

Duże zwierzęta w morzu

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Wielkość organizmu – Święty Graal Ekologii ?



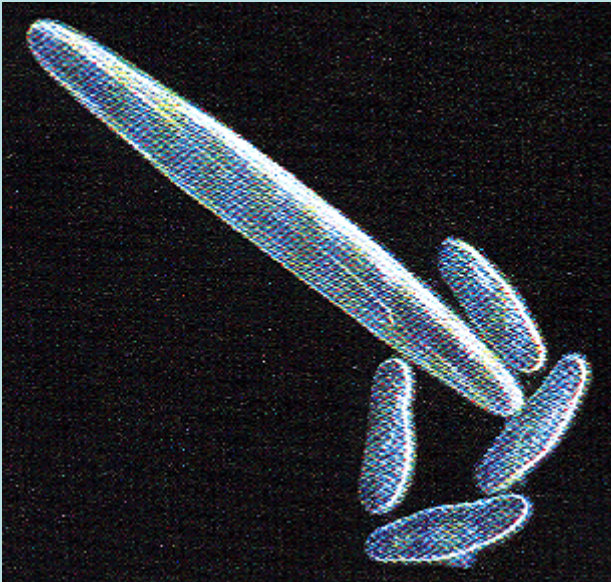
literatura

- Woodward et al.. 2005 Body size in ecological networks. TREE 20, 402-409
- Yodzis P 2001 Must top predators be culled for the sake of fisheries ? TREE 16, 78- 84
- Azovsky A 2000 Concept of scale in marine ecology. Web Ecol 1, 28- 34
- Hopcraft JGC et al. 2009 Herbivores, resources and risks. TREE 25, 119-128
- Hillebrand & Azovsky 2001 Body size determines the strength of the latitudinal diversity gradient. Ecography 24, 251- 256
- White EP et al. 2007 Relationships between body size and abundance in ecology. TREE 22, 323-330
- Smith JJ et al. 2009 Transient dwarfism of soil fauna during the PE thermal maximum. PNAS, 106, 17655- 17660
- Pope JJ et al. 2009. Honey, I cooled the cods: Modelling the effect of temperature on the structure of Boreal/Arctic fish ecosystems. DSR 56, 2097-2107

Eurythenes gryllus



Epulopiscium



Bathynomus





Duży roślinożerca na łądzie



Duży roślinożerca w morzu – 5 cm



rośliny – 0,01mm



Ekologia jest nauką o „case studies”

