] *School of Environmental Sciences, University of East Anglia, Norwic*

JONATHAN SPENCER, *Principal Adviser Natural Environment, Forestry Services, Fore* *ol Business Park, Bristol BS16 1EJ, UK*

PAUL M. DOLMAN, *School of Environmental Sciences, University of East Anglia, Norw*

The Journal of Wildlife Management 77(4):726–736; 2013;

What about us normal herbivores?

ABSTRACT Hyper-herbivory following predator removal is a global issue.

A global carbon and nitrogen isotope perspective on modern and ancient human diet

PNAS 2021 Vol. 118 No. 19 e2024642118

Michael I. Bird[a,b,1], Stefani A. Crabtree[c,d], Jordahna Haig[a,b], Sean Ulm[a,e], and Christopher M. Wurster[a,b]

A global carbon and nitrogen isotope perspective on modern and ancient human diet

PNAS 2021 Vol. 118 No. 19 e2024642118

Michael I. Bird[a,b,1], Stefani A. Crabtree[c,d], Jordahna Haig[a,b], Sean Ulm[a,e], and Christopher M. Wurster[a,b]

Humans have been shown, through their hyper-omnivory and prey-switching ability, to have consumed a wider variety of organisms than any other taxon in their respective systems (4, 59).

A global carbon and nitrogen isotope perspective on modern and ancient human diet

PNAS 202

Michael I. Bird[a,b,1], Stefani A. Crabtree[c,d], Jordahna Haig[a,b], Sean Ulm[a,e], and Christ

What about us normal omnivores?

Humans have been shown, through their hyper-omnivory and prey-switching ability, to have consumed a wider variety of organisms than any other taxon in their respective systems (4, 59).

BMJ 2015;351:h6467

Use of positive and negative words in scientific PubMed abstracts between 1974 and 2014: retrospective analysis

Christiaan H Vinkers *assistant professor*[1], Joeri K Tijdink *psychiatrist*[2], Willem M Otte *assistant professor*[3 4]

Box 1: Words used in PubMed search queries and Google books search engine

Positive words

Amazing, assuring, astonishing, bright, creative, encouraging, enormous, excellent, favourable, groundbreaking, hopeful, innovative, inspiring, inventive, novel, phenomenal, prominent, promising, reassuring, remarkable, robust, spectacular, supportive, unique, unprecedented

Negative words

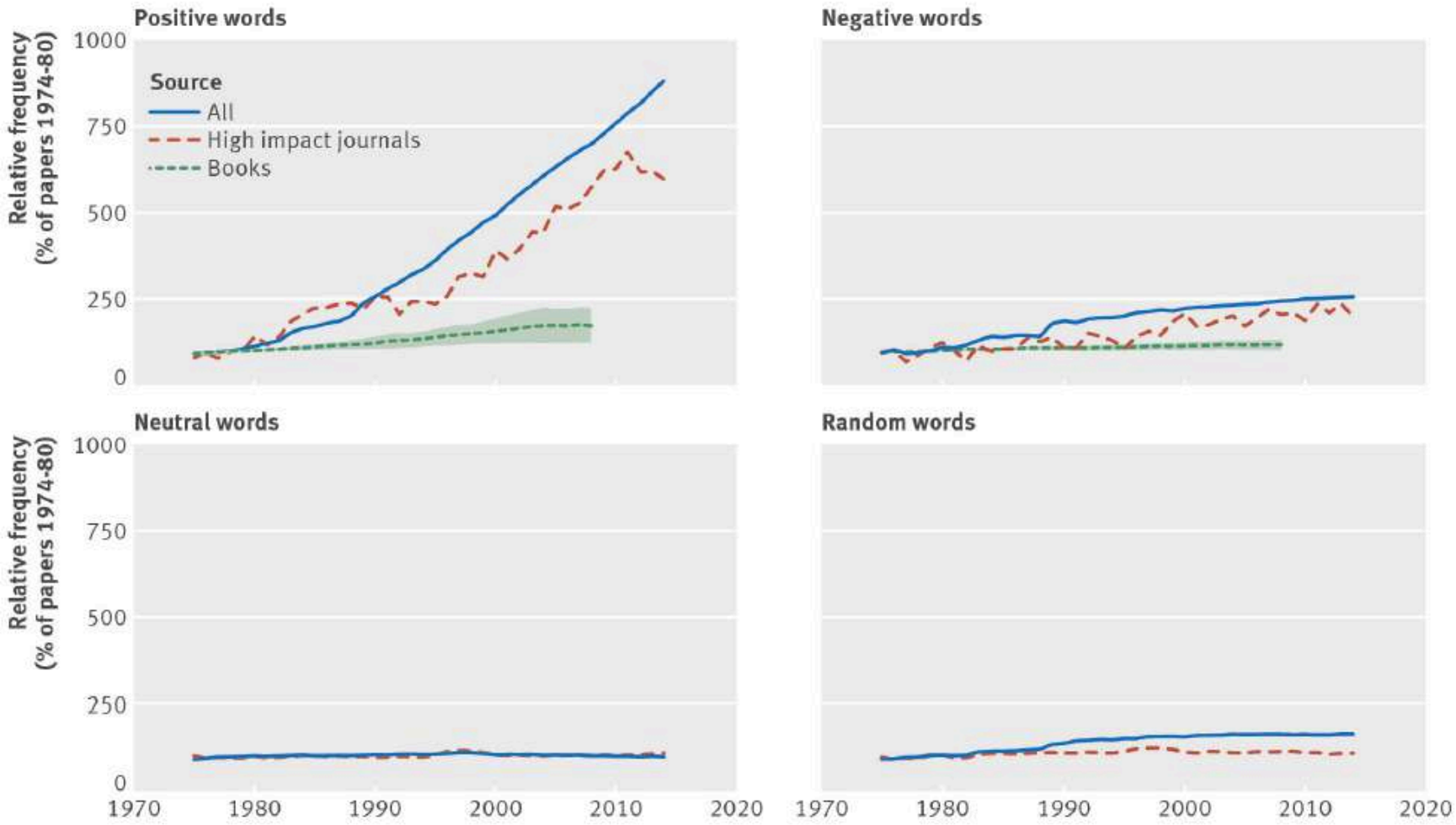
Detrimental, disappointing, disconcerting, discouraging, disheartening, disturbing, frustrating, futile, hopeless, impossible, inadequate, ineffective, insignificant, insufficient, irrelevant, mediocre, pessimistic, substandard, unacceptable, unpromising, unsatisfactory, unsatisfying, useless, weak, worrisome

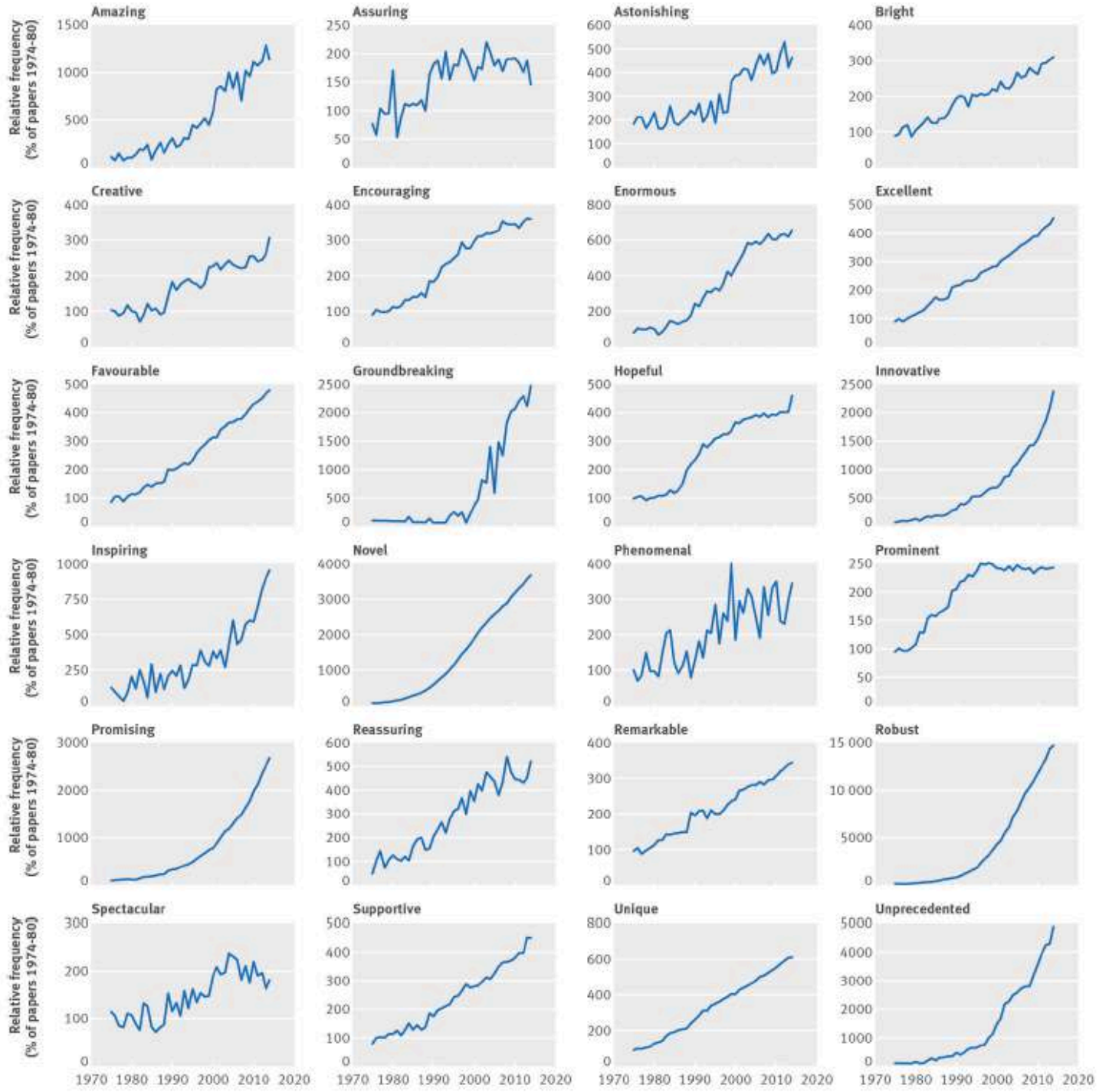
Neutral words

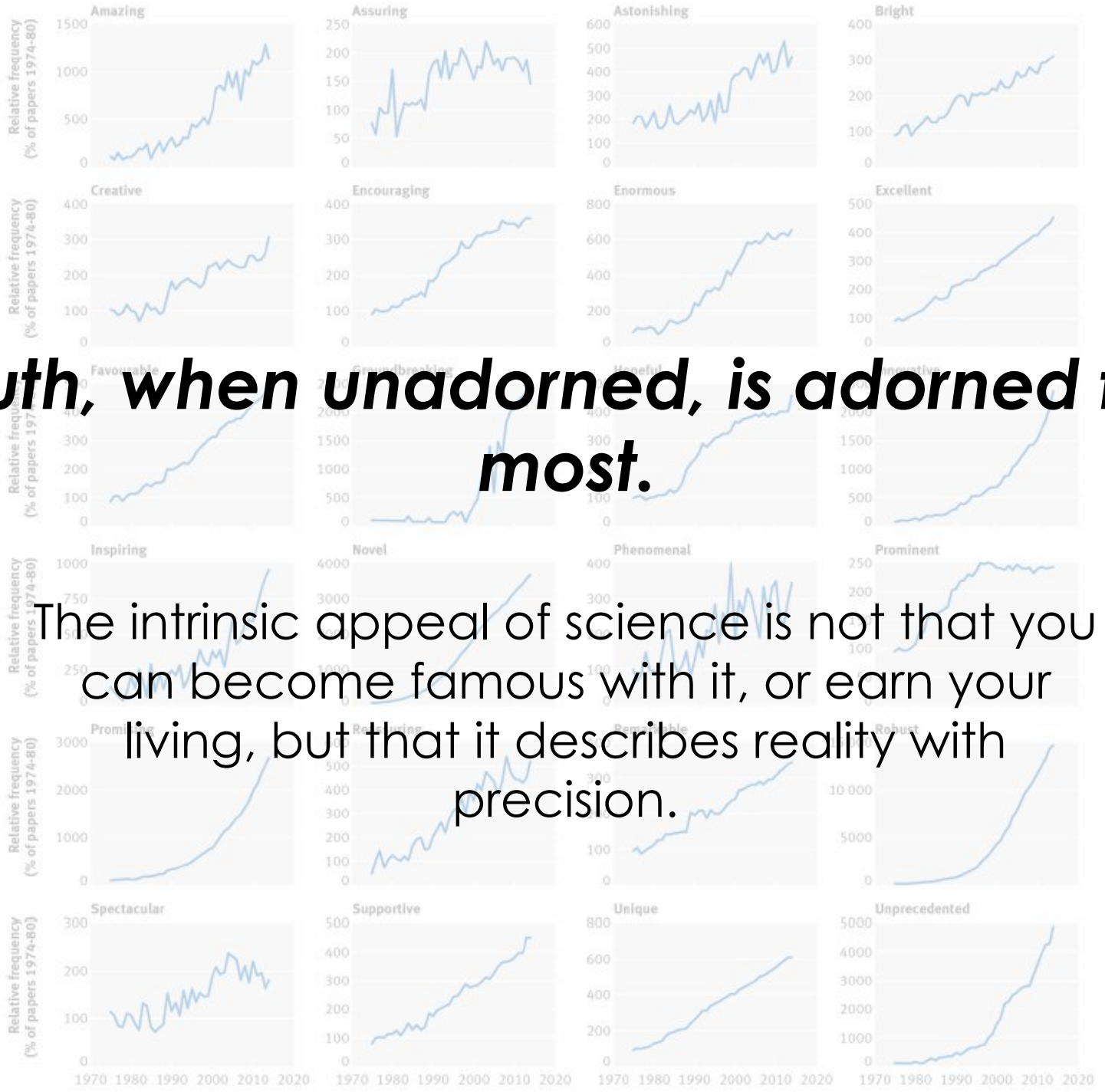
Animal, blood, bone, brain, condition, design, disease, experiment, human, intervention, kidney, liver, man, men, muscle, patient, prospective, rodent, significant, skin, skull, treatment, vessel, woman, women

BMJ 2015;351:h6467

Use of positive and negative words in scientific PubMed abstracts between 1974 and 2014: retrospective analysis

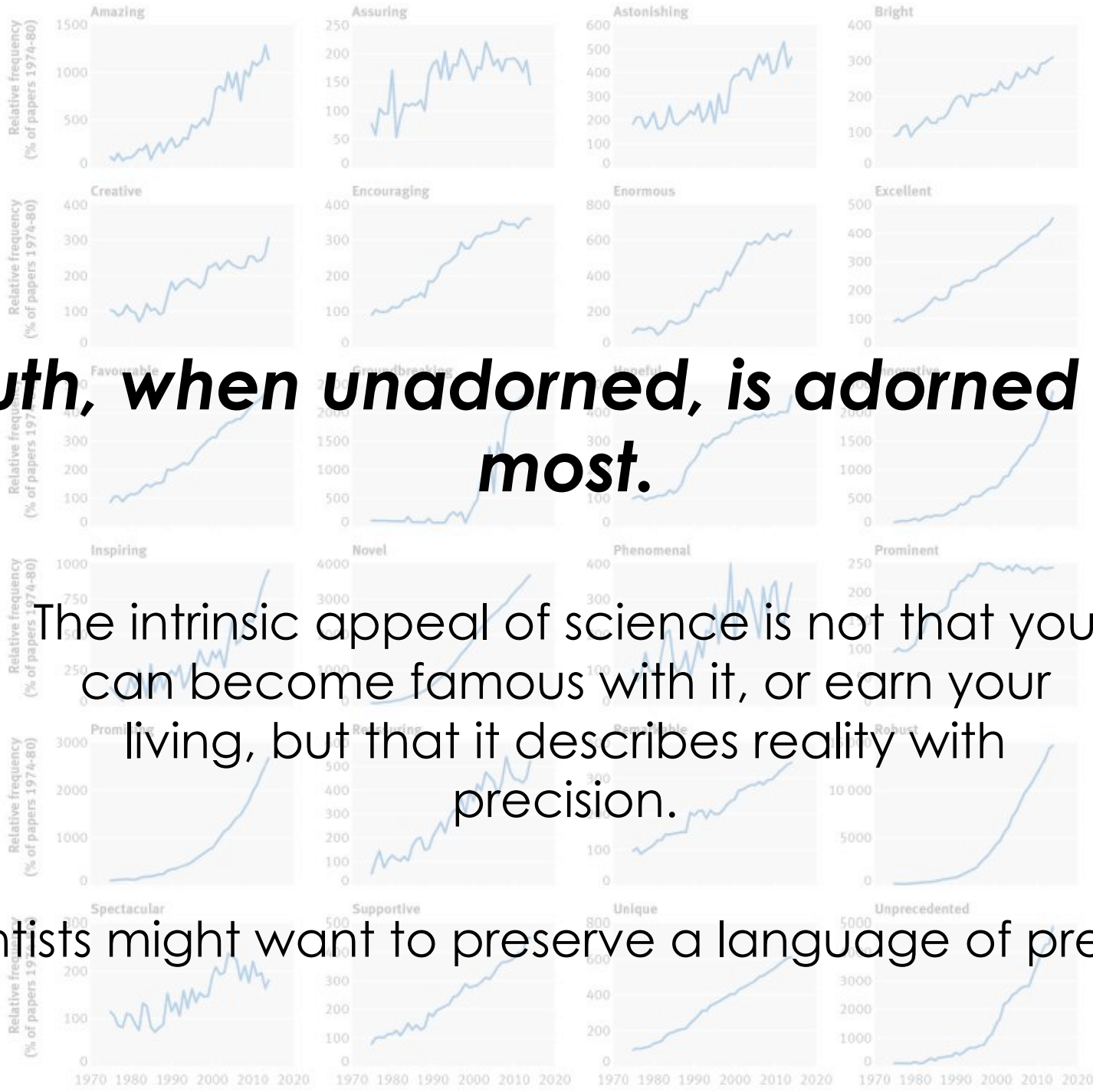



Amazing
Assuring
Astonishing
Bright
Creative
Encouraging
Enormous
Excellent
Favourable
Groundbreaking
Hopeful
Innovative
Inspiring
Novel
Phenomenal
Prominent
Promising
Reassuring
Remarkable
Robust
Spectacular
Supportive
Unique
Unprecedented
Relative frequency (% of papers 1974-80)
1970 1980 1990 2000 2010 2020



Truth, when unadorned, is adorned the most.

The intrinsic appeal of science is not that you can become famous with it, or earn your living, but that it describes reality with precision.



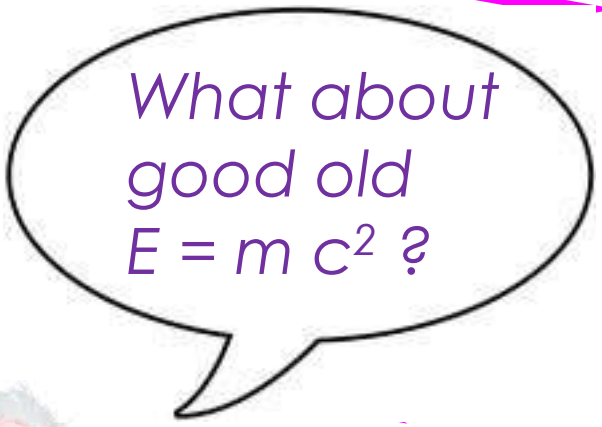
Truth, when unadorned, is adorned the most.

The intrinsic appeal of science is not that you can become famous with it, or earn your living, but that it describes reality with precision.

Scientists might want to preserve a language of precision.

Unprecedented E
Robustly equals
Unique m
times
the Squarest of all c

Unprecedented E
Robustly equals
Unique m
times
the Squarest of all c



Our human legacy:
a propensity for
(and a historical acceptance of)
causality

Why the different modes of propulsion ?

Speed ?

Speed ?

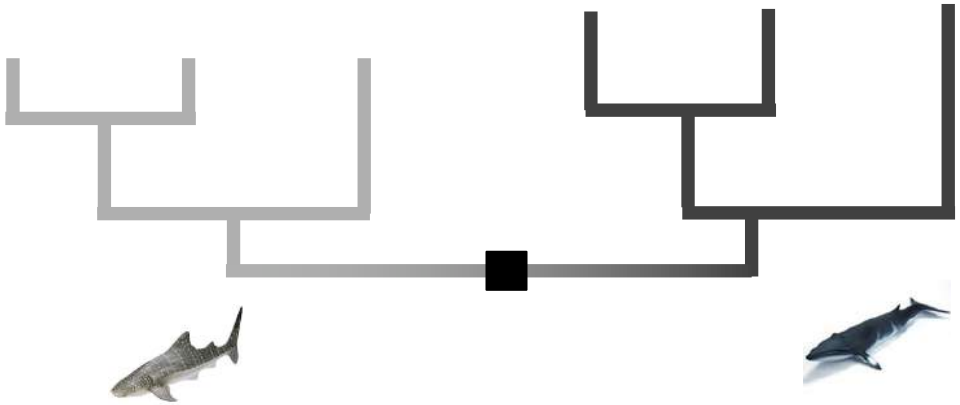
Direction (horizontal / vertical) ?

Direction (horizontal / vertical) ?

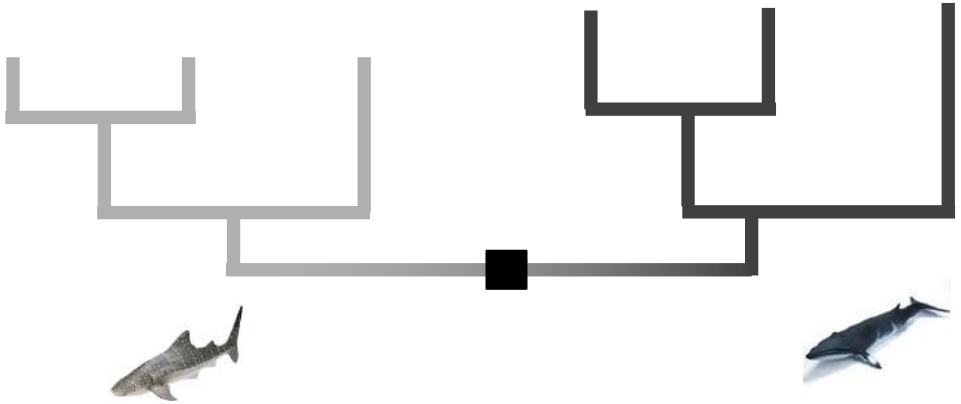
Contingency (evolutionary history) ?

Contingency (evolutionary history) ?

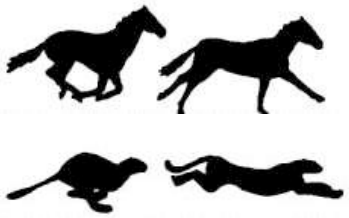
Contingency (evolutionary history) ?

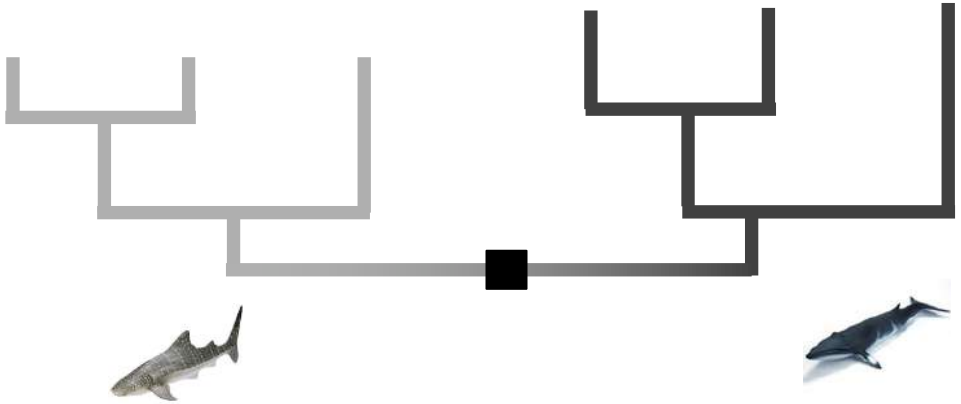


Contingency (evolutionary history) ?



Contingency (evolutionary history) ?





Contingency (evolutionary history) ?

Two different solutions for the same problem.

Contingency (evolutionary history) ?

Two different solutions for the same problem.

None is “better”.

Propensity for selective perception

Propensity for selective perception

- a craving for rules

(as opposed to no rule)

(Cuvier 1798)

Principle of the correlation of parts

(Cuvier 1798)

Principle of the correlation of parts

If an animal's teeth are such as they must be, in order for it to nourish itself with flesh, we can be sure without further examination that the whole system of its digestive organs is appropriate for that kind of food, and that its whole skeleton and locomotive organs, and even its sense organs, are arranged in such a way as to make it skilful at pursuing and catching its prey. For these relations are the necessary conditions of existence of the animal; if things were not so, it would not be able to subsist. (Cuvier 1798)

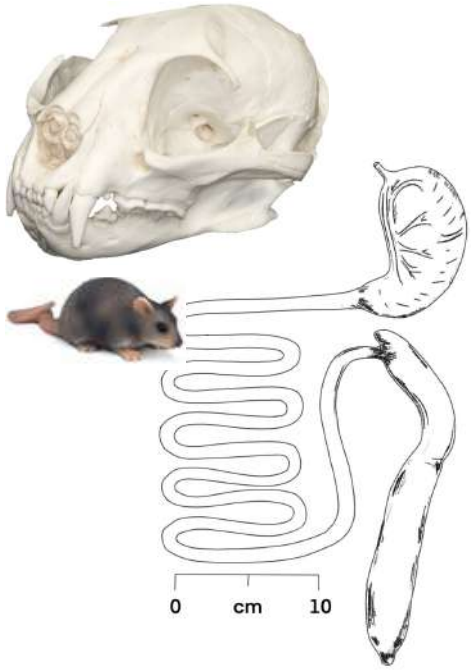
Principle of the correlation of parts

If an animal's teeth are such as they must be, in order for it to nourish itself with flesh, we can be sure without further examination that the whole system of its digestive organs is appropriate for that kind of food, and that its whole skeleton and locomotive organs, and even its sense organs, are arranged in such a way as to make it skilful at pursuing and catching its prey. For these relations are the necessary conditions of existence of the animal; if things were not so, it would not be able to subsist. (Cuvier 1798)

Principle of the correlation of parts

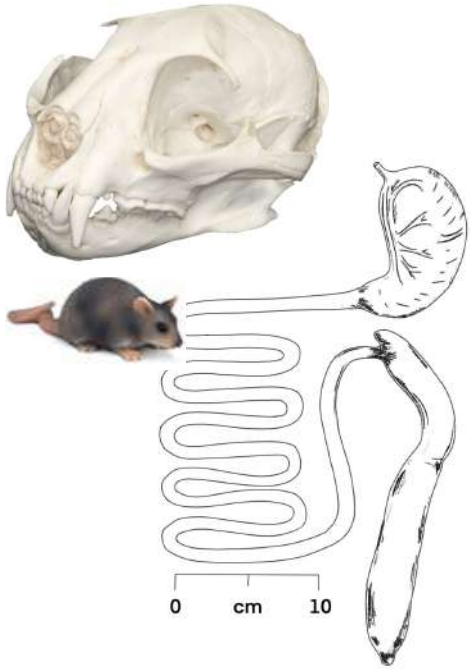
If an animal's teeth are such as they must be, in order for it to nourish itself with flesh, we can be sure without further examination that the whole system of its digestive organs is appropriate for that kind of food, and that its whole skeleton and locomotive organs, and even its sense organs, are arranged in such a way as to make it skilful at pursuing and catching its prey. For these relations are the necessary conditions of existence of the animal; if things were not so, it would not be able to subsist. (Cuvier 1798)

Principle of the correlation of parts



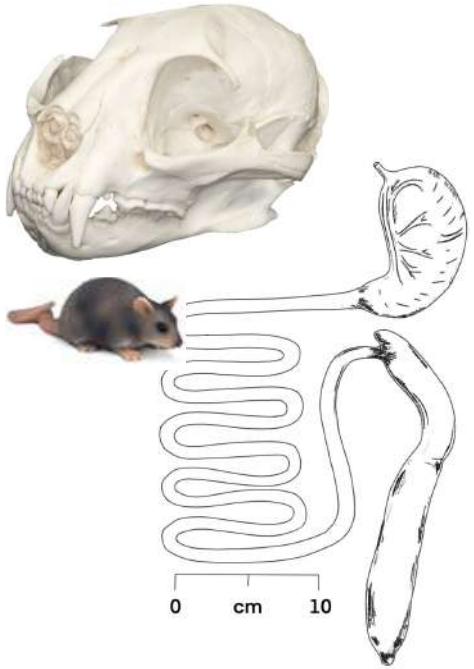
If an animal's teeth are such as they must be, in order for it to nourish itself with flesh, we can be sure without further examination that the whole system of its digestive organs is appropriate for that kind of food, and that its whole skeleton and locomotive organs, and even its sense organs, are arranged in such a way as to make it skilful at pursuing and catching its prey. For these relations are the necessary conditions of existence of the animal; if things were not so, it would not be able to subsist. (Cuvier 1798)

Principle of the correlation of parts



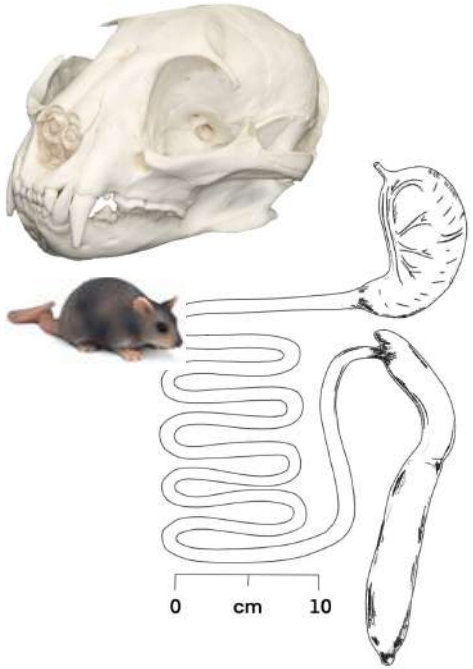
If an animal's teeth are such as they must be, in order for it to nourish itself with flesh, we can be sure without further examination that the whole system of its digestive organs is appropriate for that kind of food, and that its whole skeleton and locomotive organs, and even its sense organs, are arranged in such a way as to make it skilful at pursuing and catching its prey. For these relations are the necessary conditions of existence of the animal; if things were not so, it would not be able to subsist. (Cuvier 1798)

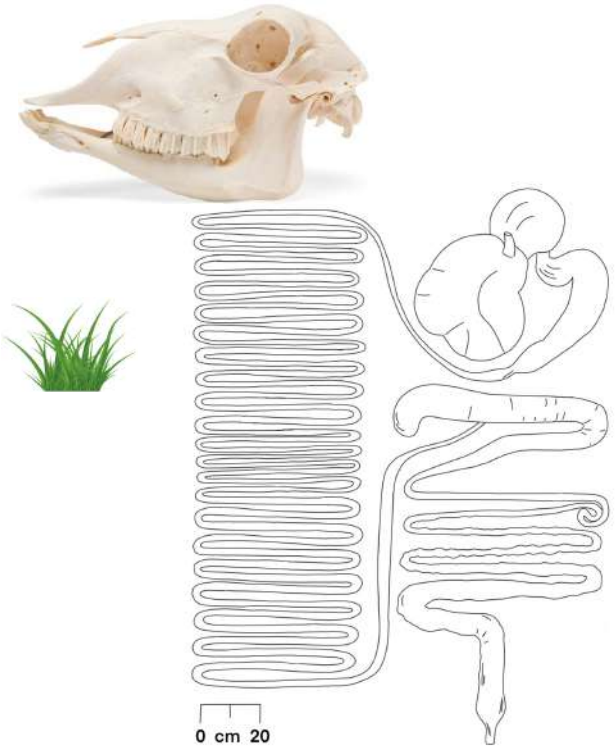
Principle of the correlation of parts



If an animal's teeth are such as they must be, in order for it to nourish itself with flesh, we can be sure without further examination that the whole system of its digestive organs is appropriate for that kind of food, and that its whole skeleton and locomotive organs, and even its sense organs, are arranged in such a way as to make it skilful at pursuing and catching its prey. For these relations are the necessary conditions of existence of the animal; if things were not so, it would not be able to subsist. (Cuvier 1798)

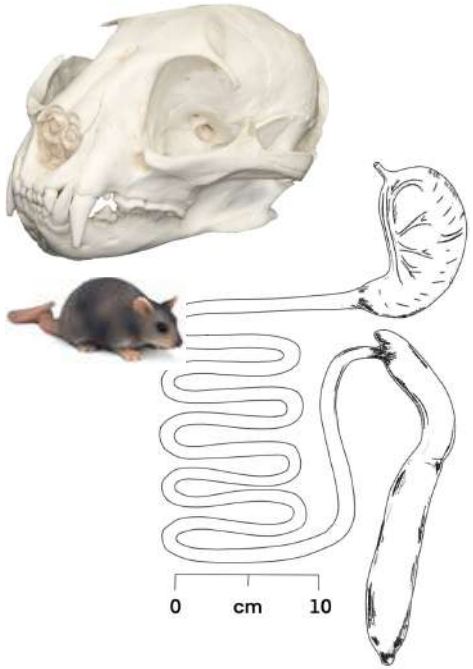
Principle of the correlation of parts

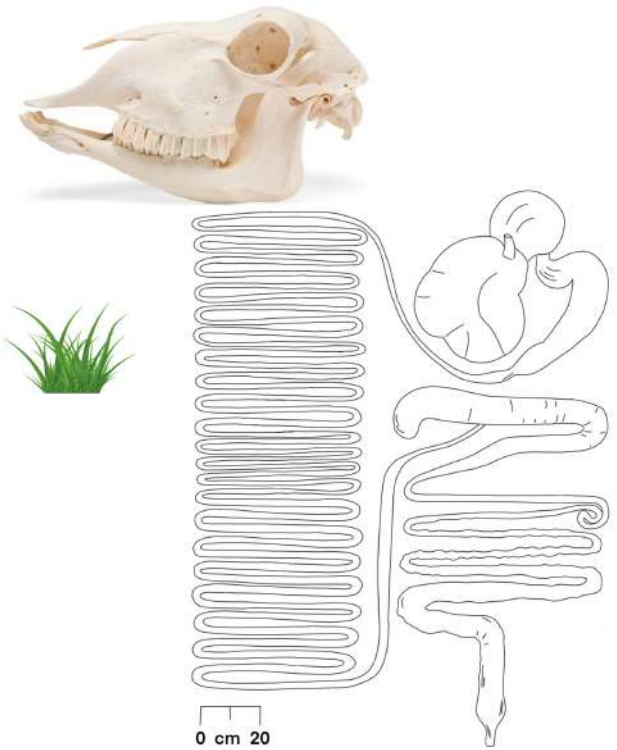


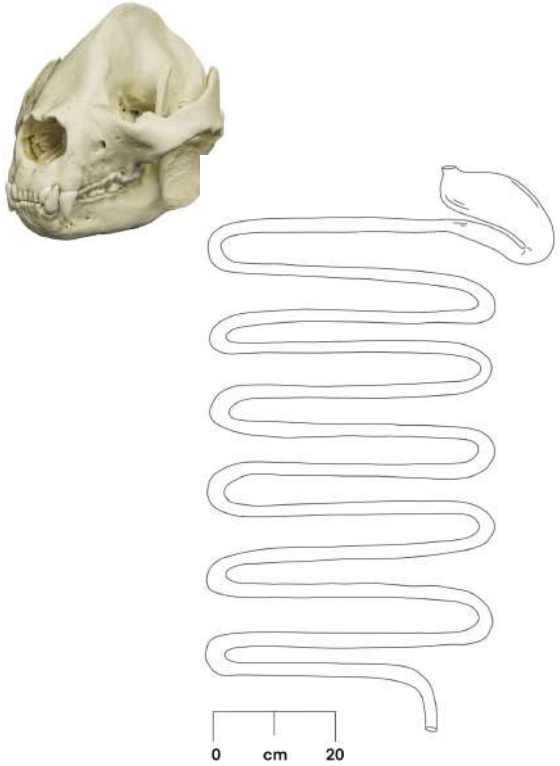


If an animal's teeth are such as they must be, in order for it to nourish itself with flesh, we can be sure without further examination that the whole system of its digestive organs is appropriate for that kind of food, and that its whole skeleton and locomotive organs, and even its sense organs, are arranged in such a way as to make it skilful at pursuing and catching its prey. For these relations are the necessary conditions of existence of the animal; if things were not so, it would not be able to subsist. (Cuvier 1798)

Principle of the correlation of parts

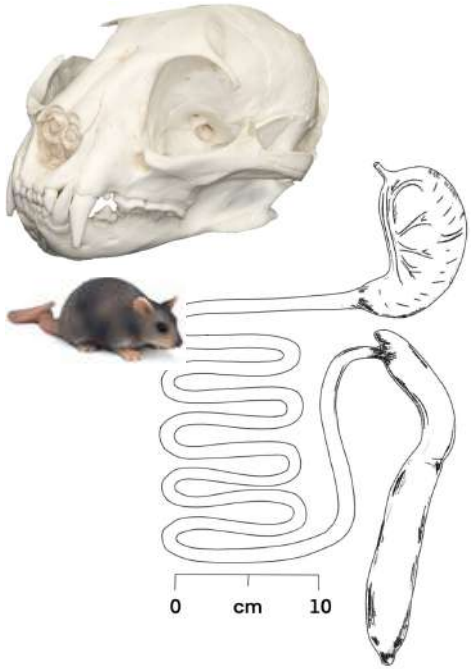


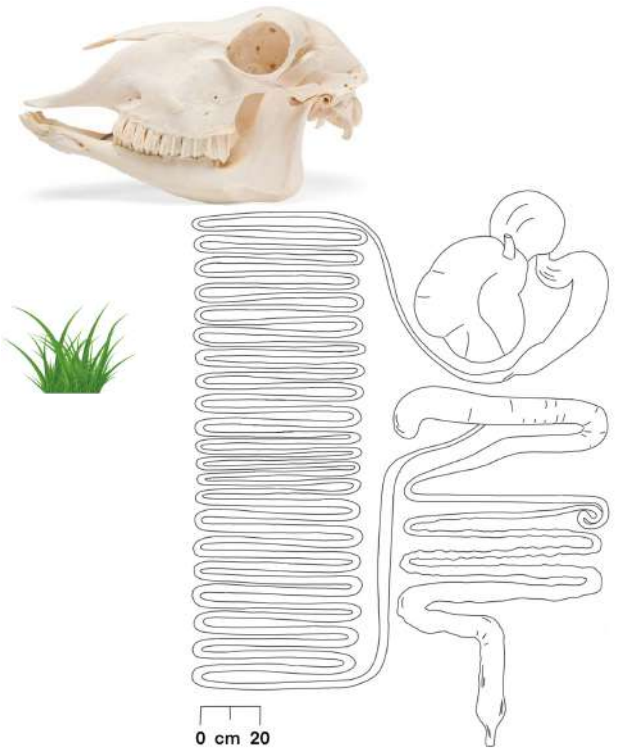


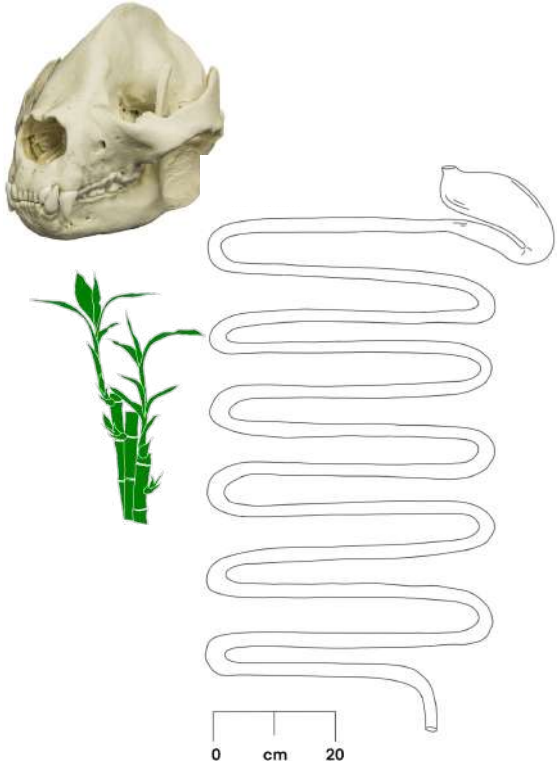


If an animal's teeth are such as they must be, in order for it to nourish itself with flesh, we can be sure without further examination that the whole system of its digestive organs is appropriate for that kind of food, and that its whole skeleton and locomotive organs, and even its sense organs, are arranged in such a way as to make it skilful at pursuing and catching its prey. For these relations are the necessary conditions of existence of the animal; if things were not so, it would not be able to subsist. (Cuvier 1798)

Principle of the correlation of parts

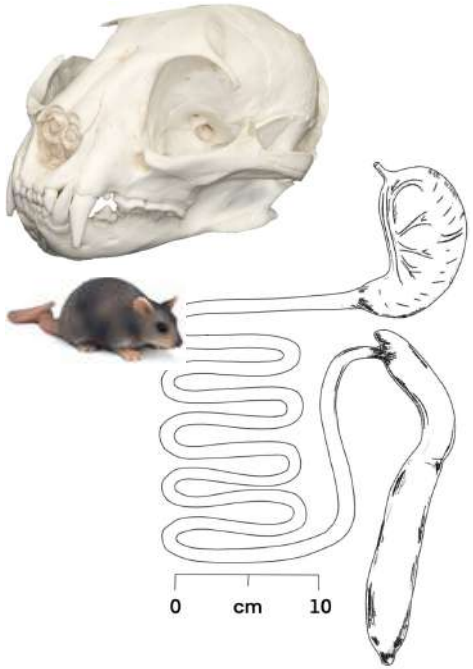


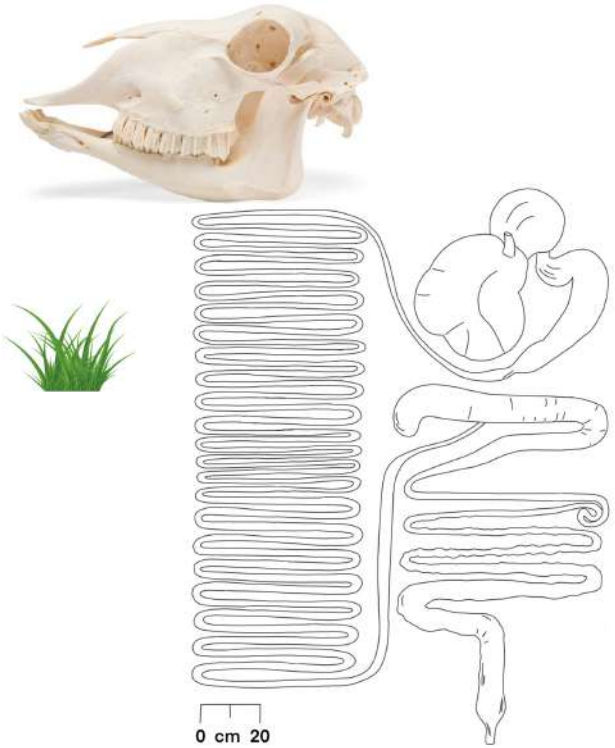




If an animal's teeth are such as they must be, in order for it to nourish itself with flesh, we can be sure without further examination that the whole system of its digestive organs is appropriate for that kind of food, and that its whole skeleton and locomotive organs, and even its sense organs, are arranged in such a way as to make it skilful at pursuing and catching its prey. For these relations are the necessary conditions of existence of the animal; if things were not so, it would not be able to subsist. (Cuvier 1798)