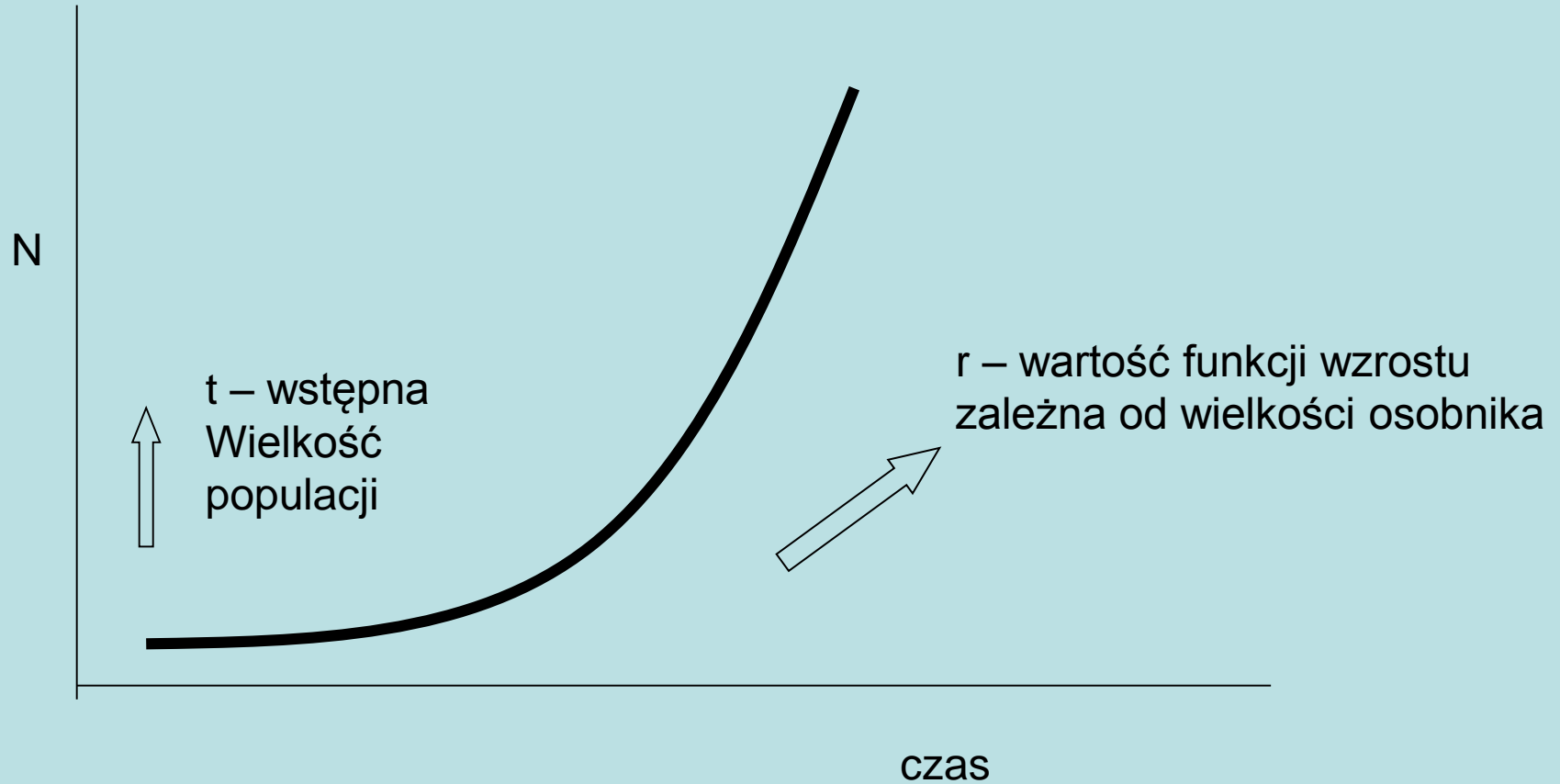


Zależności pomiędzy wielkością osobnika i ekologią wg Woodward i inni , TREE 20, 7, 2005

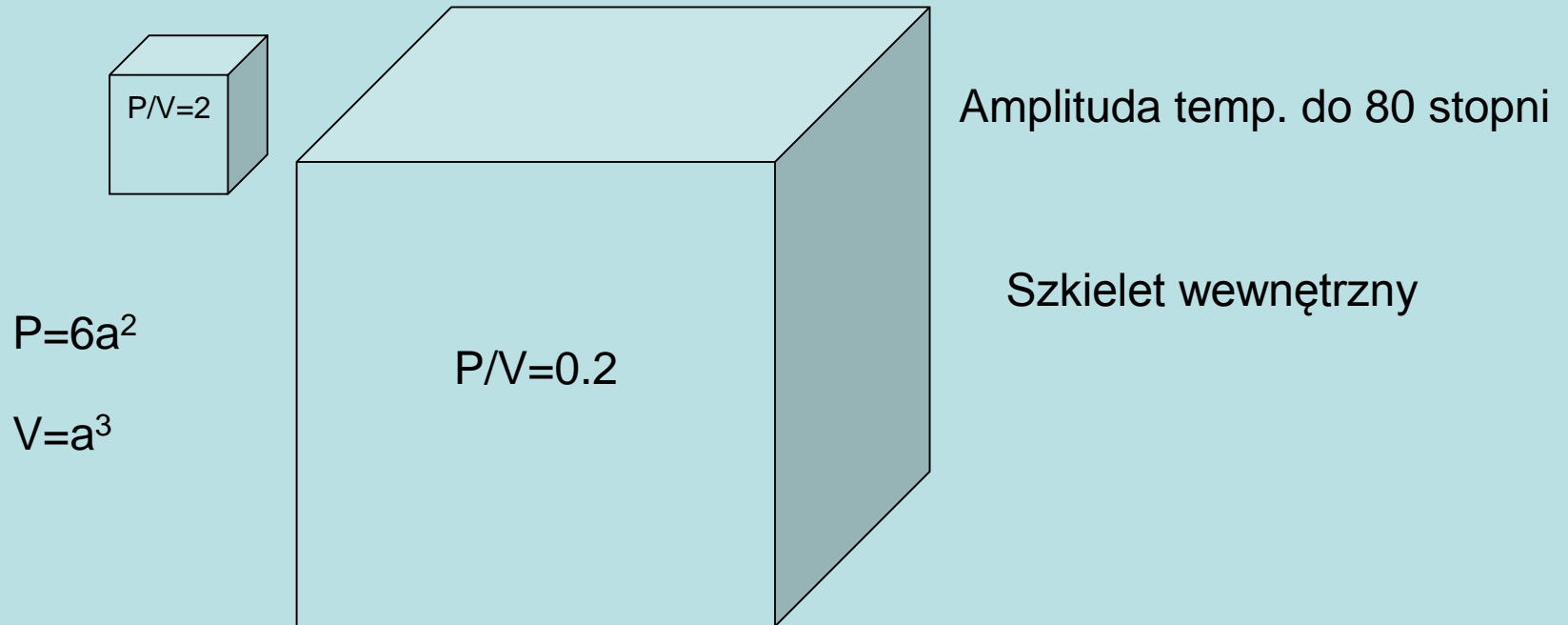
- Liczba klas wielkości (+)
- Liczebność (-)
- Poziom troficzny (+)
- Szerokość niszy (?)
- Produkcja (+)
- Obrót biogenów (-)
- Bogactwo gatunkowe (-)
- Potencjalny kanibalizm
- Przewaga małych osobników
- Duże osobniki są drapieżne
- Nisza rozszerza się z wiekiem
- Duże osobniki mają niższe P/B
- Duże osobniki mają wolniejszy metabolizm