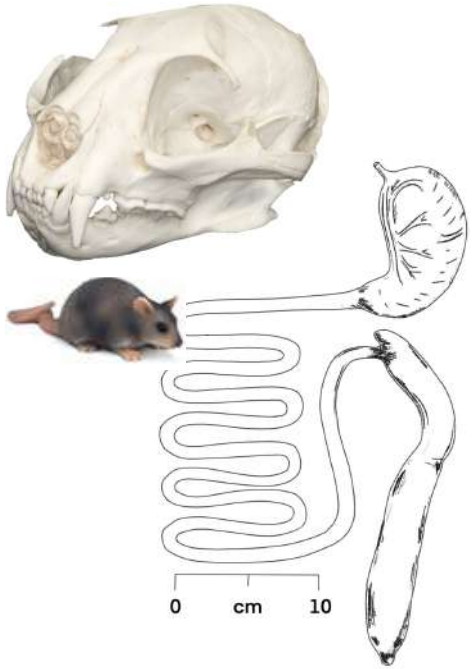
Principle of the correlation of parts

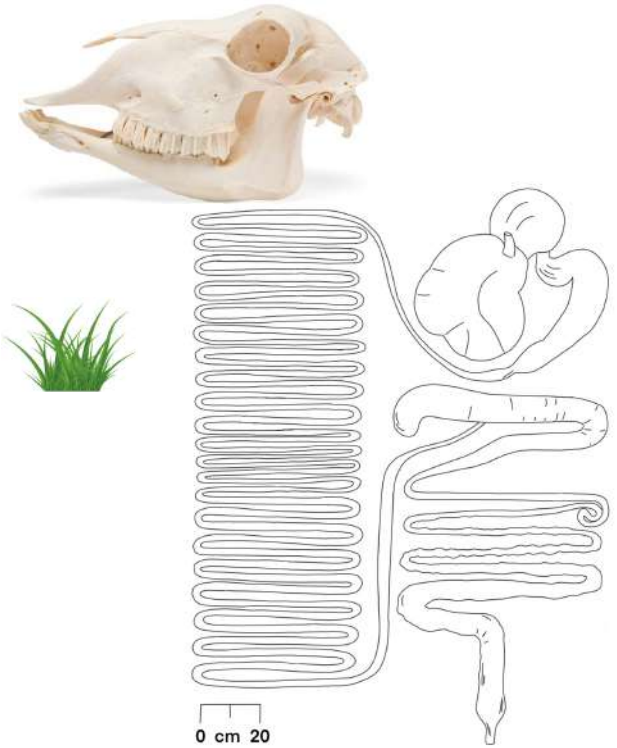




If an animal's teeth are such as they must be, in order for it to nourish itself with flesh, we can be sure without further examination that the whole system of its digestive organs is appropriate for that kind of food, and that its whole skeleton and locomotive organs, and even its sense organs, are arranged in such a way as to make it skilful at pursuing and catching its prey. For these relations are the necessary conditions of existence of the animal; if things were not so, it would not be able to subsist. (Cuvier)

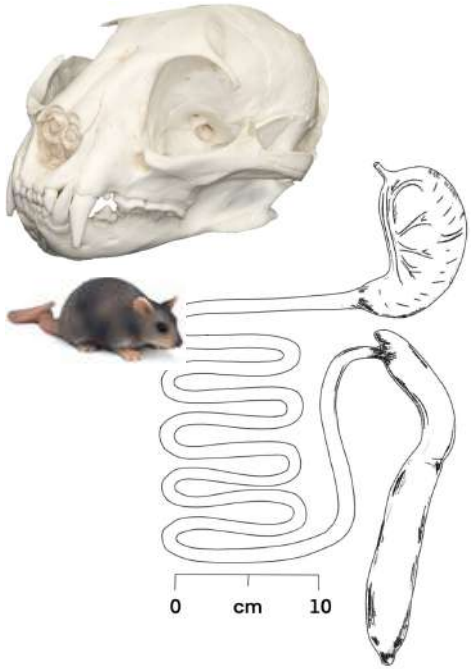
Principle of the correlation of parts

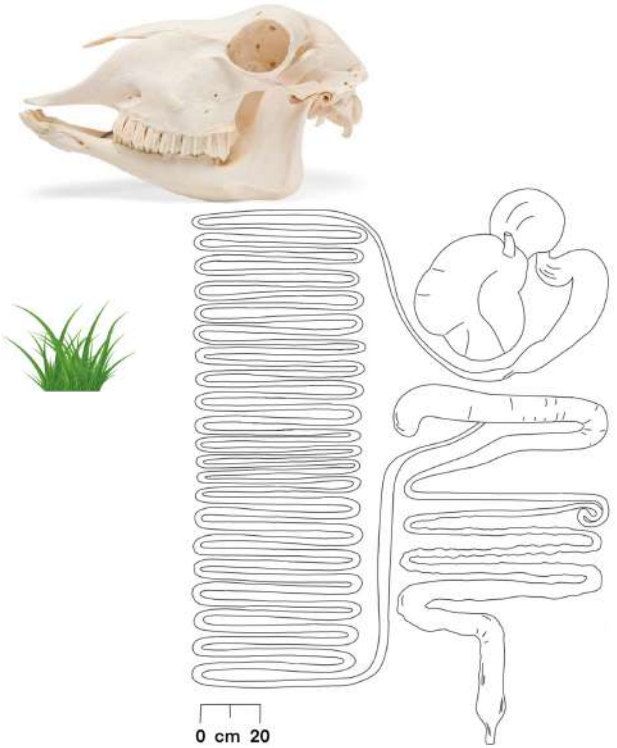


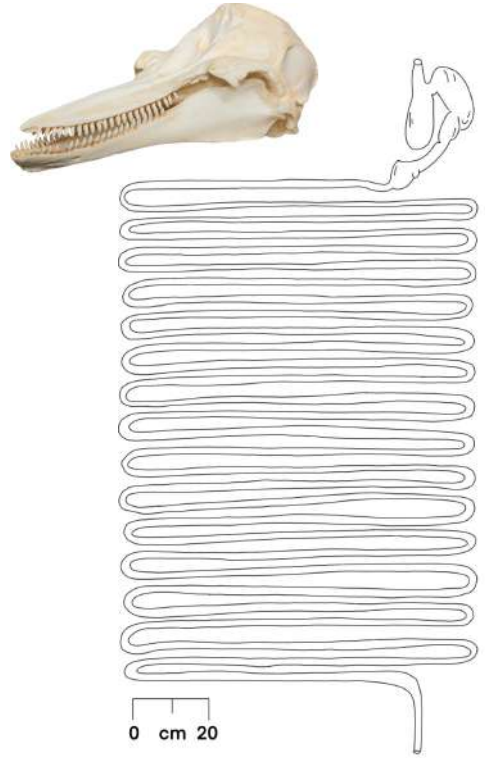


If an animal's teeth are such as they must be, in order for it to nourish itself with flesh, we can be sure without further examination that the whole system of its digestive organs is appropriate for that kind of food, and that its whole skeleton and locomotive organs, and even its sense organs, are arranged in such a way as to make it skllful at pursuing and catching its prey. For these relations are the necessary conditions of existence of the animal; if things were not so, it would not be able to subsist. (Cuvier)

Principle of the correlation of parts

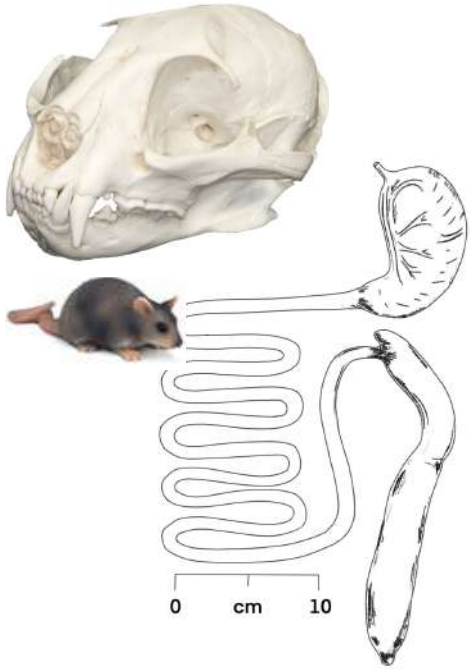


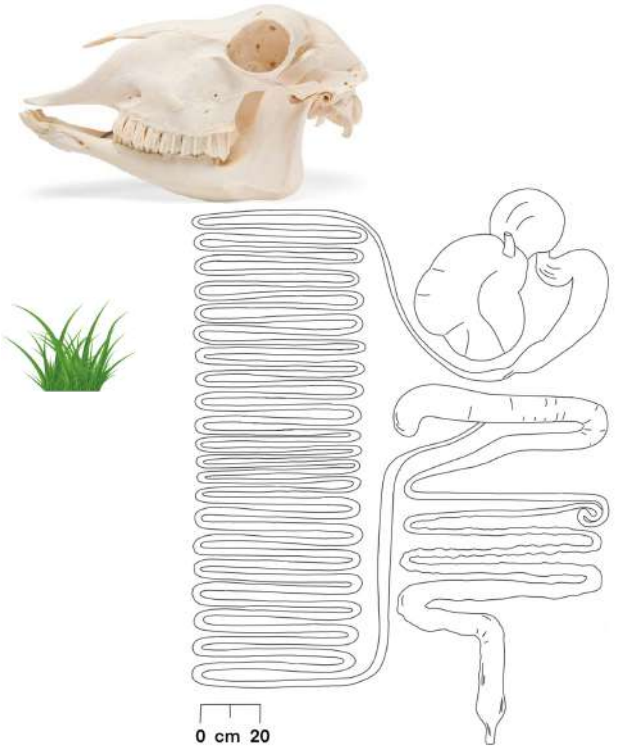


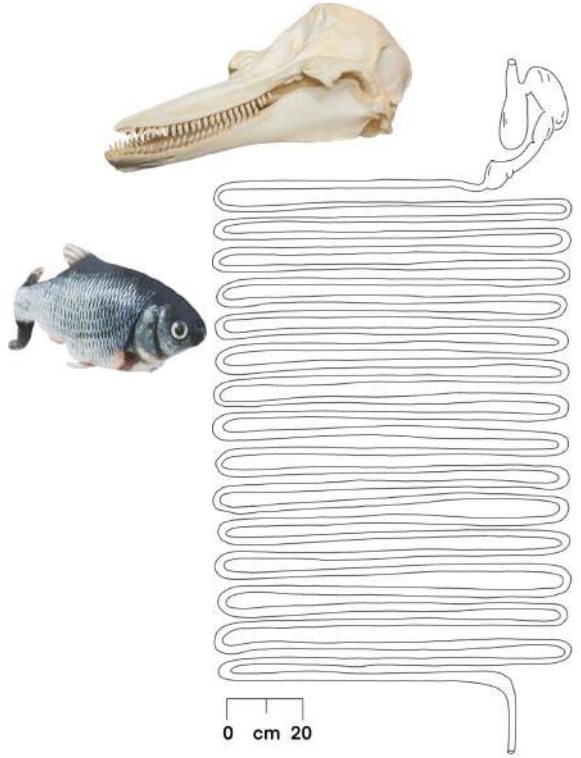


If an animal's teeth are such as they must be, in order for it to nourish itself with flesh, we can be sure without further examination that the whole system of its digestive organs is appropriate for that kind of food, and that its whole skeleton and locomotive organs, and even its sense organs, are arranged in such a way as to make it skllful at pursuing and catching its prey. For these relations are the necessary conditions of existence of the animal; if things were not so, it would not be able to subsist. (Cuvier)

Principle of the correlation of parts





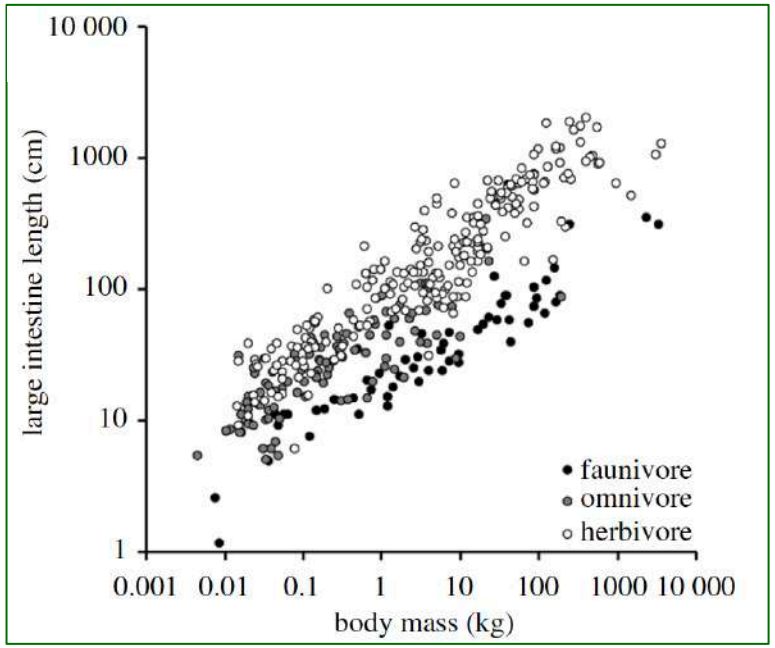


If an animal's teeth are such as they must be, in order for it to nourish itself with flesh, we can be sure without further examination that the whole system of its digestive organs is appropriate for that kind of food, and that its whole skeleton and locomotive organs, and even its sense organs, are arranged in such a way as to make it skllful at pursuing and catching its prey. For these relations are the necessary conditions of existence of the animal; if things were not so, it would not be able to subsist. (Cuvier)


Baleen Whales (Mysticeti)
facing right
WHALES of the WORLD
Whales, Dolphins, & Porpoises (Cetacea)
Toothed Whales (Odontoceti)
facing left
0
10 feet
10 metres

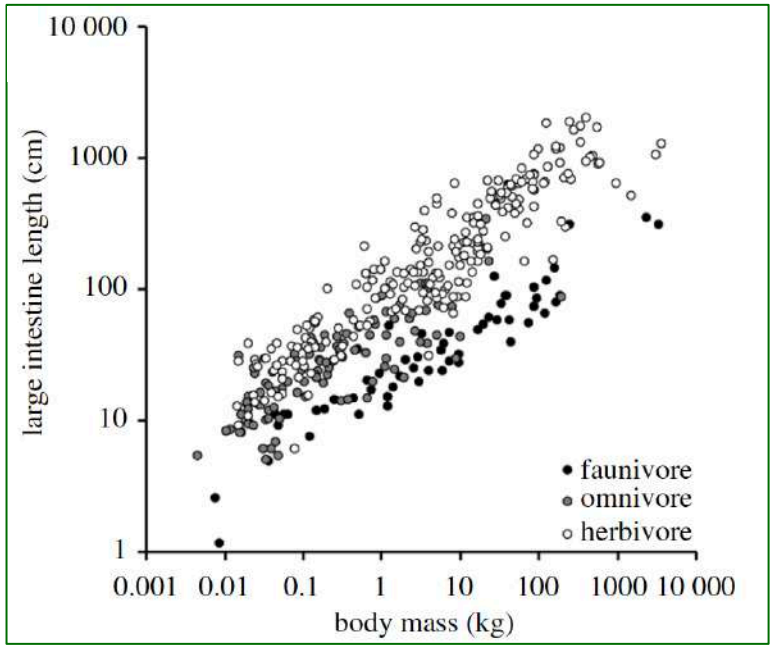
Form-function convergence ?

Form-function convergence ?



Duque-Correa et al. (2021)

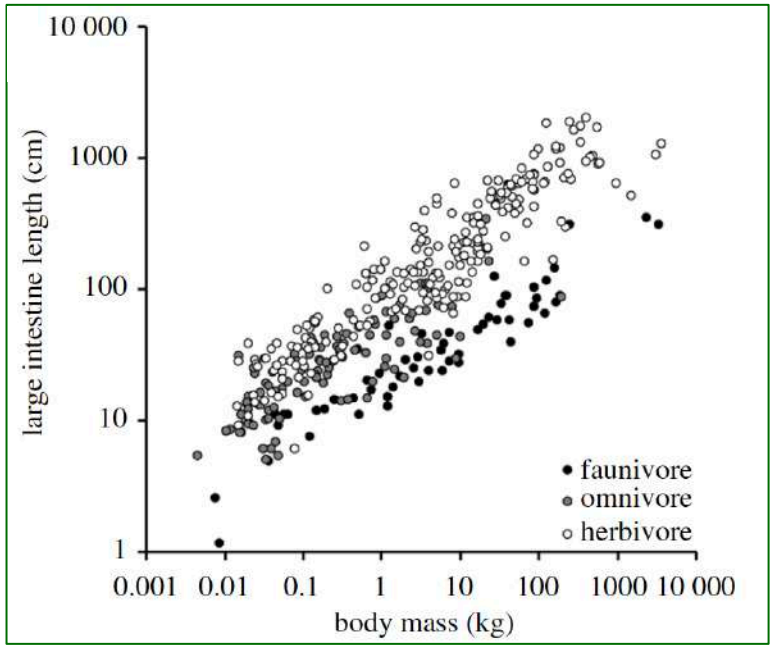
Form-function convergence ?



✔

Duque-Correa et al. (2021)

Form-function convergence ?

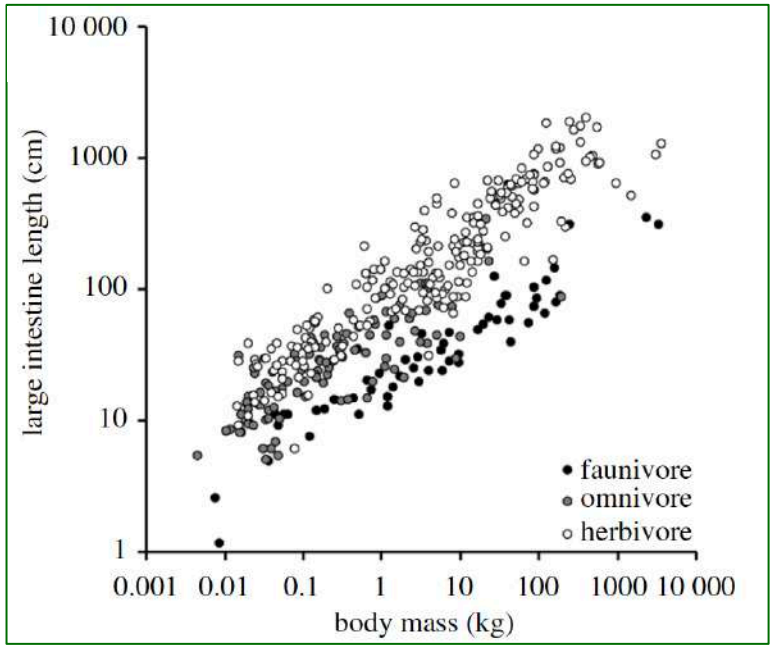


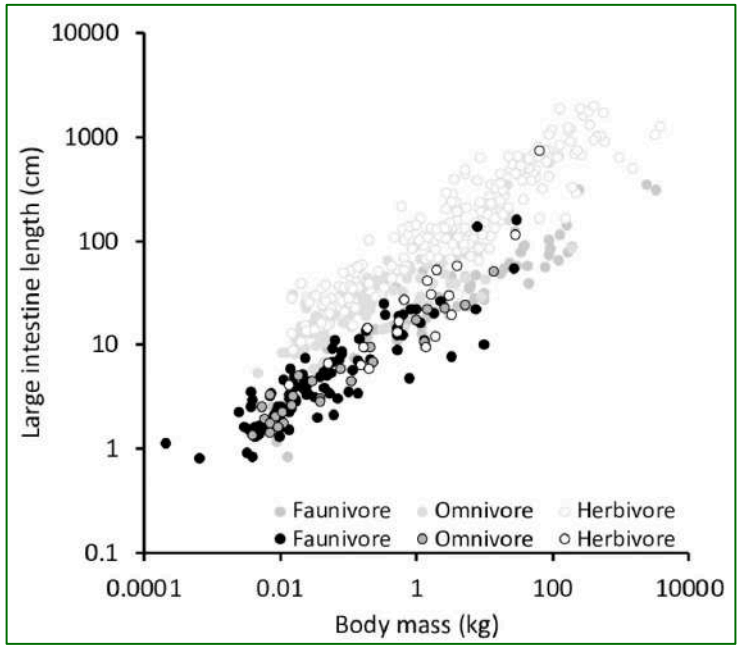
✔

(no whales)

Duque-Correa et al. (2021)

Form-function convergence ?



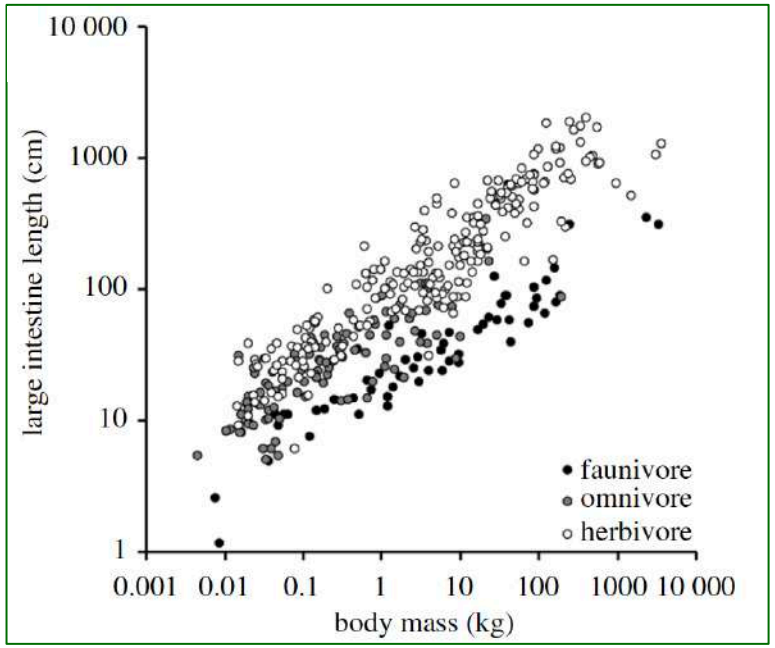


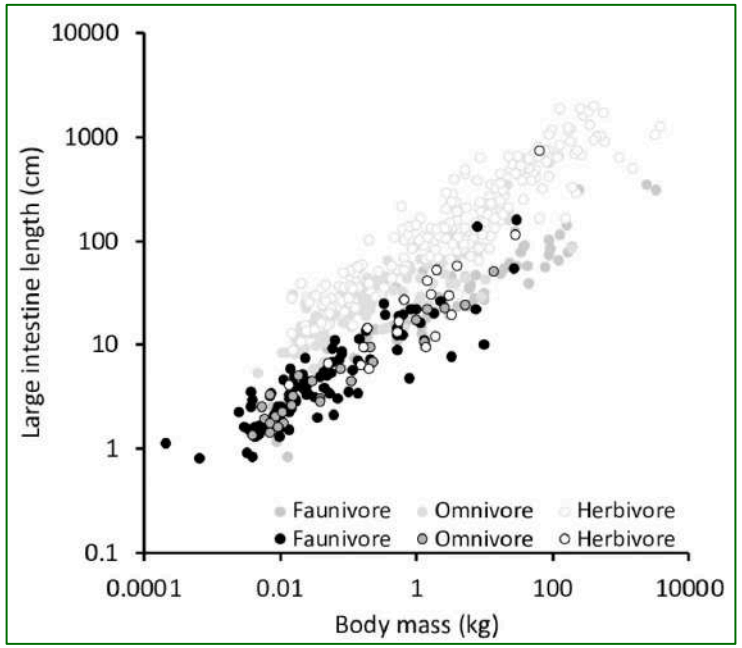
✔

(no whales)

Duque-Correa et al. (2021), Hoppe et al. (2021)

Form-function convergence ?