Malthus 1798, Prawo wykładniczego wzrostu populacji

$$N = N_0 * e^{r,t}$$



Wielkość zwierzęcia w ekosystemie lądowym wymiana ciepła

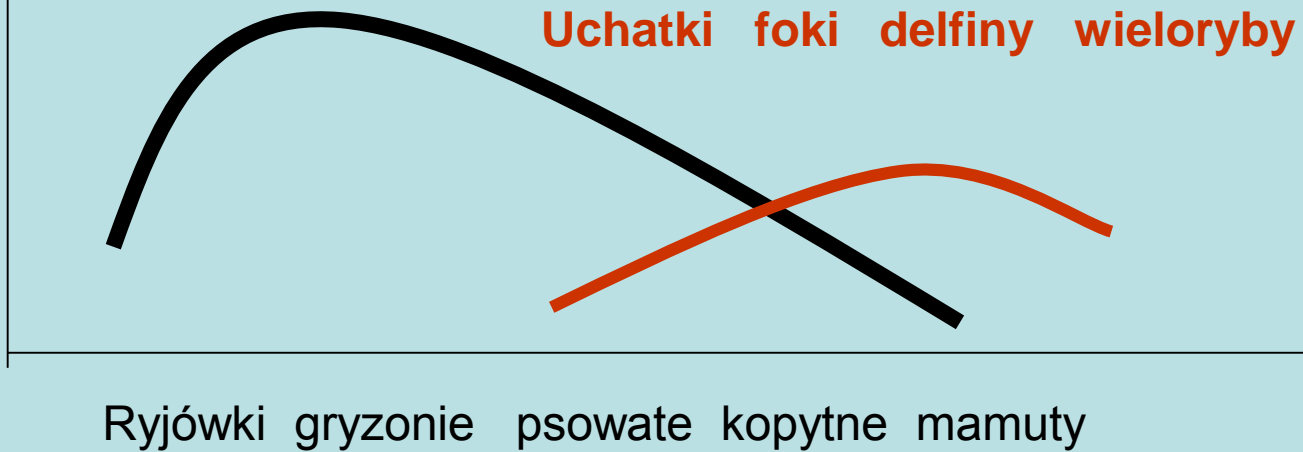


Morskie zwierzę stałocieplne nie może być myszą

Utrata ciepła w wodzie 25X większa niż w powietrzu



N



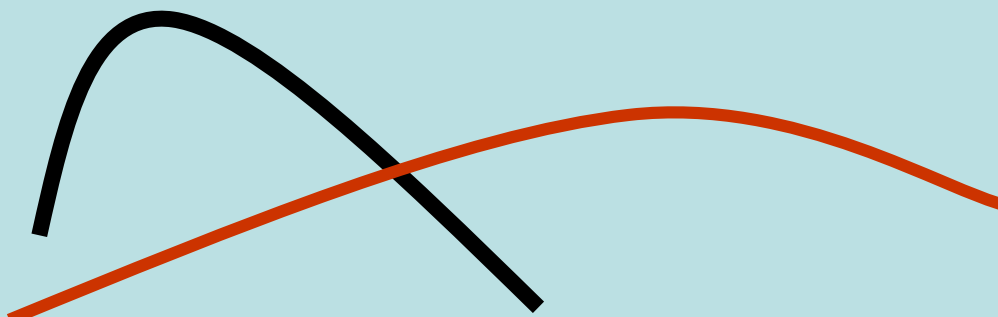
Lądowe zwierzę bezkręgowce nie może być kałamarnicą olbrzymią

Siła wyporu w wodzie



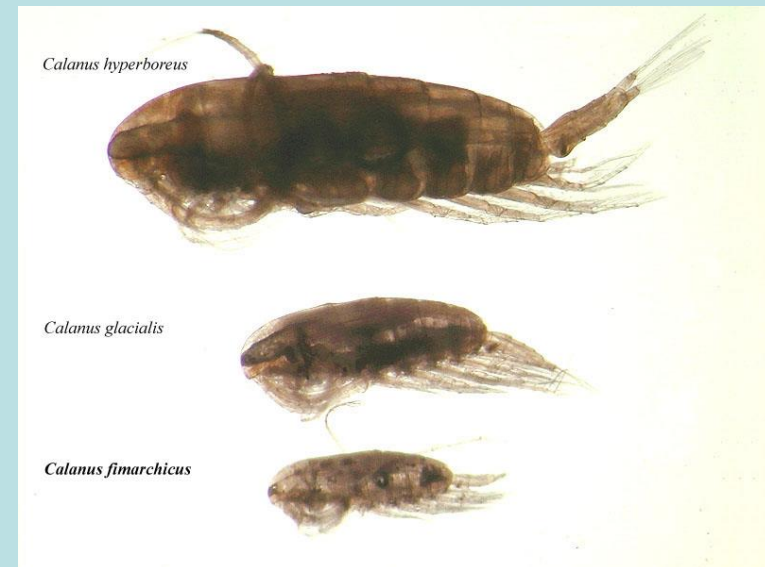
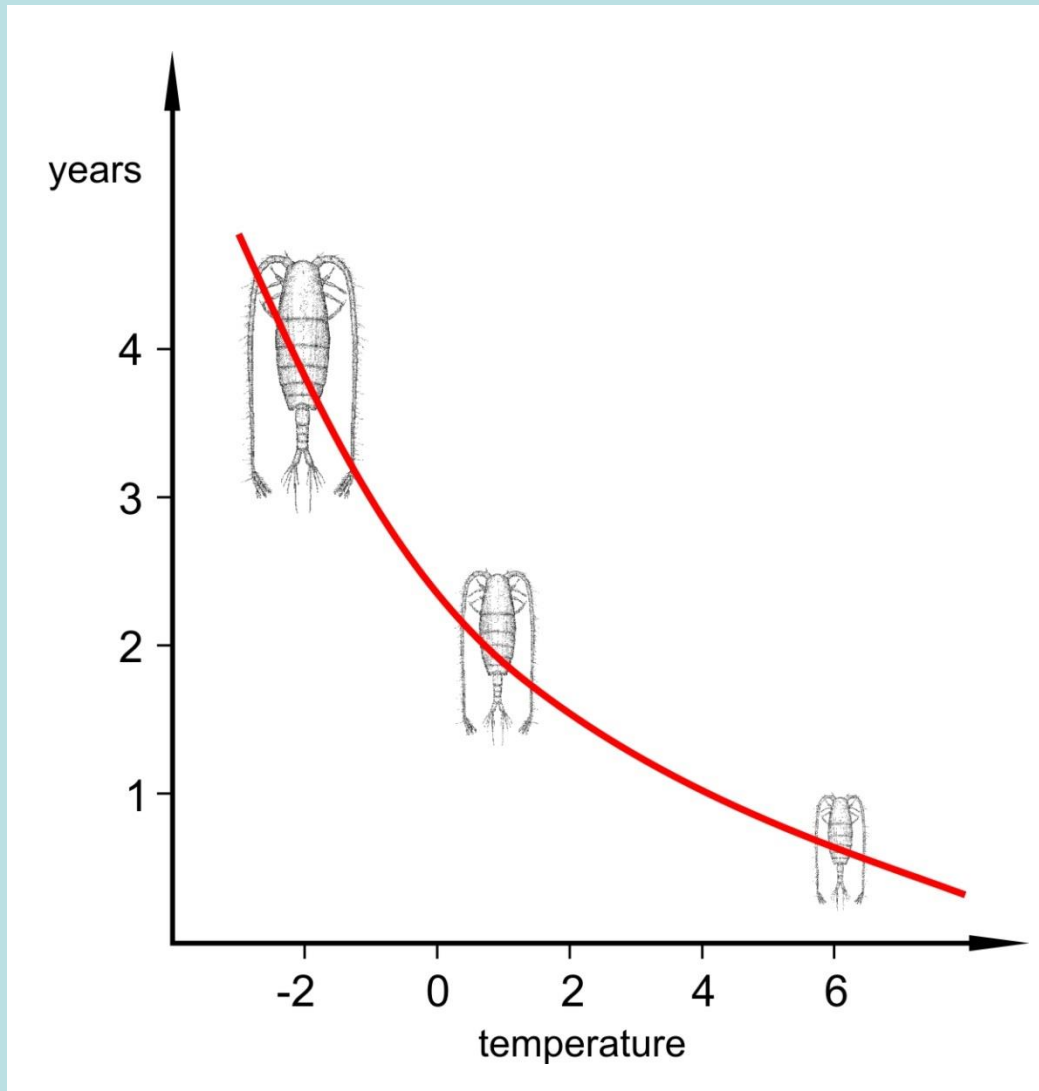
N