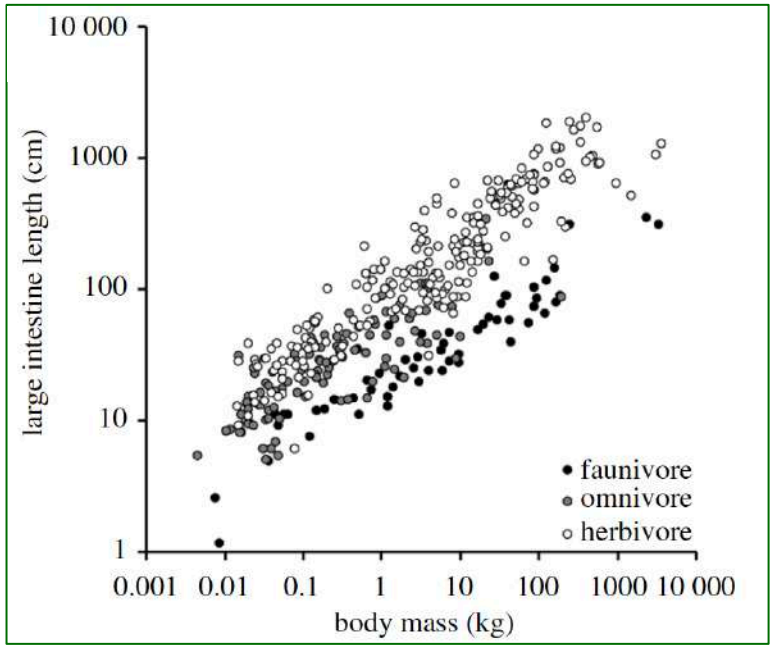
✔

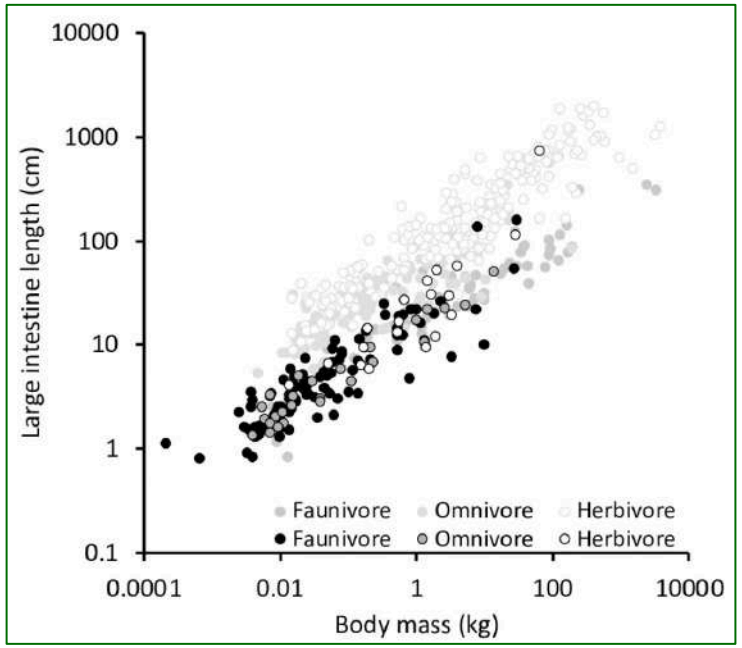
(no whales)

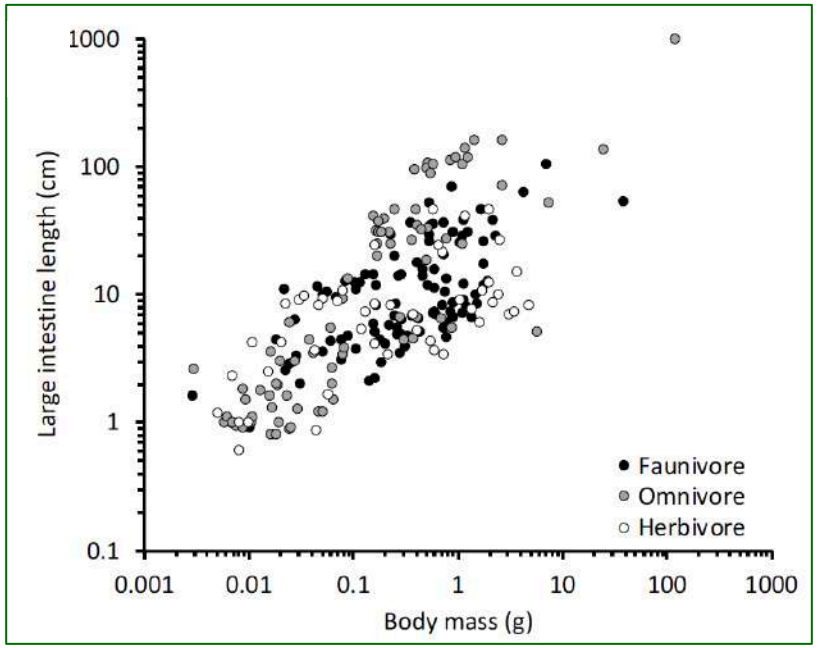
✘

Duque-Correa et al. (2021), Hoppe et al. (2021)

Form-function convergence ?







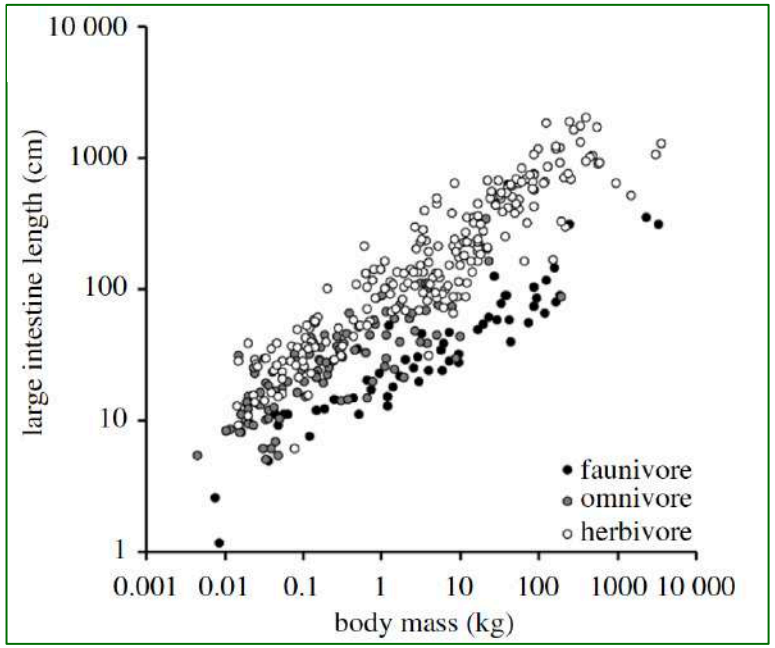
✔

(no whales)

✘

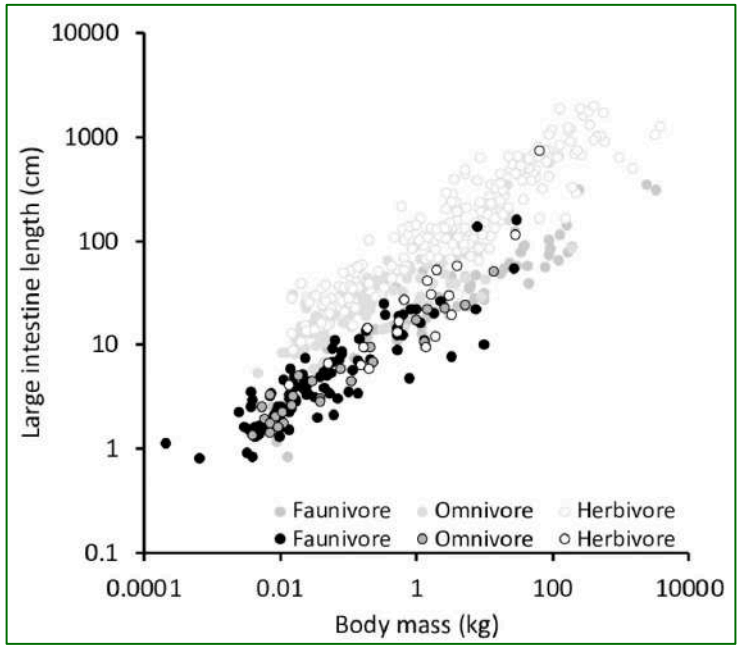
Duque-Correa et al. (2021), Hoppe et al. (2021), Duque-Correa et al. (2022)

Form-function convergence ?

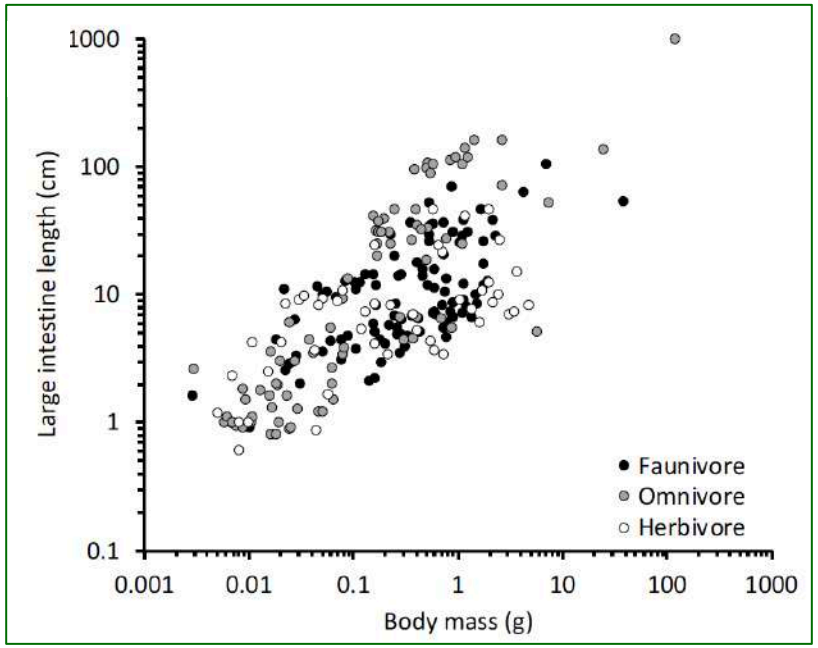


✔

(no whales)



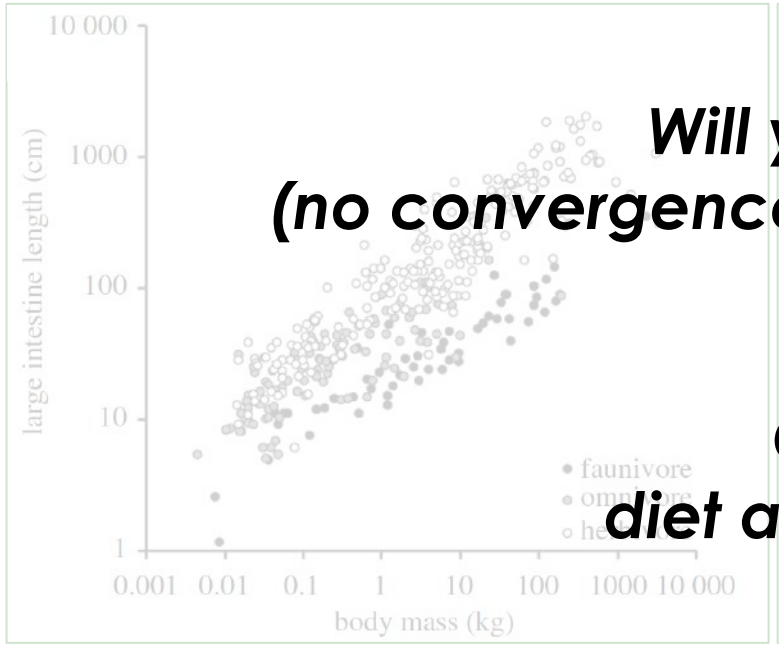
✘

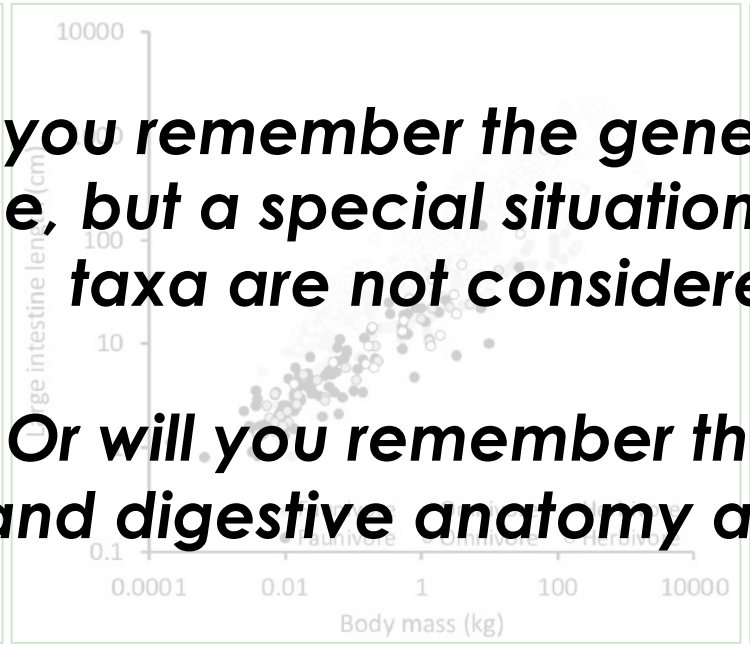


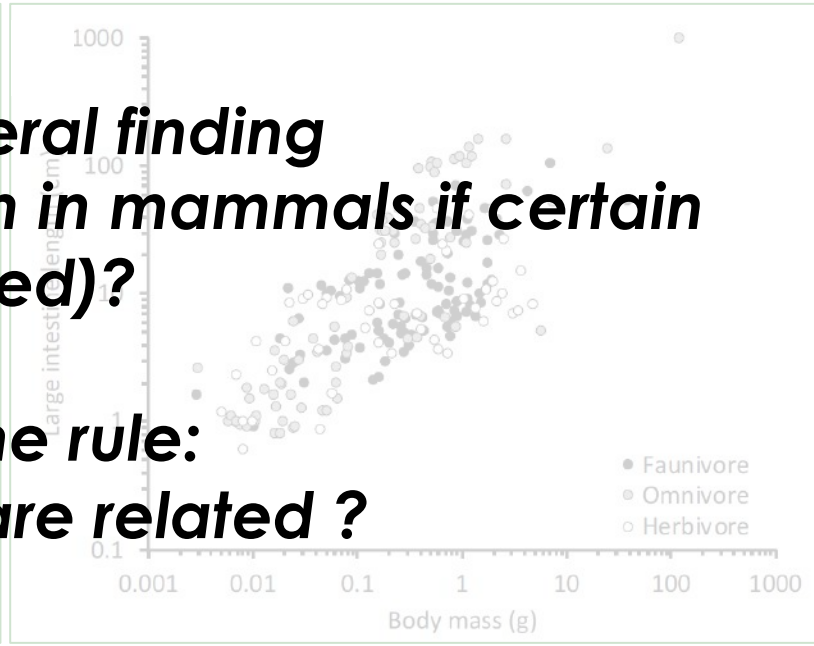
✘

Duque-Correa et al. (2021), Hoppe et al. (2021), Duque-Correa et al. (2022)

Form-function convergence ?







Will you remember the general finding (no convergence, but a special situation in mammals if certain taxa are not considered)?

Or will you remember the rule: diet and digestive anatomy are related ?

✔ (no whales)

✘

✘

Duque-Correa et al. (2021), Hoppe et al. (2021), Duque-Correa et al. (2022)

Propensity for selective perception

- a craving for rules

(as opposed to no rule)

Propensity for selective perception

- a craving for rules

(as opposed to no rule)

- arbitrary starting points

How coprophagy was detected

MÉMOIRES

DE LA

SOCIÉTÉ CENTRALE

DE

MÉDECINE VÉTÉRINAIRE

TOME DOUZIÈME

PREMIÈRE SÉRIE

PARIS

ASSELIN & Cie, LIBRAIRES DE LA FACULTÉ DE MÉDECINE

Et de la Société centrale de médecine vétérinaire

PLACE DE L'ÉCOLE-DE-MÉDECINE

—

1882

DES

PELOTES STOMACALES

DES LÉPORIDÉS

De leur Origine (Ingestion des Crottes), de leur Nature et de leur Rôle.

PAR M. CH. MOROT

VÉTÉRINAIRE A PARIS

DES

PELOTES STOMACALES

DES LÉPORIDÉS

De leur Origine (Ingestion des Crottes), de leur Nature et de leur Rôle.

PAR M. CH. MOROT

VÉTÉRINAIRE A PARIS

La comparaison des matières non pelotonnées récemment dégluties avec les matières pelotonnées me donna l'idée, que peut-être les lapins ruminaient et que les pelotes devaient leur origine à la réjection des aliments de l'estomac à la bouche. Je supposai que les bols rétrogrades, possédant une cohésion plus complète, à la suite d'une trituration et d'une insalivation nouvelles plus parfaites que les premières, retournaient au réservoir gastrique sans être déformés.

L'antique et persistante croyance de la rumination chez les léporidés contribua beaucoup à me faire admettre cette hypothése.

Toutes ces considérations me décidèrent à rechercher si réellement ces animaux ruminaient.

En résumé, si personne encore n'avait prouvé que les léporidés ruminaient, personne non plus n'avait jusqu'ici démontré qu'ils ne ruminaient point.

DES

PELOTES STOMACALES

DES LÉPORIDÉS

De leur Origine (Ingestion des Crottes), de leur Nature et de leur Rôle.

PAR M. CH. MOROT

VÉTÉRINAIRE A PARIS

A philosophical question:

A philosophical question:
who practices coprophagy?

Knowledge gain

'No animal practices coprophagy apart from those in which it was proven.'

Knowledge gain

'No animal practices coprophagy apart from those in which it was proven.'

'All lagomorphs, cavimorph and muroid rodents practice coprophagy except those in which it was proven that they do not do it.'

1931

Kot- und Haarfressen beim Sumpfbiber.

Von Dr. P. Kirner, Gersthofen.

Das Kotfressen der Nutria, welches bisher selten wahrgenommen wurde, kann entweder eine harmlose Spielerei sein, wie sie namentlich manchen Pflanzenfressern eigen ist; es kann aber auch ein ernstes Sympthom für eine sogen. Mangelkrankheit sein.

1954

Aus der Anstalt für Vitaminforschung und Vitaminprüfung Potsdam-Rehbrücke
(Direktor: Professor Dr. Dr. h. c. A. SCHEUNERT)

WALTRAUT OTTO

Über die Verdauung des Sumpfbibers

(Myocastor coypus)

Koprophagie, wie sie nach KIRNER [5]) vorkommen soll, *konnte mit Sicherheit nicht beobachtet werden*. Die Frage der Koprophagie ist wichtig, da von anderen Nagern, z. B. Kaninchen und Meerschweinchen, bekannt ist, daß bei ihnen Koprophagie vorkommt.

Abgesehen davon, daß ein Kotfressen unserer Versuchstiere nie gesehen wurde, konnten auch bei der Inspektion des Mageninnern *keine Kotreste beobachtet werden*.

1979

The twenty-four hour activity cycle of captive coypus (*Myocastor coypus*)

L. M. GOSLING

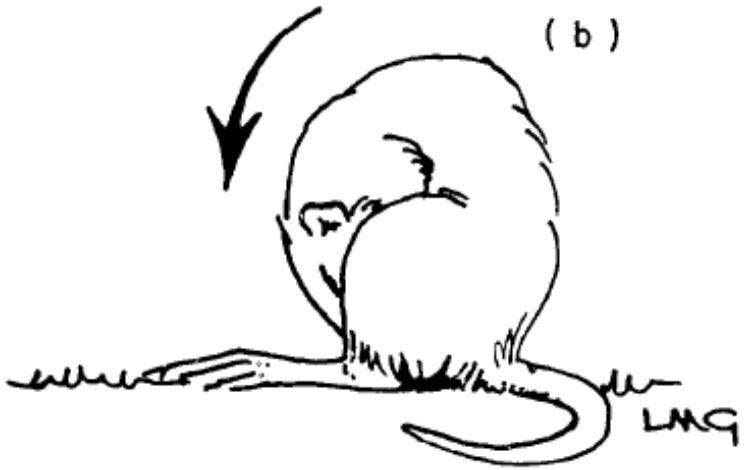
J. Zool., Lond. (1979) **187,** 341–367

1979

The twenty-four hour activity cycle of captive coypus (*Myocastor coypus*)

L. M. GOSLING

J. Zool., Lond. (1979) **187,** 341–367

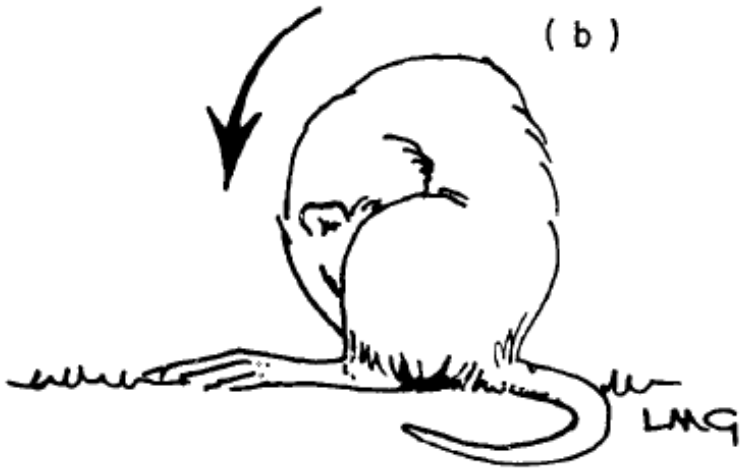


1979

The twenty-four hour activity cycle of captive coypus (*Myocastor coypus*)

L. M. GOSLING

J. Zool., Lond. (1979) **187,** 341–367

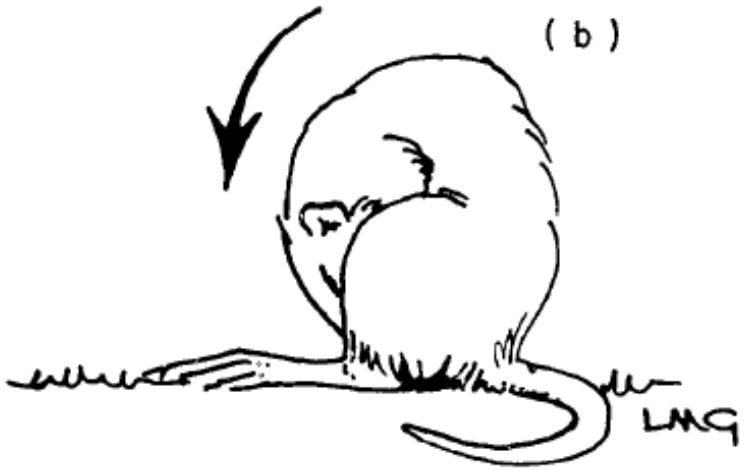


1979

The twenty-four hour activity cycle of captive coypus (*Myocastor coypus*)

L. M. GOSLING

J. Zool., Lond. (1979) **187,** 341–367



Refection has been noted by Kirner (1931) and Axell (1962) but has not been mentioned elsewhere and has not been described in any detail. This is surprising, since all coypus that were watched in the present, and other long term observations, refect regularly each day.

1998

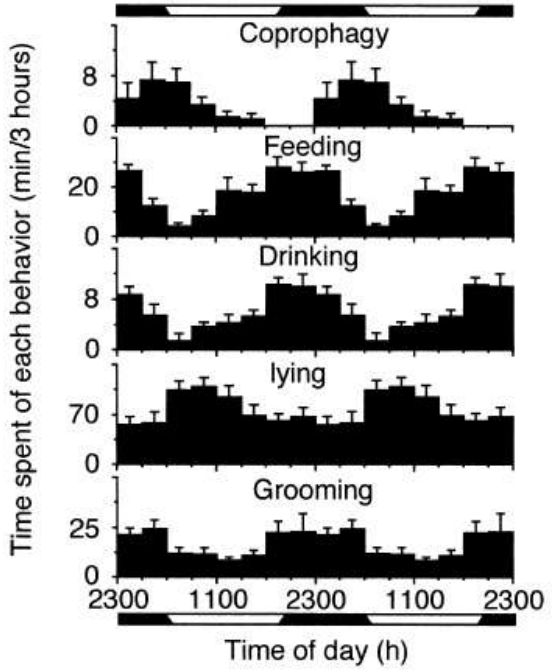
J Comp Physiol B (1998) 168: 281–288

ORIGINAL PAPER

T. Takahashi · E. Sakaguchi

Behaviors and nutritional importance of coprophagy in captive adult and young nutrias (*Myocastor coypus*)

		Adult	Young
Soft feces excretion ($g/kg^{-0.75}$ day^{-1})	DM	9.5	4.6
Diet intake ($g/kg^{-0.75}$ day^{-1})	DM	63	66
Contribution of soft feces to intake[c] (%)	DM	13	6
	CP	16	8



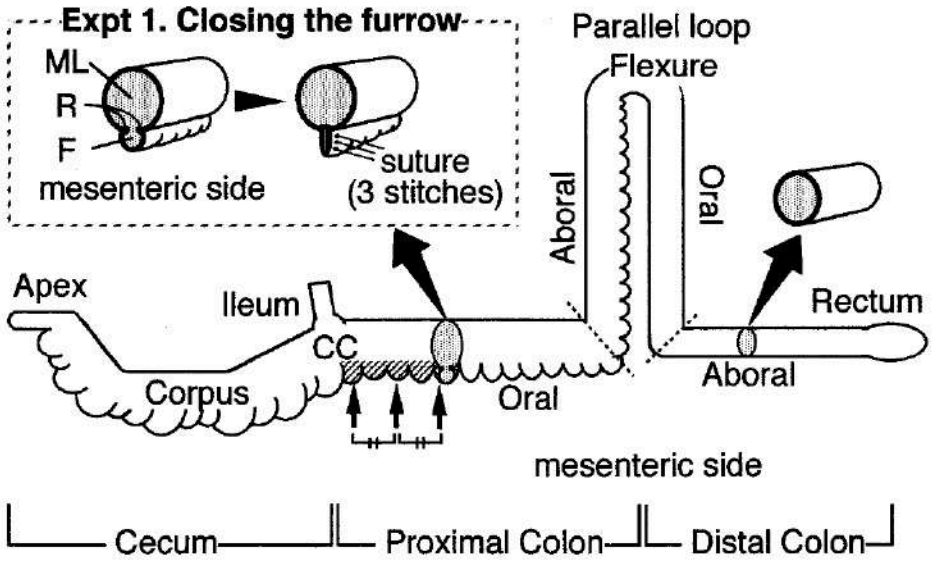
2000

J Comp Physiol B (2000) 170: 531–535

ORIGINAL PAPER

T. Takahashi · E. Sakaguchi

Role of the furrow of the proximal colon in the production of soft and hard feces in nutrias, *Myocastor coypus*



Knowledge gain

'No animal practices coprophagy apart from those in which it was proven.'

'All lagomorphs, cavimorph and muroid rodents practice coprophagy except those in which it was proven that they do not do it.'

Nutria

Otto (1954)	– no coprophagy
Gosling (1979)	– coprophagy in natural habitat
Hörnike (1985)	– normal in fur animals
1988-2000	– detailed studies

Knowledge gain

'No animal practices coprophagy apart from those in which it was proven.'

'All lagomorphs, cavimorph and muroid rodents practice coprophagy except those in which it was proven that they do not do it.'

Nutria

Otto (1954)	– no coprophagy
Gosling (1979)	– coprophagy in natural habitat
Hörnike (1985)	– normal in fur animals
1988-2000	– detailed studies

Paca

Kraus et al. (1970)	– no coprophagy
Pérez (1992)	– coprophagy rarely
Sabatini (2001)	– regular coprophagy
G. Aldrigui et al. (2018)	– detailed studies

Knowledge gain

'No animal practices coprophagy apart from those in which it was proven.'

'All lagomorphs, cavimorph and muroid rodents practice coprophagy except those in which it was proven that they do not do it.'

Nutria

Otto (1954)	– no coprophagy
Gosling (1979)	– coprophagy in natural habitat
Hörnike (1985)	– normal in fur animals
1988-2000	– detailed studies

Capybara

Hirakawa (2001)	– no coprophagy
Hirakawa (2002)	– coprophagy normal

Paca

Kraus et al. (1970)	– no coprophagy
Pérez (1992)	– coprophagy rarely
Sabatini (2001)	– regular coprophagy
G. Aldrigui et al. (2018)	– detailed studies

Knowledge gain

'No animal practices coprophagy apart from those in which it was proven.'

'All lagomorphs, cavimorph and muroid rodents practice coprophagy except those in which it was proven that they do not do it.'

Nutria

Otto (1954)	– no coprophagy
Gosling (1979)	– coprophagy in natural habitat
Hörnike (1985)	– normal in fur animals
1988-2000	– detailed studies

Capybara

Hirakawa (2001)	– no coprophagy
Hirakawa (2002)	– coprophagy normal

Paca

Kraus et al. (1970)	– no coprophagy
Pérez (1992)	– coprophagy rarely
Sabatini (2001)	– regular coprophagy
G. Aldrigui et al. (2018)	– detailed studies

Gerbil

Otken (1984)	– coprophagy not normal
Pei (2001)	– clear observations
Khokhlova (2005)	– coprophagy normal

Knowledge gain

~~*'No animal practices coprophagy apart from those in which it was proven.'*~~

'All lagomorphs, cavimorph and muroid rodents practice coprophagy except those in which it was proven that they do not do it.'

Nutria

Otto (1954)	– no coprophagy
Gosling (1979)	– coprophagy in natural habitat
Hörnike (1985)	– normal in fur animals
1988-2000	– detailed studies

Capybara

Hirakawa (2001)	– no coprophagy
Hirakawa (2002)	– coprophagy normal

Paca

Kraus et al. (1970)	– no coprophagy
Pérez (1992)	– coprophagy rarely
Sabatini (2001)	– regular coprophagy
G. Aldrigui et al. (2018)	– detailed studies

Gerbil

Otken (1984)	– coprophagy not normal
Pei (2001)	– clear observations
Khokhlova (2005)	– coprophagy normal

Knowledge gain

~~*'No animal practices coprophagy apart from those in which it was proven.'*~~

'All lagomorphs, cavimorph and muroid rodents practice coprophagy except those in which it was proven that they do not do it.'

'No animal is capable of consciousness apart from those in which it was proven.'

Knowledge gain

'No animal practices coprophagy apart from those in which it was proven.'

'All lagomorphs, cavimorph and muroid rodents practice coprophagy except those in which it was proven that they do not do it.'

'No animal is capable of consciousness apart from those in which it was proven.'

'Convergent evidence indicates that non-human animals have the neuroanatomical, neurochemical, and neurophysiological substrates of conscious states along with the capacity to exhibit intentional behaviors.'

Knowledge gain

'No animal practices coprophagy apart from those in which it was proven.'

'All lagomorphs, cavimorph and muroid rodents practice coprophagy except those in which it was proven that they do not do it.'

'No animal is capable of consciousness apart from those in which it was proven.'

'Convergent evidence indicates that non-human animals have the neuroanatomical, neurochemical, and neurophysiological substrates of conscious states along with the capacity to exhibit intentional behaviors.'

Cambridge Declaration of Consciousness 2012

Knowledge gain

Knowledge gain

J. Dairy Sci. 99:2453–2467
http://dx.doi.org/10.3168/jds.2015-10144

Invited review: Effects of group housing of dairy calves on behavior, cognition, performance, and health

J. H. C. Costa, M. A. G. von Keyserlingk, and D. M. Weary[1]

Knowledge gain

J. Dairy Sci. 99:2453–2467
http://dx.doi.org/10.3168/jds.2015-10144

Invited review: Effects of group housing of dairy calves on behavior, cognition, performance, and health

J. H. C. Costa, M. A. G. von Keyserlingk, and D. M. Weary[1]

Why do we produce research to show the benefit of social housing of calves?

Knowledge gain

J. Dairy Sci. 99:2453–2467
http://dx.doi.org/10.3168/jds.2015-10144

Invited review: Effects of group housing of dairy calves on behavior, cognition, performance, and health

J. H. C. Costa, M. A. G. von Keyserlingk, and D. M. Weary[1]

Why do we produce research to show the benefit of social housing of calves?
Should the burden of evidence not lie with those claiming isolation does no harm?

Knowledge gain

J. Dairy Sci. 99:2453–2467
http://dx.doi.org/10.3168/jds.2015-10144

Invited review: Effects of group housing of dairy calves on behavior, cognition, performance, and health

J. H. C. Costa, M. A. G. von Keyserlingk, and D. M. Weary[1]

Knowledge gain

J. Dairy Sci. 99:2453–2467
http://dx.doi.org/10.3168/jds.2015-10144

Invited review: Effects of group housing of dairy calves on behavior, cognition, performance, and health

J. H. C. Costa, M. A. G. von Keyserlingk, and D. M. Weary[1]

PHYSIOLOGY

J. Vet. Med. A **52,** 485–490 (2005)

Division of Zoo Animals and Exotic Pets, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland

Energy and Fibre Intake in a Group of Captive Giraffe (*Giraffa camelopardalis*) Offered Increasing Amounts of Browse

J.-M. Hatt[1,8], D. Schaub[1], M. Wanner[2], H.-R. Wettstein[3], E. J. Flach[4], C. Tack[4], M. Hässig[5], S. Ortmann[6], J. Hummel[7] and M. Clauss[1]

Knowledge gain

J. Dairy Sci. 99:2453–2467
http://dx.doi.org/10.3168/jds.2015-10144

Invited review: Effects of group housing of dairy calves on behavior, cognition, performance, and health

J. H. C. Costa, M. A. G. von Keyserlingk, and D. M. Weary[1]

Why do we produce research to show the benefit of browse?
Should the burden of evidence not lie with those claiming it is not needed?

PHYSIOLOGY

J. Vet. Med. A **52,** 485–490 (2005)

Division of Zoo Animals and Exotic Pets, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland

Energy and Fibre Intake in a Group of Captive Giraffe (*Giraffa camelopardalis*) Offered Increasing Amounts of Browse

J.-M. Hatt[1,8], D. Schaub[1], M. Wanner[2], H.-R. Wettstein[3], E. J. Flach[4], C. Tack[4], M. Hässig[5], S. Ortmann[6], J. Hummel[7] and M. Clauss[1]

Propensity for selective perception

- a craving for rules

(as opposed to no rule)

- arbitrary starting points

Propensity for selective perception

- a craving for rules

(as opposed to no rule)

- arbitrary starting/end points

THE

COAL QUESTION;

AN INQUIRY

CONCERNING THE PROGRESS OF THE NATION,

AND THE

PROBABLE EXHAUSTION OF OUR COAL-MINES.

W. STANLEY JEVONS, M.A.

FELLOW OF UNIVERSITY COLLEGE, LONDON;

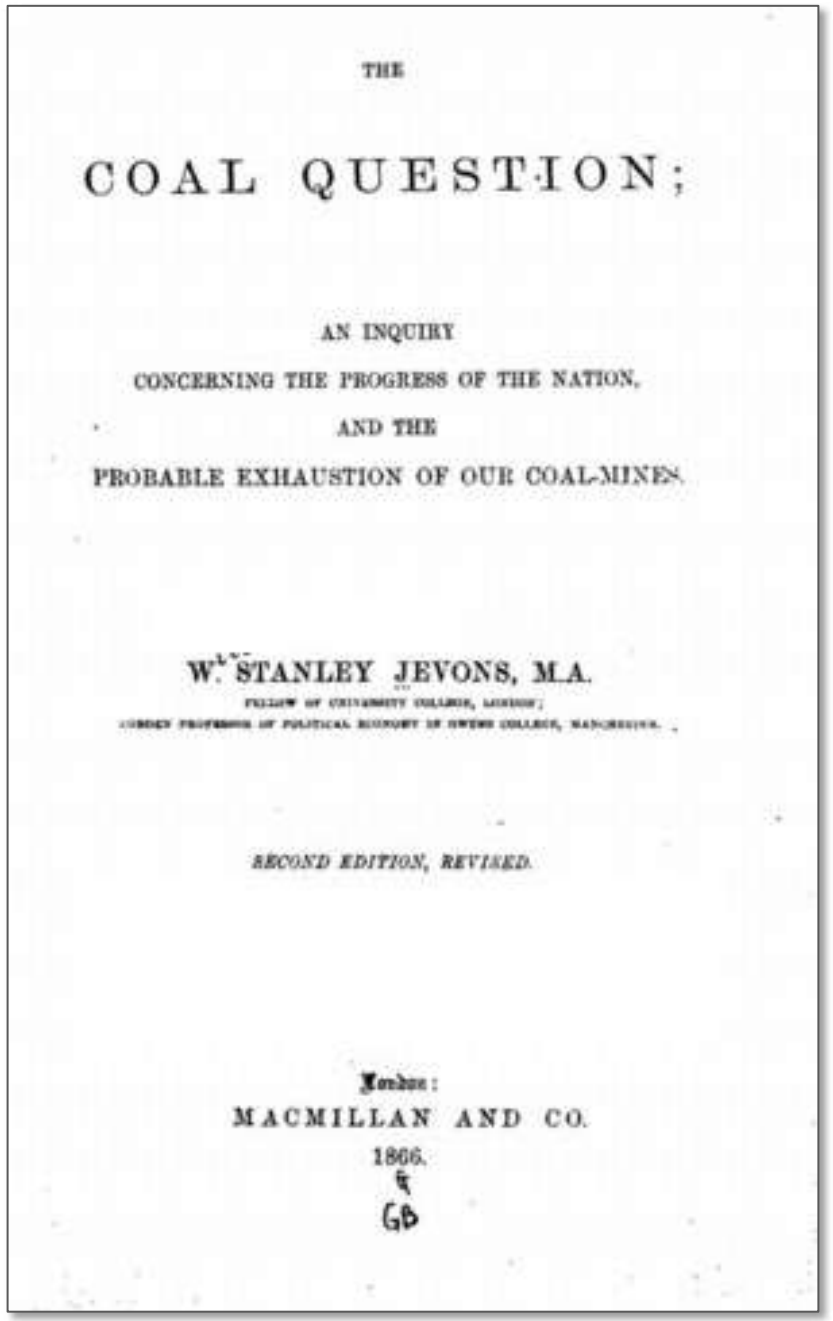
CORRESPONDING PROFESSOR OF POLITICAL ECONOMY IN OWENS COLLEGE, MANCHESTER.

SECOND EDITION, REVISED.

London:

MACMILLAN AND CO.

1866.



THE

COAL QUESTION;

AN INQUIRY

CONCERNING THE PROGRESS OF THE NATION,

AND THE

PROBABLE EXHAUSTION OF OUR COAL-MINES.

W. STANLEY JEVONS, M.A.

SECOND EDITION, REVISED.

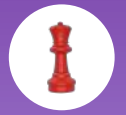
London:

MACMILLAN AND CO.

1866.

"It is a confusion of ideas to suppose that the economical use of fuel is equivalent to diminished consumption. The very contrary is the truth."


JEVON'S PARADOX
FUEL EFFICIENCY GAINS TEND TO INCREASE, NOT DECREASE, FUEL USE.
THESE NEW CARS ARE SO EFFICENT EVERYONE'S DRIVING EVERYWHERE THESE DAYS.
NEW
80 MPG!
sketchplanations


Propensity for perfection and order



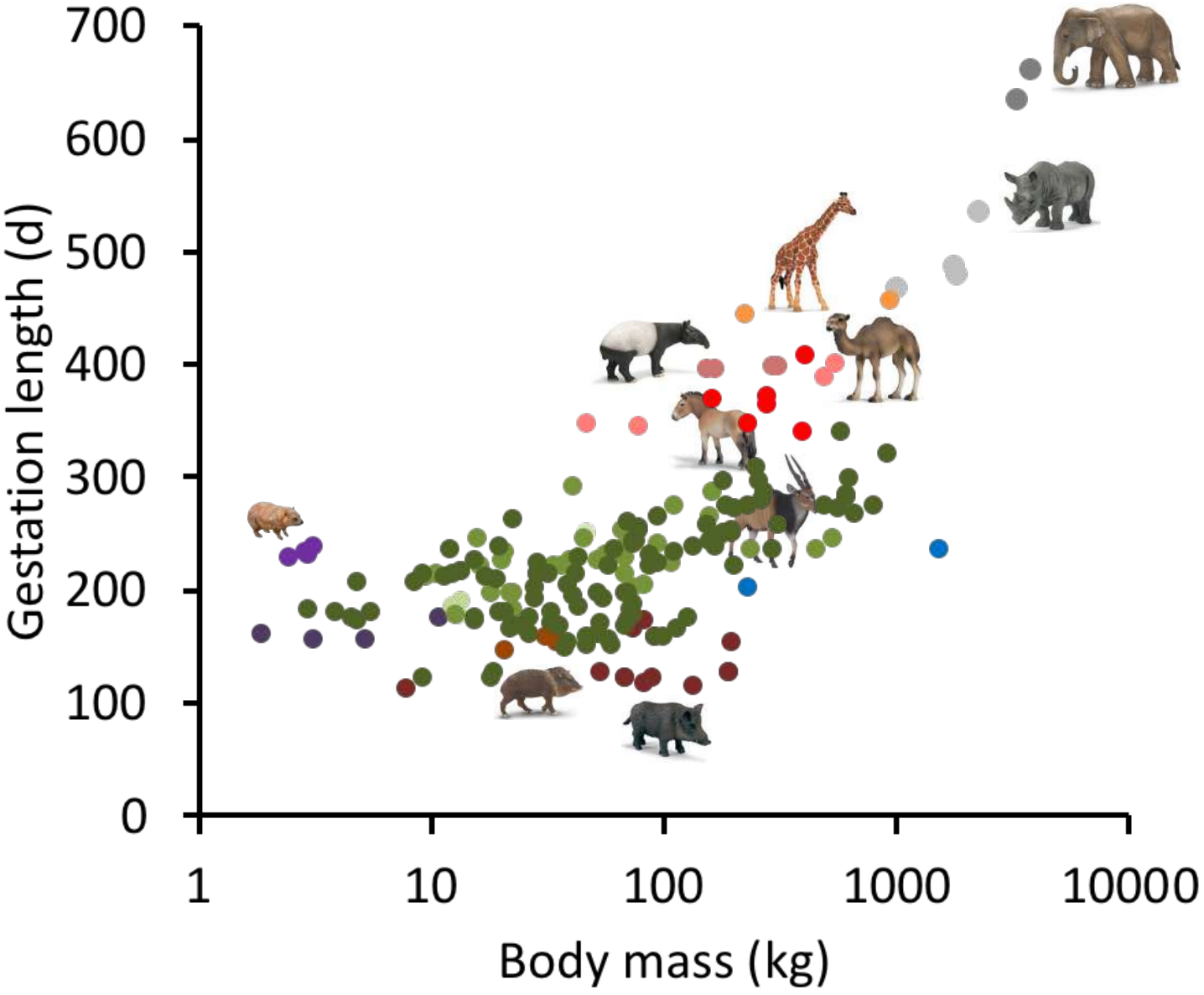
Do you believe in evolution ?



Do you believe in evolution ?

if you do, what does that mean ?

Understanding life history



Effects of body size and lifestyle on evolution of mammal life histories

Richard M. Sibly*†‡ and James H. Brown‡§¶

PNAS | November 6, 2007 | vol. 104 | no. 45 | 17707–17712

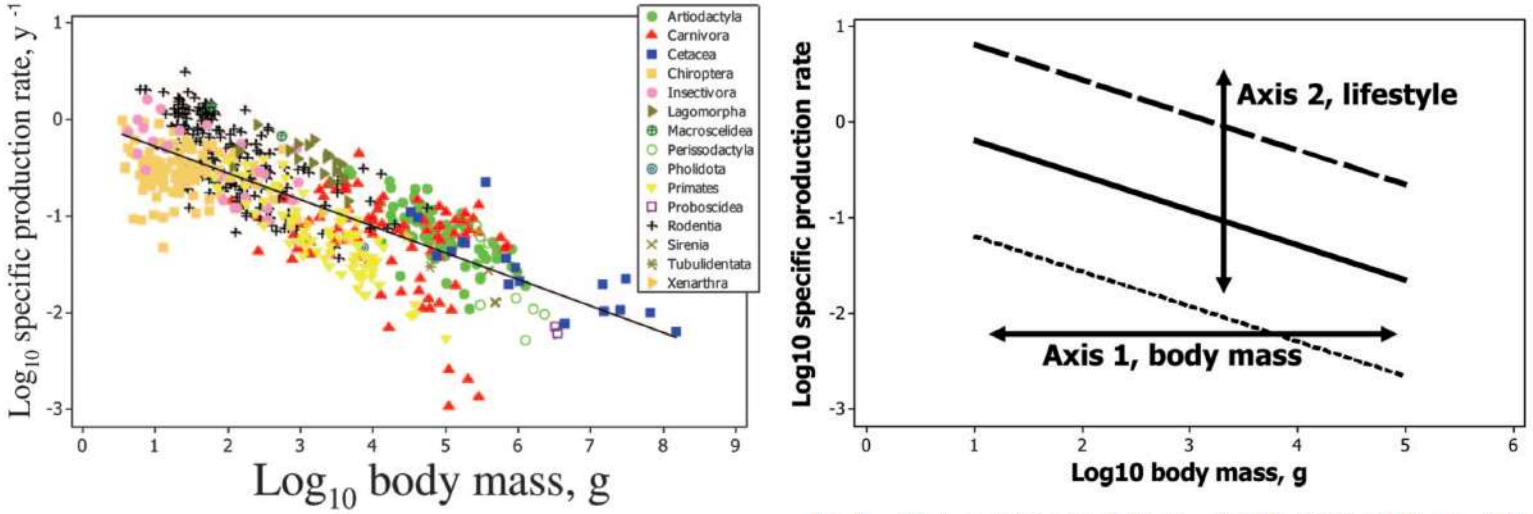


Fig. 4. The two major axes of the slow–fast life-history continuum, body mass, and lifestyle. To the well known axis of allometric variation due to body size, we have added a second orthogonal axis based on ecological lifestyle. Here the solid line represents an unspecialized ancestral condition, the dashed line depicts a more productive ''live fast die young'' lifestyle, and the dotted line shows a lifestyle with a lower death rate, slower life history, and consequently lower production.



Trade-off

you either invest more into reproduction (live fast, produce many offspring at a time) or more into maintenance (live slower, produce less offspring at a time but over a longer period) …



The trade-off fallacy

Saying that you either invest more into reproduction (live fast, produce many offspring at a time) or more into maintenance (live slower, produce less offspring at a time but over a longer period) …



The trade-off fallacy

Saying that you either invest more into reproduction (live fast, produce many offspring at a time) or more into maintenance (live slower, produce less offspring at a time but over a longer period) …

… is like saying that with a given amount of fuel, you either transport a certain load a certain distance, or a higher load a shorter distance.



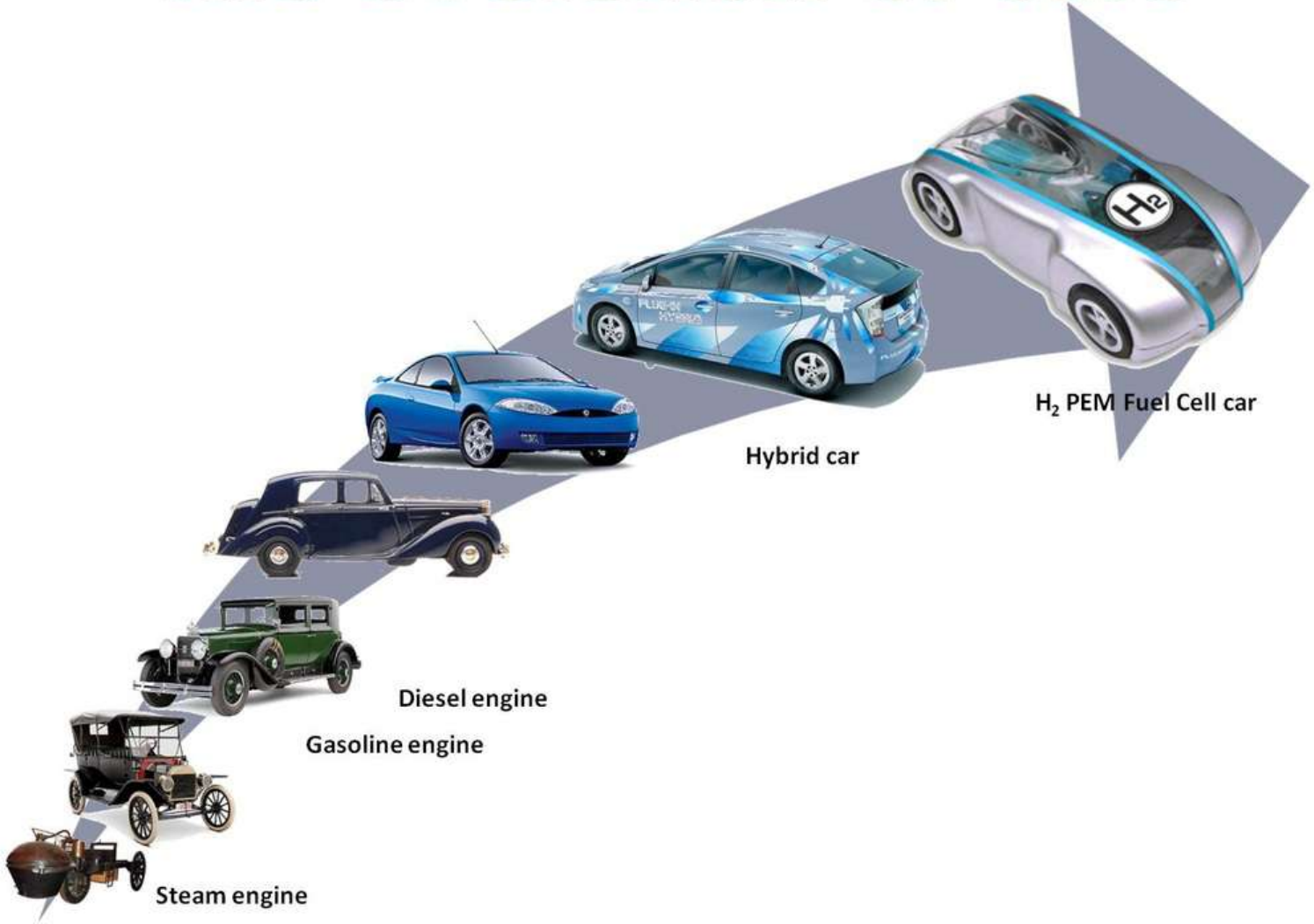
The trade-off fallacy

Saying that you either invest more into reproduction (live fast, produce many offspring at a time) or more into maintenance (live slower, produce less offspring at a time but over a longer period) …

… is like saying that with a given amount of fuel, you either transport a certain load a certain distance, or a higher load a shorter distance

ignoring the possibility that someone might develop a more efficient engine.

The evolution of cars





The trade-off fallacy

Saying that you either invest more into reproduction (live fast, produce many offspring at a time) or more into maintenance (live slower, produce less offspring at a time but over a longer period) …



The trade-off fallacy

Saying that you either invest more into reproduction (live fast, produce many offspring at a time) or more into maintenance (live slower, produce less offspring at a time but over a longer period) …

… is like saying that if you want to have more meat on your chicken, you have to feed it more food for a longer period of time.

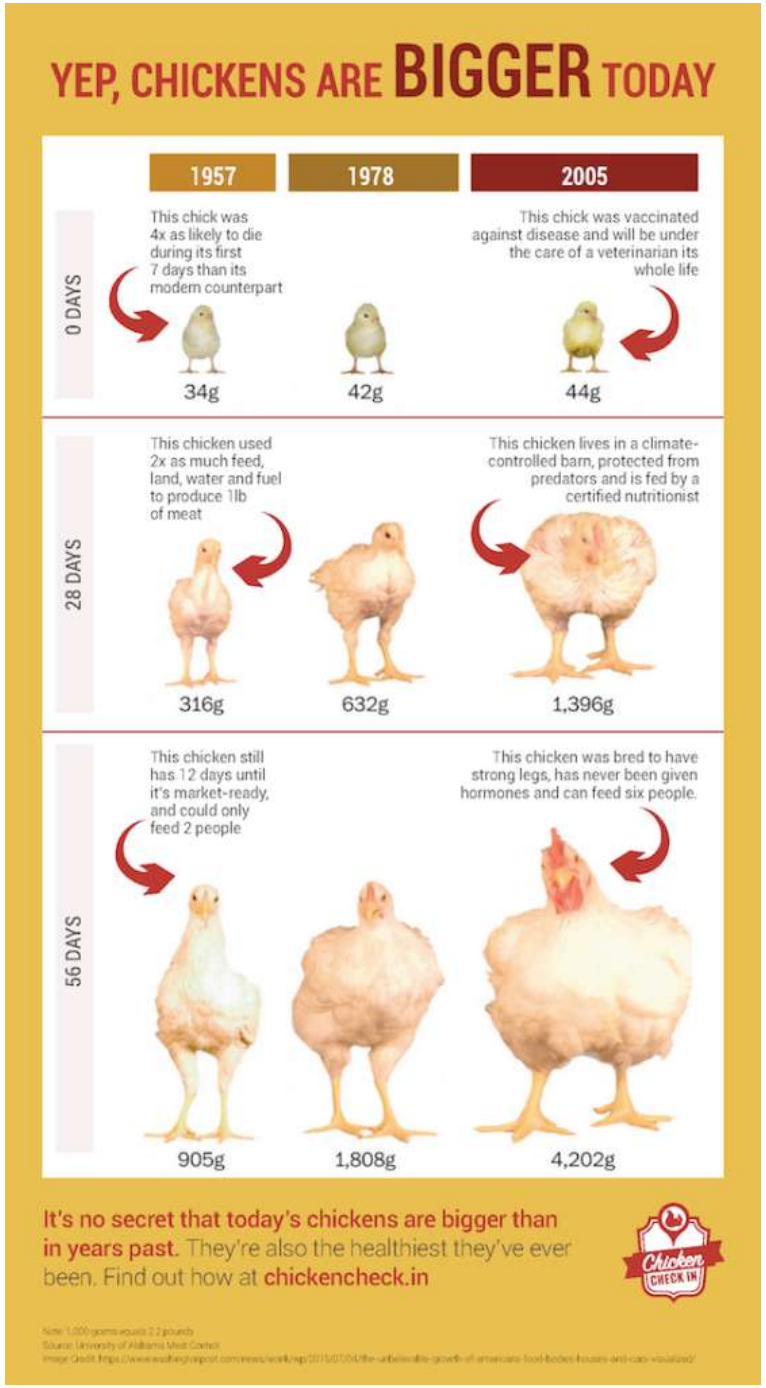


The trade-off fallacy

Saying that you either invest more into reproduction (live fast, produce many offspring at a time) or more into maintenance (live slower, produce less offspring at a time but over a longer period) …

… is like saying that if you want to have more meat on your chicken, you have to feed it more food for a longer period of time

ignoring the possibility that someone might breed an animal that grows faster on less food.


YEP, CHICKENS ARE BIGGER TODAY
1957
1978
2005
0 DAYS
This chick was 4x as likely to die during its first 7 days than its modern counterpart
This chick was vaccinated against disease and will be under the care of a veterinarian its whole life
34g
42g
44g
28 DAYS
This chicken used 2x as much feed, land, water and fuel to produce 1lb of meat
This chicken lives in a climate-controlled barn, protected from predators and is fed by a certified nutritionist
316g
632g
1,396g
56 DAYS
This chicken still has 12 days until it's market-ready, and could only feed 2 people
This chicken was bred to have strong legs, has never been given hormones and can feed six people.
905g
1,808g
4,202g
It's no secret that today's chickens are bigger than in years past. They're also the healthiest they've ever been. Find out how at chickencheck.in
Chicken CHECK IN



The trade-off fallacy

Saying that you either invest more into reproduction (live fast, produce many offspring at a time) or more into maintenance (live slower, produce less offspring at a time but over a longer period) …



The trade-off fallacy

Saying that you either invest more into reproduction (live fast, produce many offspring at a time) or more into maintenance (live slower, produce less offspring at a time but over a longer period) …

… is ignoring the possibility that individuals (and taxa) might evolve that achieve a higher reproductive output with the same level of resources due to a higher efficiency.

High reproductive effort is associated with decreasing mortality late in life in captive ruffed lemurs

Morgane Tidière[1] | Jean-François Lemaître[1] | Guillaume Douay[2] | Mylisa Whipple[3] | Jean-Michel Gaillard[1]

Am J Primatol. 2017;**79**:e22677.

These findings indicate that individual quality rather than trade-off drives the association between reproductive success and survival pattern among individual lemurs



The trade-off fallacy

Saying that you either invest more into reproduction (live fast, produce many offspring at a time) or more into maintenance (live slower, produce less offspring at a time but over a longer period) …

… is ignoring the possibility that individuals (and taxa) might evolve that achieve a higher reproductive output with the same level of resources due to a higher efficiency.

The trade-off fallacy

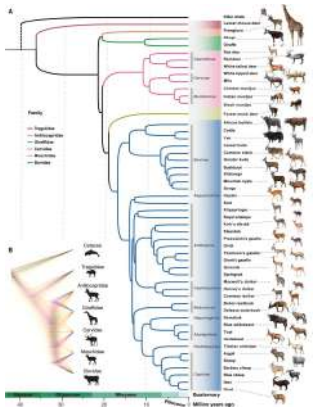
Saying that you either invest more into reproduction (live fast, produce many offspring at a time) or more into maintenance (live slower, produce less offspring at a time but over a longer period) …

… is ignoring the possibility that individuals (and taxa) might evolve that achieve a higher reproductive output with the same level of resources due to a higher efficiency.

The trade-off fallacy

Saying that you either invest more into reproduction (live fast, produce many offspring at a time) or more into maintenance (live slower, produce less offspring at a time but over a longer period) …

… is ignoring the possibility that individuals (and taxa) might evolve that achieve a higher reproductive output with the same level of resources due to a higher efficiency.



The trade-off fallacy

Saying that you either invest more into reproduction (live fast, produce many offspring at a time) or more into maintenance (live slower, produce less offspring at a time but over a longer period) …

… is ignoring the possibility that individuals (and taxa) might evolve that achieve a higher reproductive output with the same level of resources due to a higher efficiency.



The trade-off fallacy

Saying that you either invest more into reproduction (live fast, produce many offspring at a time) or more into maintenance (live slower, produce less offspring at a time but over a longer period) …

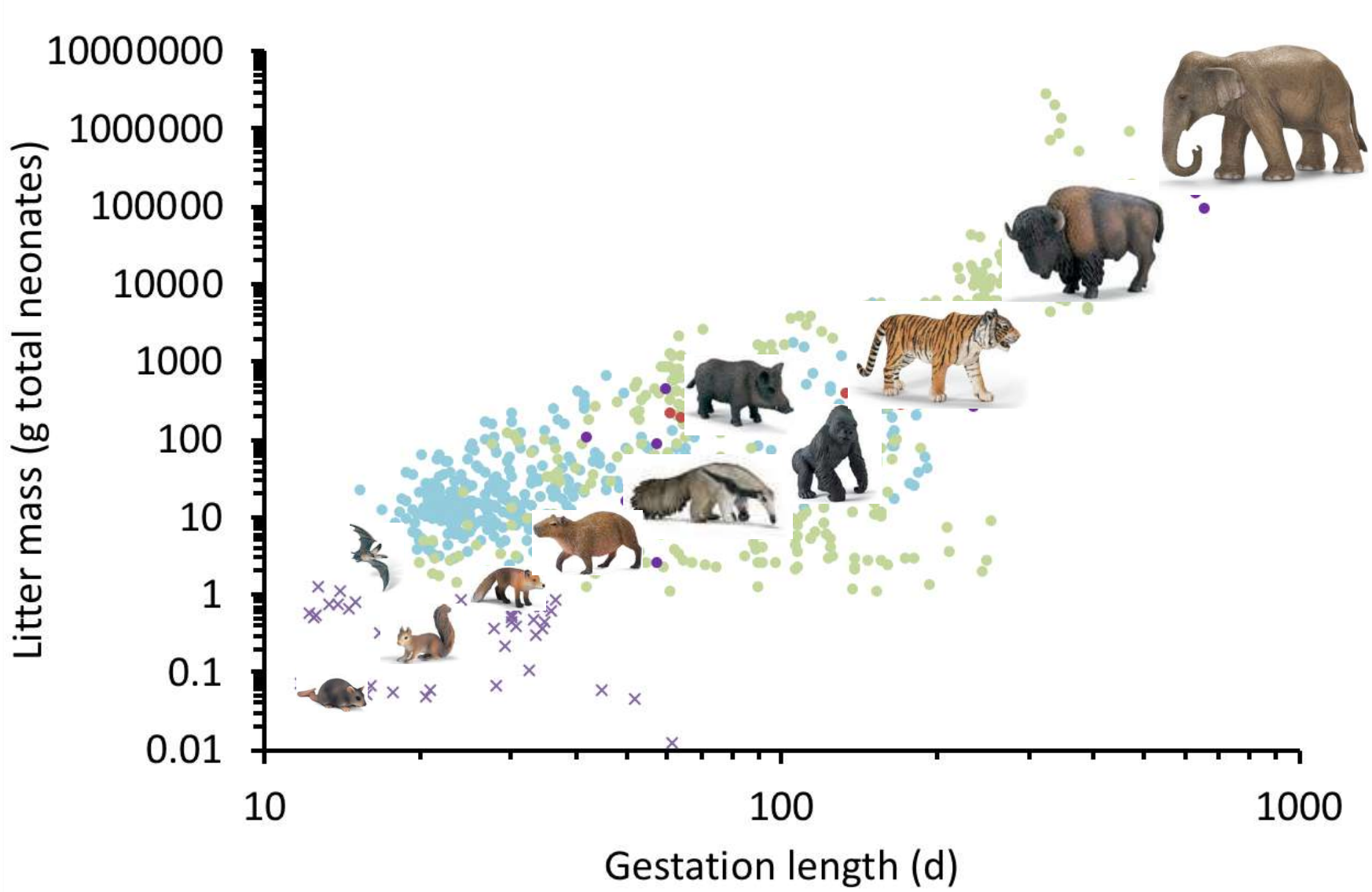


The trade-off fallacy

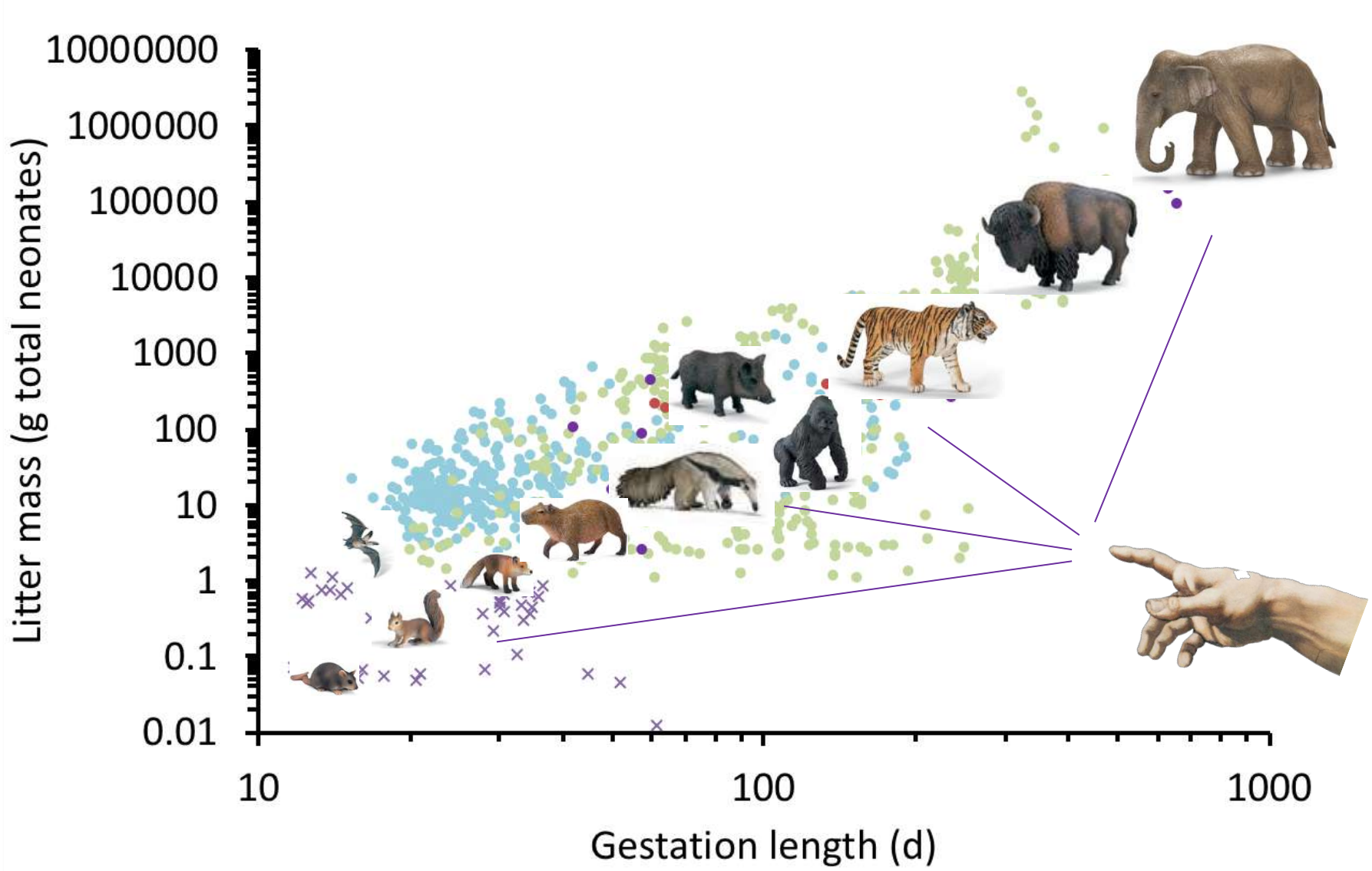
Saying that you either invest more into reproduction (live fast, produce many offspring at a time) or more into maintenance (live slower, produce less offspring at a time but over a longer period) …

… ***is like saying you do not believe that evolution can find new solutions.***

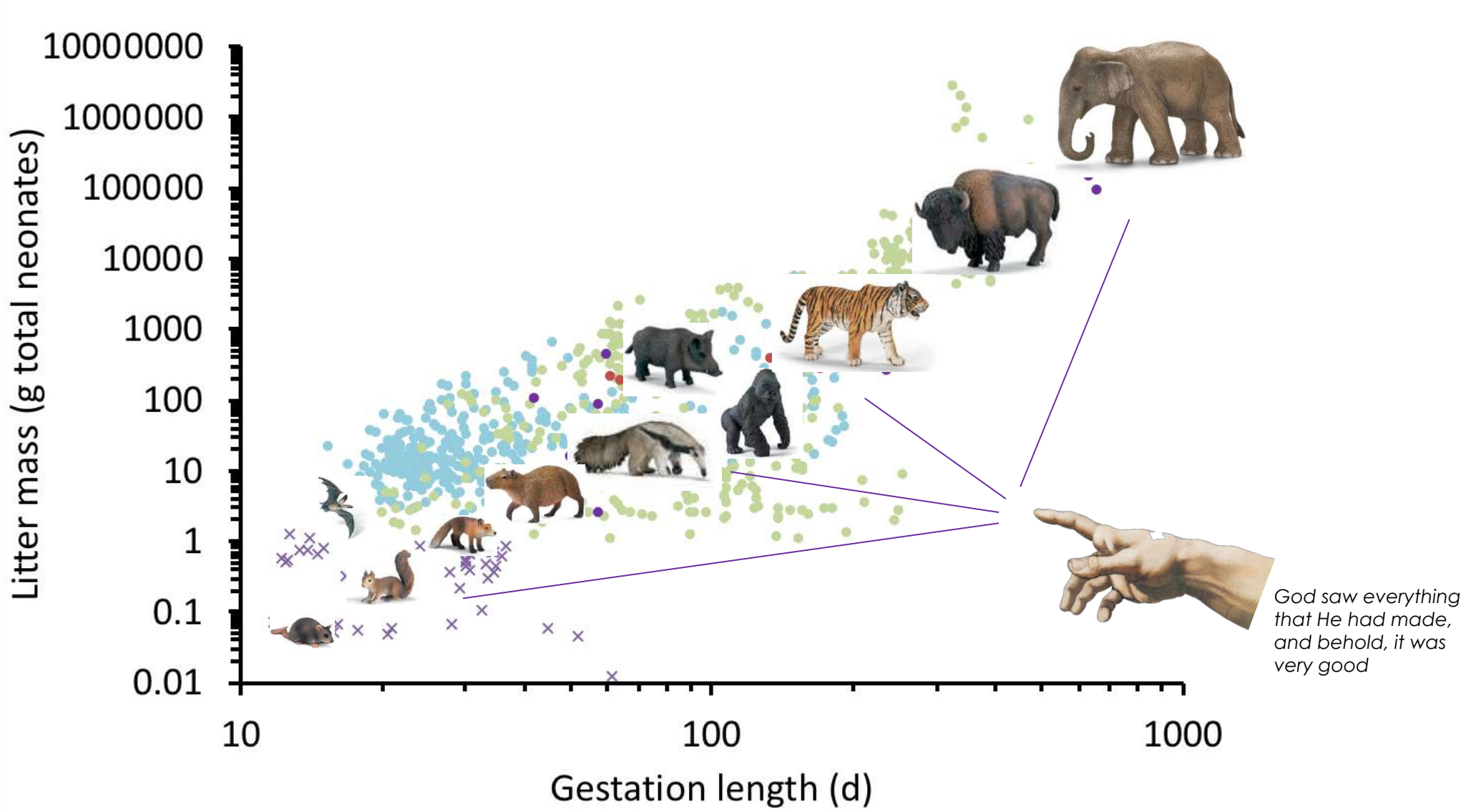
Two ways of being a creationist



Two ways of being a creationist

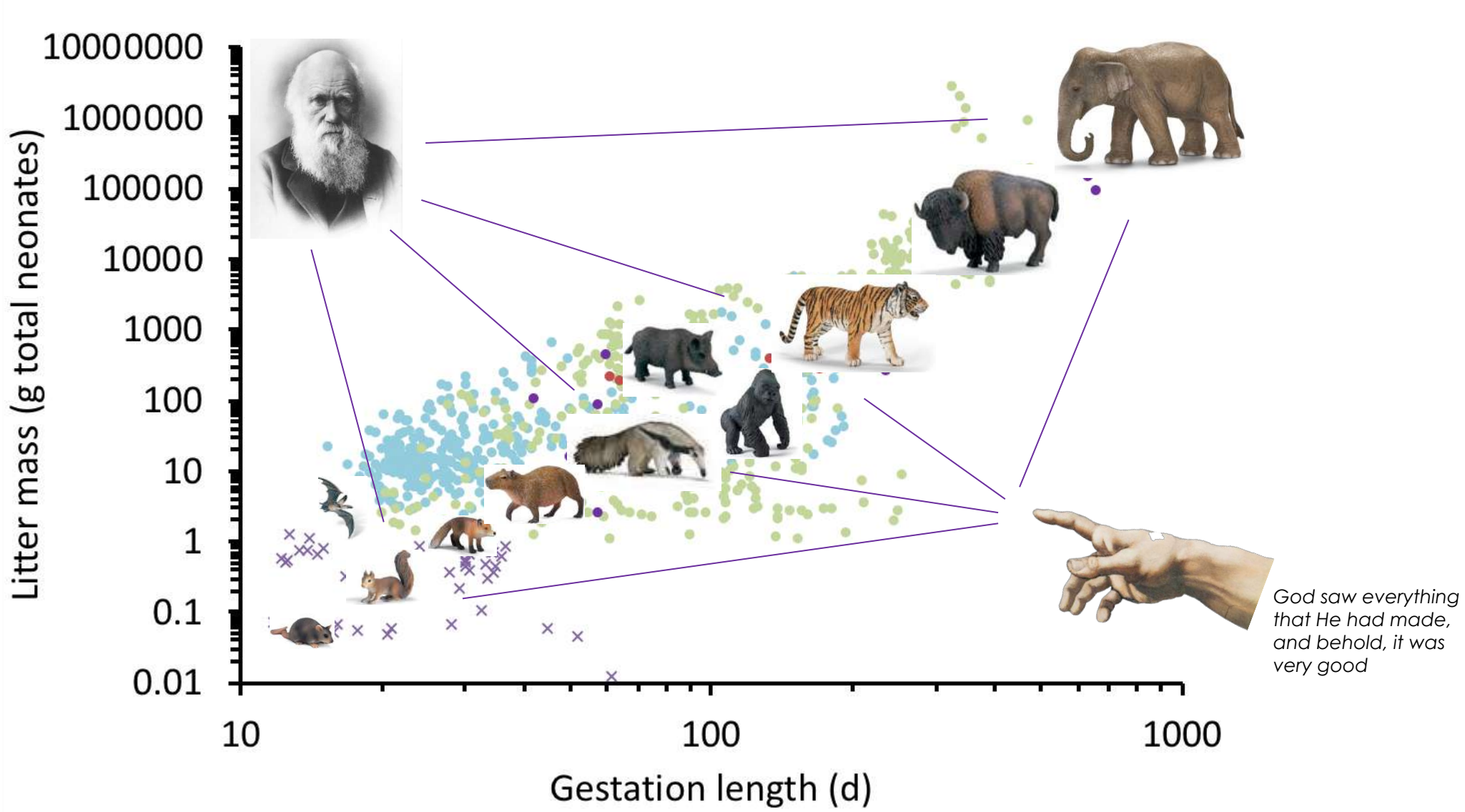


Two ways of being a creationist



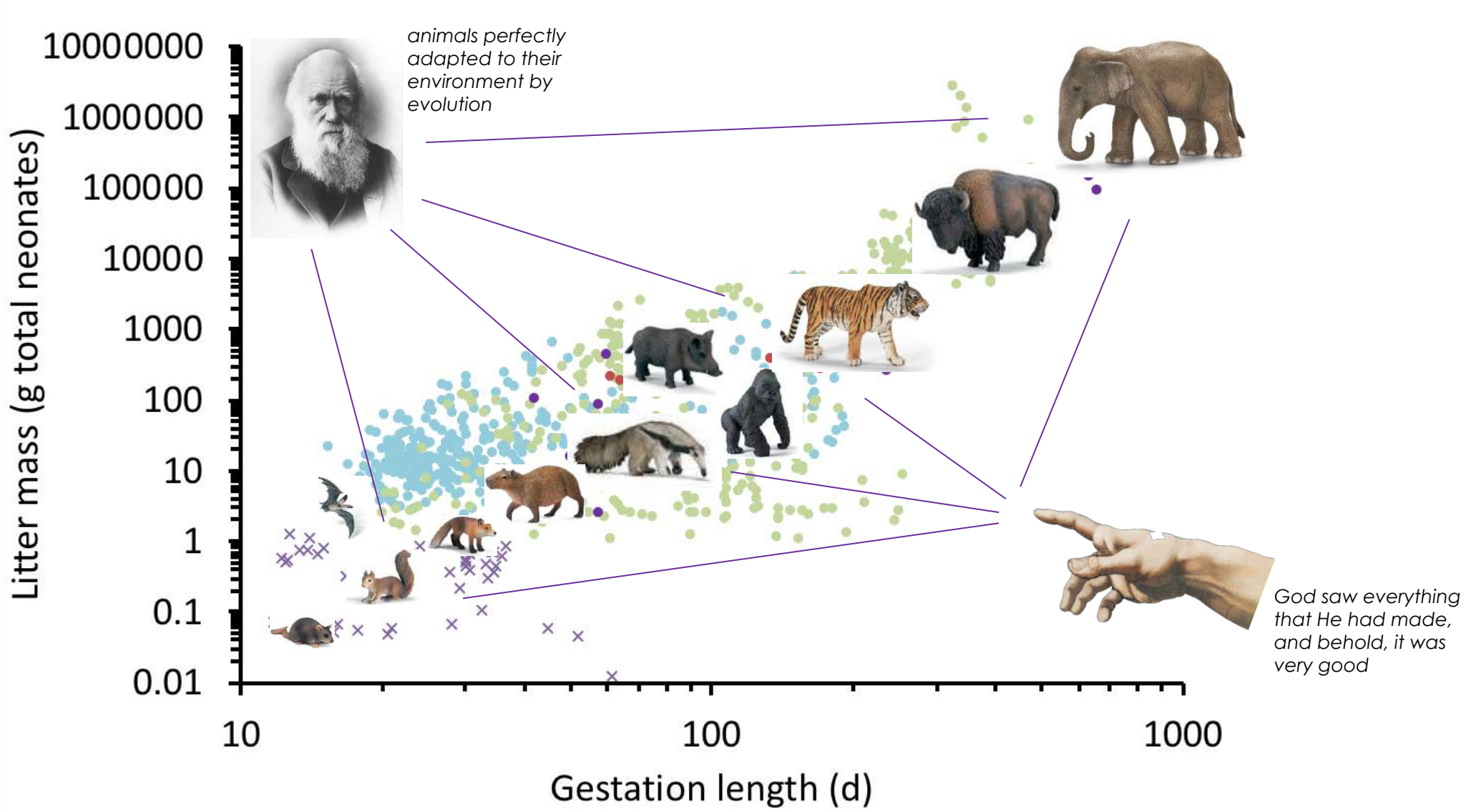
God saw everything that He had made, and behold, it was very good

Two ways of being a creationist



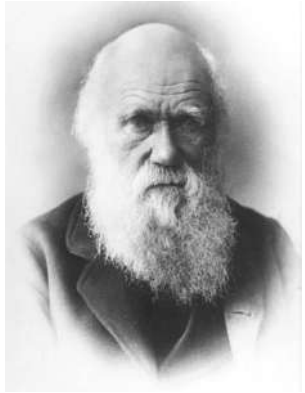
God saw everything that He had made, and behold, it was very good

Two ways of being a creationist



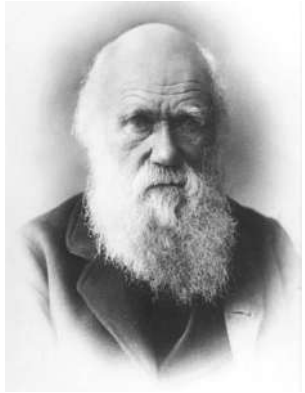
What separates an evolutionist from a creationist ?

Not so much the agency
(the old man with the white beard)



What separates an evolutionist from a creationist ?

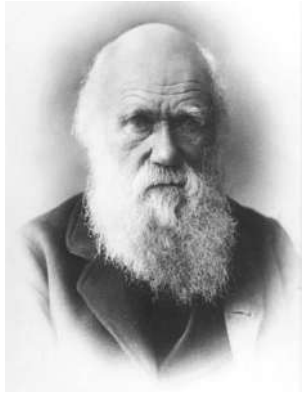
Not so much the agency
(the old man with the white beard)



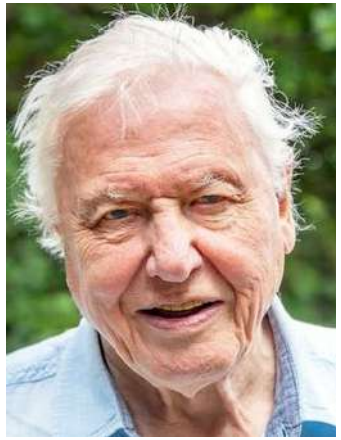
but the narrative of the adaptation
('perfect' vs. 'adequate *at the time*')

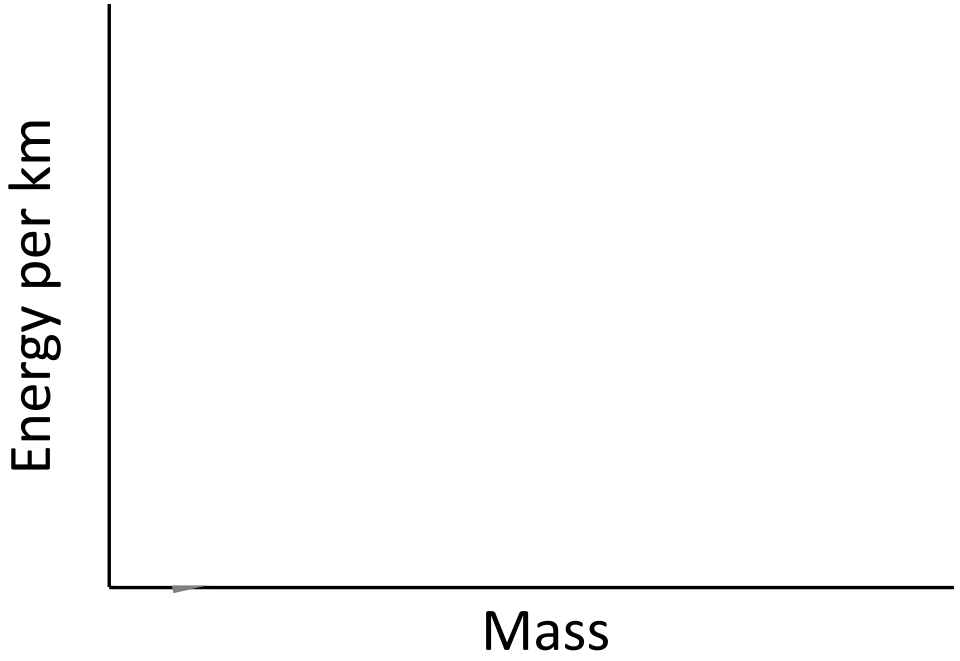
What separates an evolutionist from a creationist ?

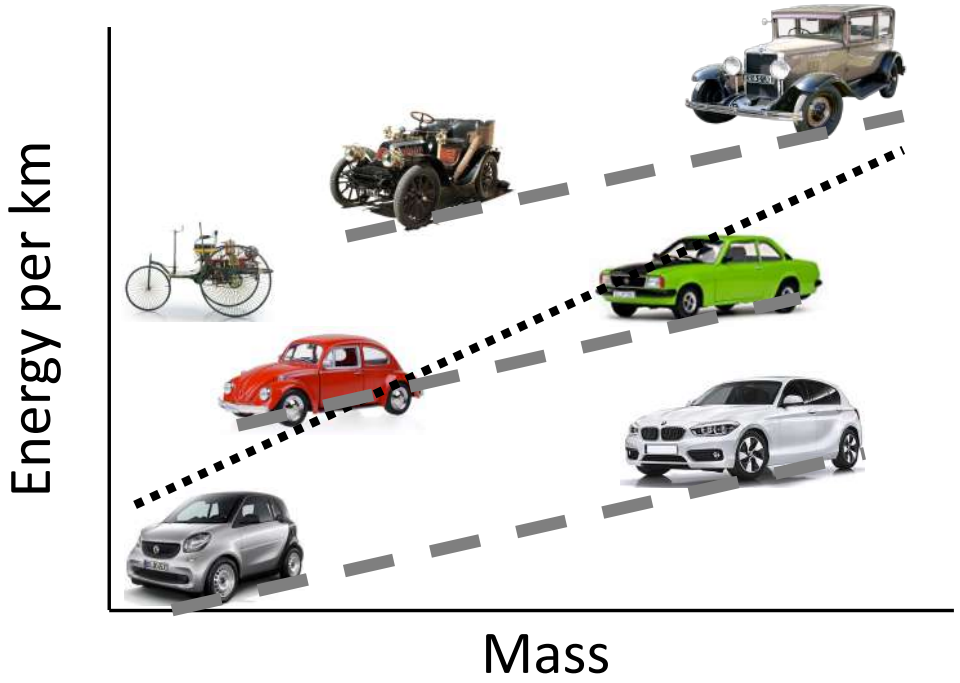
Not so much the agency
(the old man with the white beard)

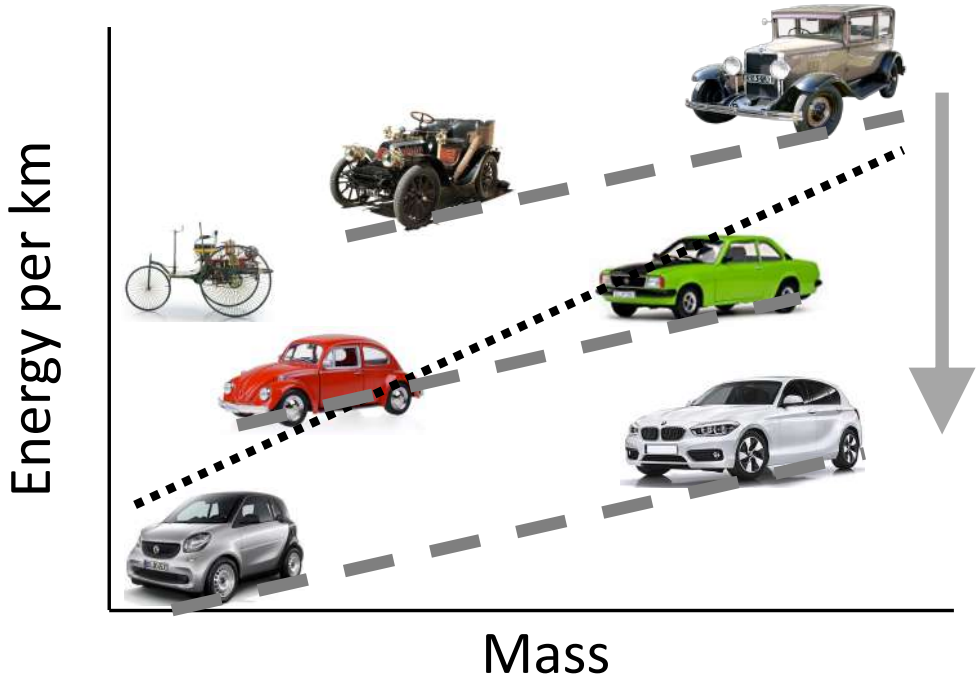


but the narrative of the adaptation
('perfect' vs. 'adequate *at the time*')

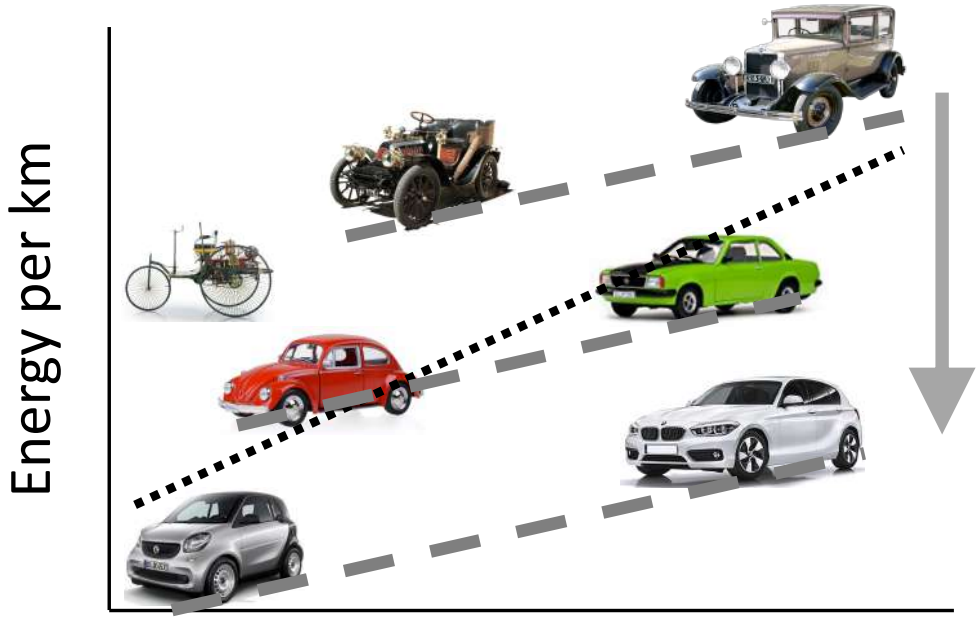


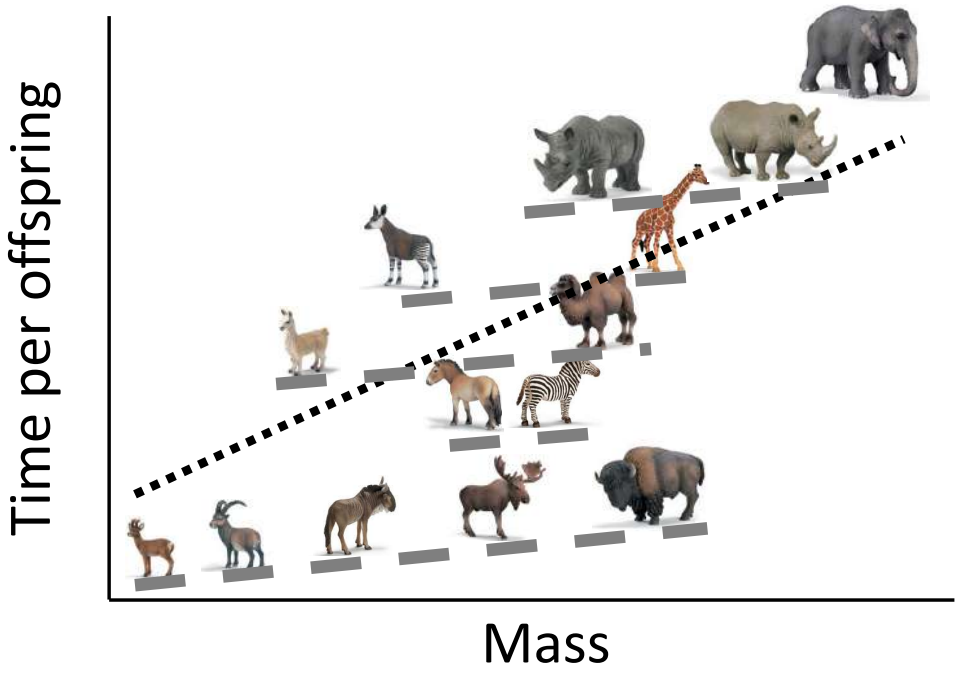

Energy per km
Mass


Energy per km
Mass

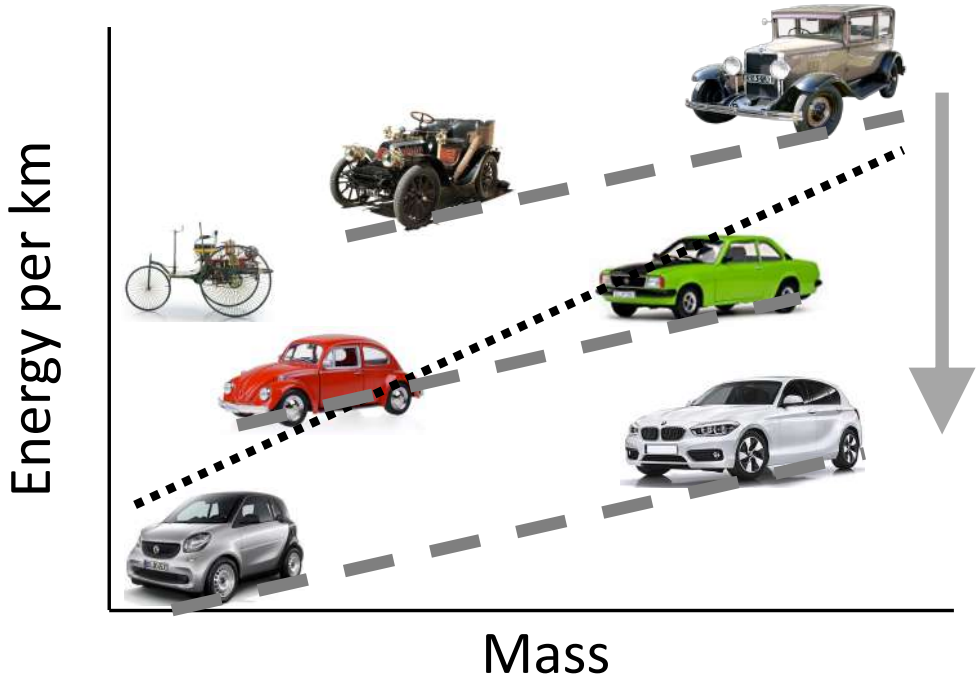


You would not consider the overall pattern a fixed law, but consider it with respect to technical progress.

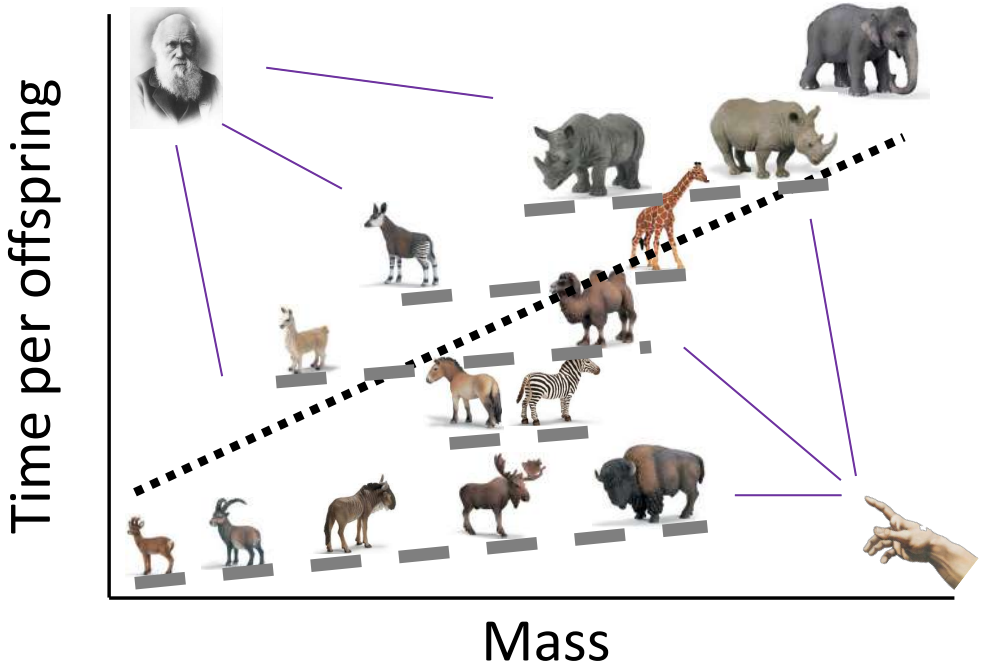




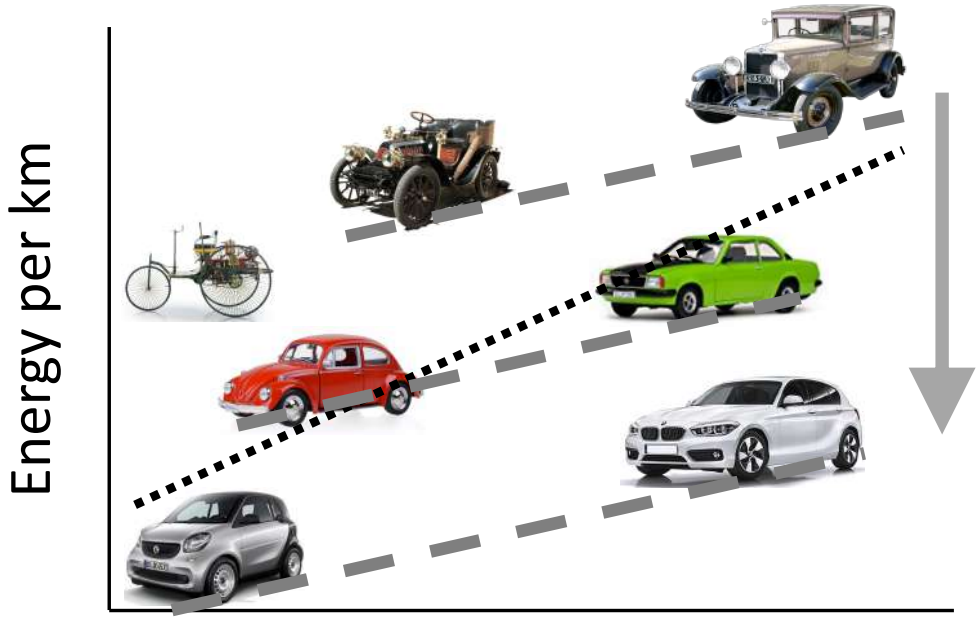
You would not consider the overall pattern a fixed law, but consider it with respect to technical progress.



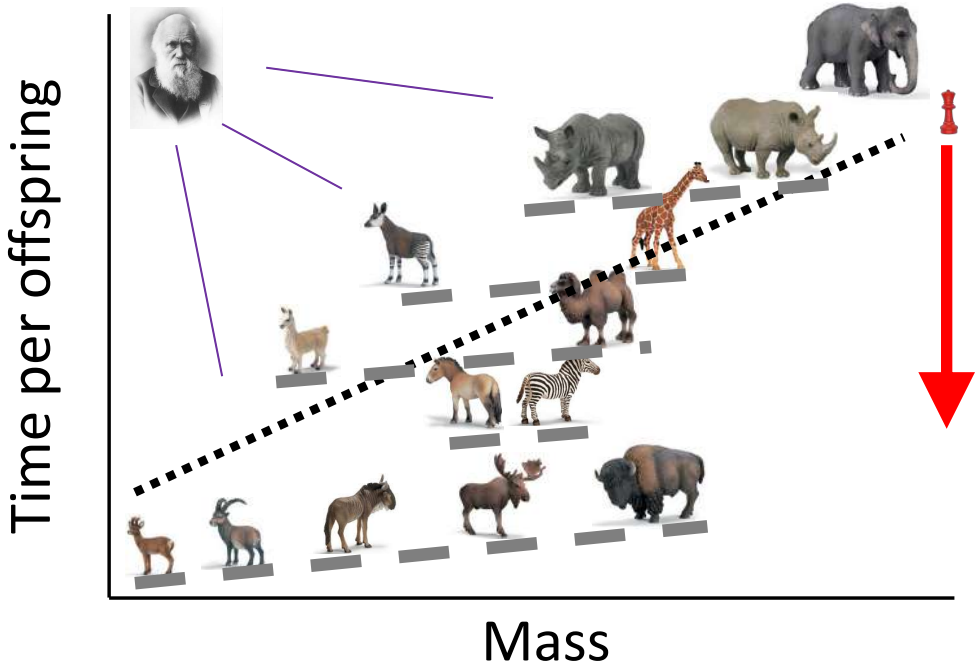
You would not consider the overall pattern a fixed law, but consider it with respect to technical progress.



Why would you consider this a pattern due to fixed life history tradeoff laws?

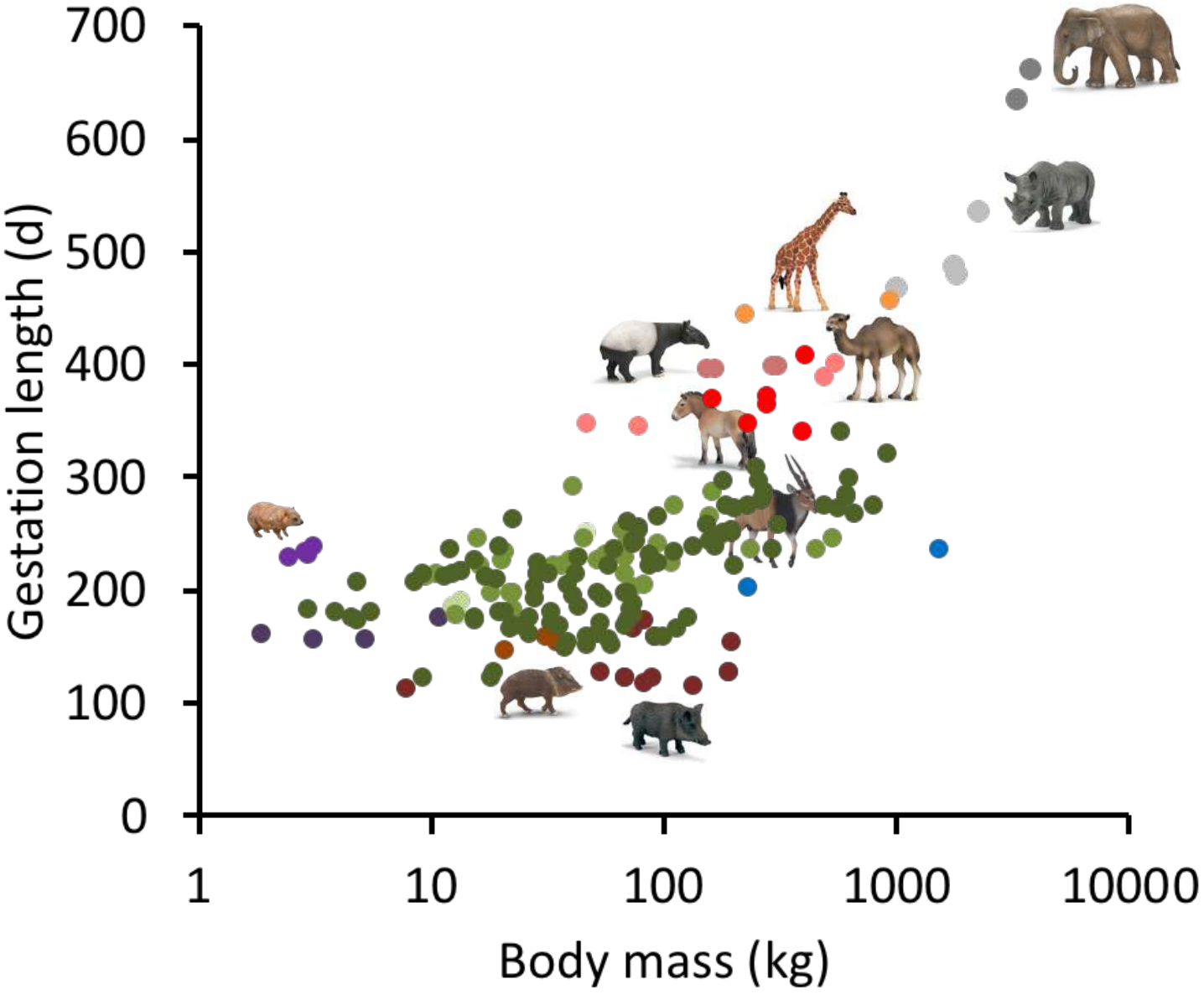


You would not consider the overall pattern a fixed law, but consider it with respect to technical progress.



Why would you consider this a pattern due to fixed life history tradeoff laws, and not rather a ***snapshot*** *in a process of optimization?*

Gestation length



Science history

the question that has not even been asked in biological science

280 days

340 days

By what means do cattle achieve faster intrauterine growth than horses?

280 days

340 days

By what means do some animals achieve faster intrauterine growth?

280 days

340 days

By what means do some animals achieve faster intrauterine growth?

280 days

340 days

390 days

440 days

By what means do some animals achieve faster intrauterine growth?

280 days

340 days

390 days

440 days

42 days

230 days

By what means do some animals achieve faster intrauterine growth?

280 days

340 days

390 days

440 days

42 days

230 days

By what means do some animals achieve faster intrauterine growth?

280 days

340 days

390 days

440 days

42 days

230 days

365 days

660 days

By what means do some animals achieve faster intrauterine growth?

280 days

340 days

390 days

440 days

42 days

230 days

365 days

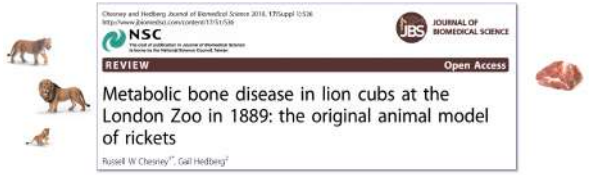
660 days

there is not even a theory about underlying physiological mechanisms

Summary: historical burdens in science

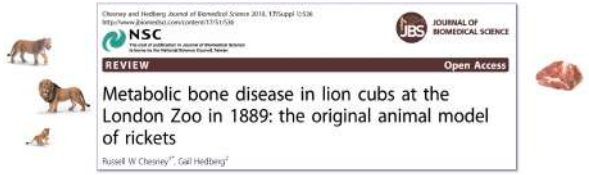
Summary: historical burdens in science

Words cause preconceptions



Summary: historical burdens in science

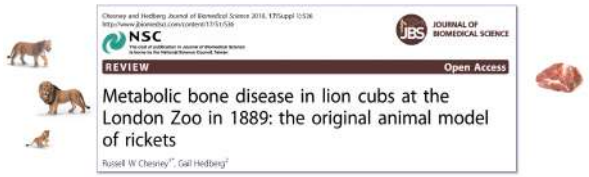
Words cause preconceptions



Obsession with adaptation and functionality

Summary: historical burdens in science

Words cause preconceptions

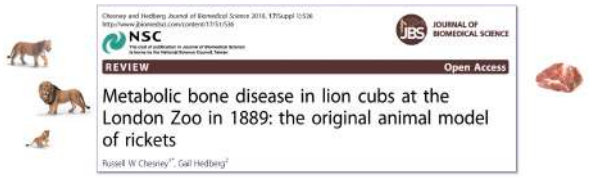


Obsession with adaptation and functionality

Selective perception

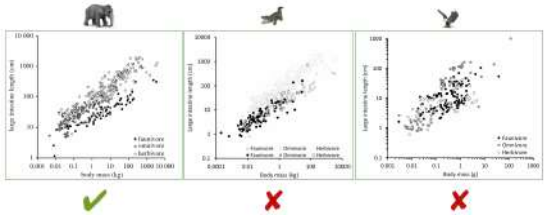
Summary: historical burdens in science

Words cause preconceptions



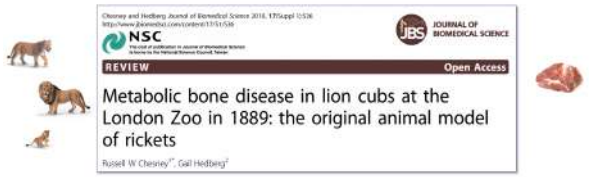
Obsession with adaptation and functionality

Selective perception
- a craving for rules



Summary: historical burdens in science

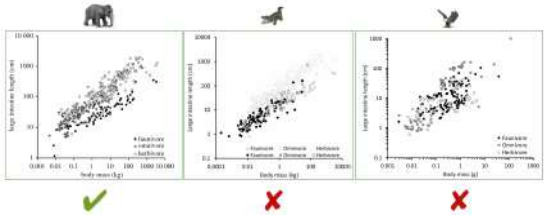
Words cause preconceptions



Obsession with adaptation and functionality

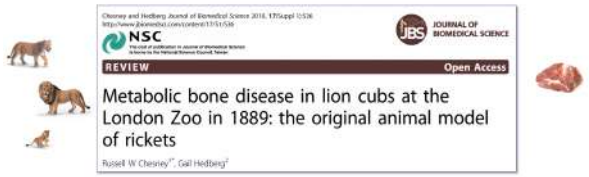
Selective perception

- a craving for rules
- contingency of vantage points

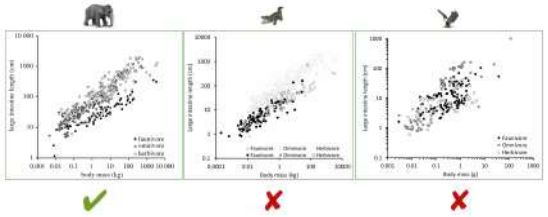


Summary: historical burdens in science

Words cause preconceptions



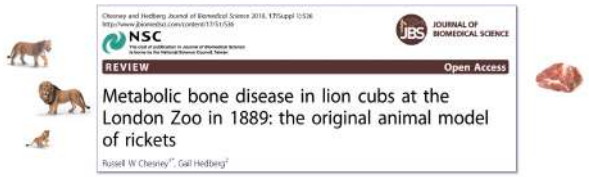
Obsession with adaptation and functionality



Selective perception
- a craving for rules
- contingency of vantage and end points

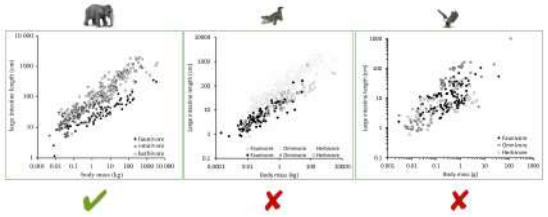
Summary: historical burdens in science

Words cause preconceptions

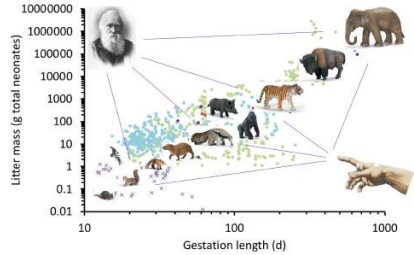


Obsession with adaptation and functionality

Selective perception
- a craving for rules
- contingency of vantage and end points

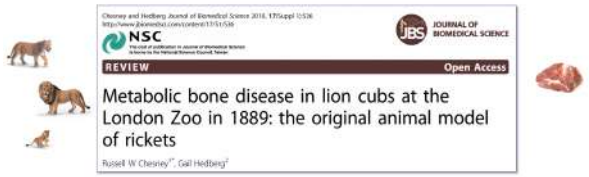


Obession with perfection (it's not the agency)



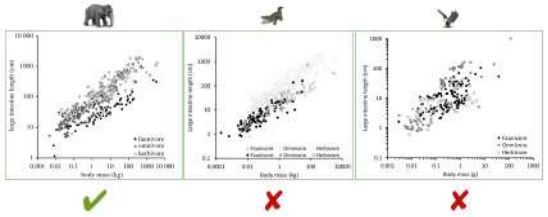
Summary: historical burdens in science

Words cause preconceptions

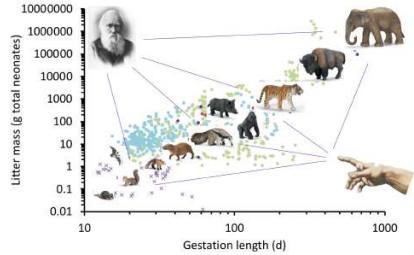


Obsession with adaptation and functionality

Selective perception
- a craving for rules
- contingency of vantage and end points



Obession with perfection (it's not the agency)



… can make you overlook really fundamental stuff

thank you for your attention