Wieloszczety Małże Skorupiaki Kałamarnice

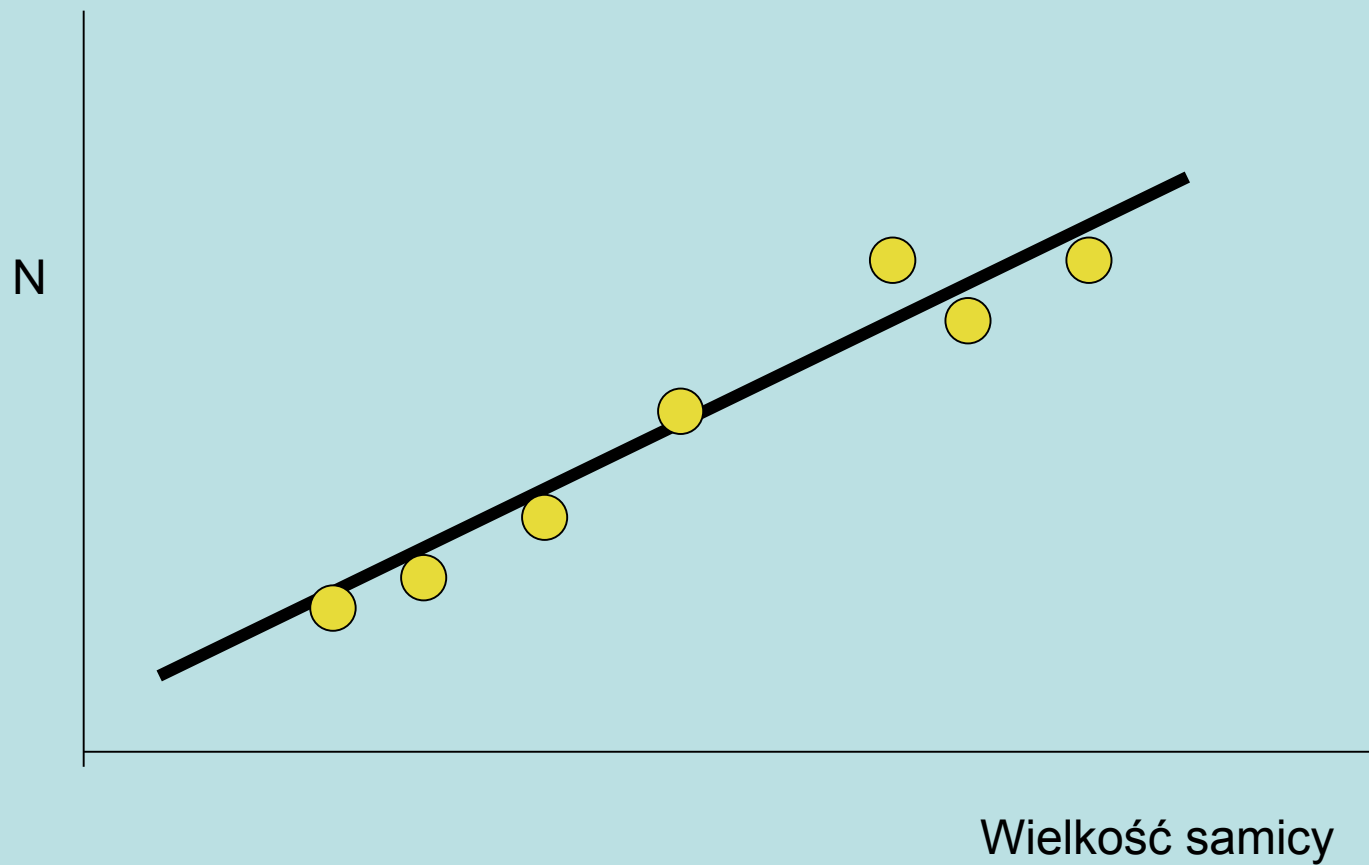


Pajęczaki Owady

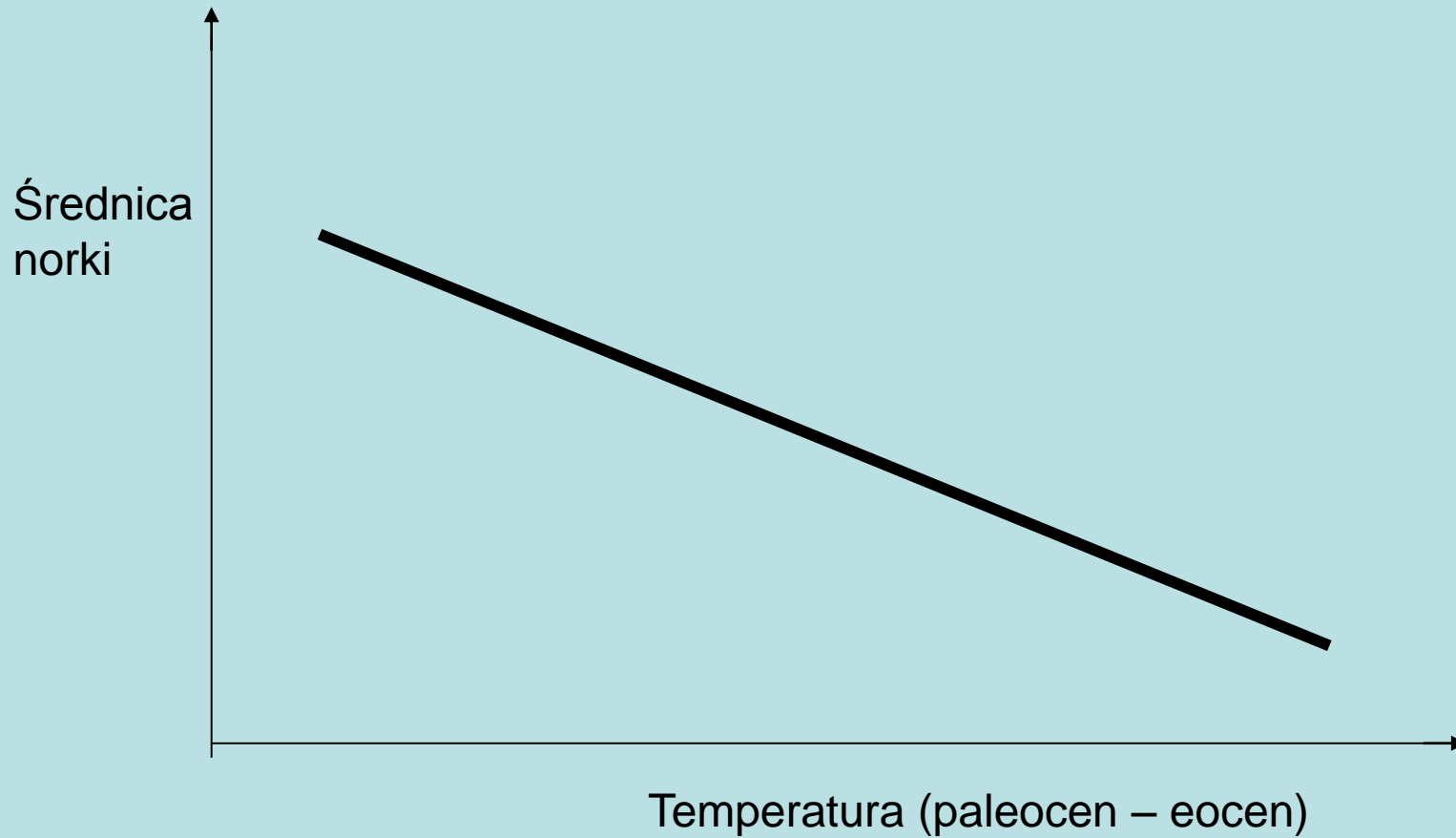
Zimna woda – długie życie, duże rozmiary Bergman 1847



Jensen 1958,
zależność ilości jaj od wielkości ryby/skorupiaka



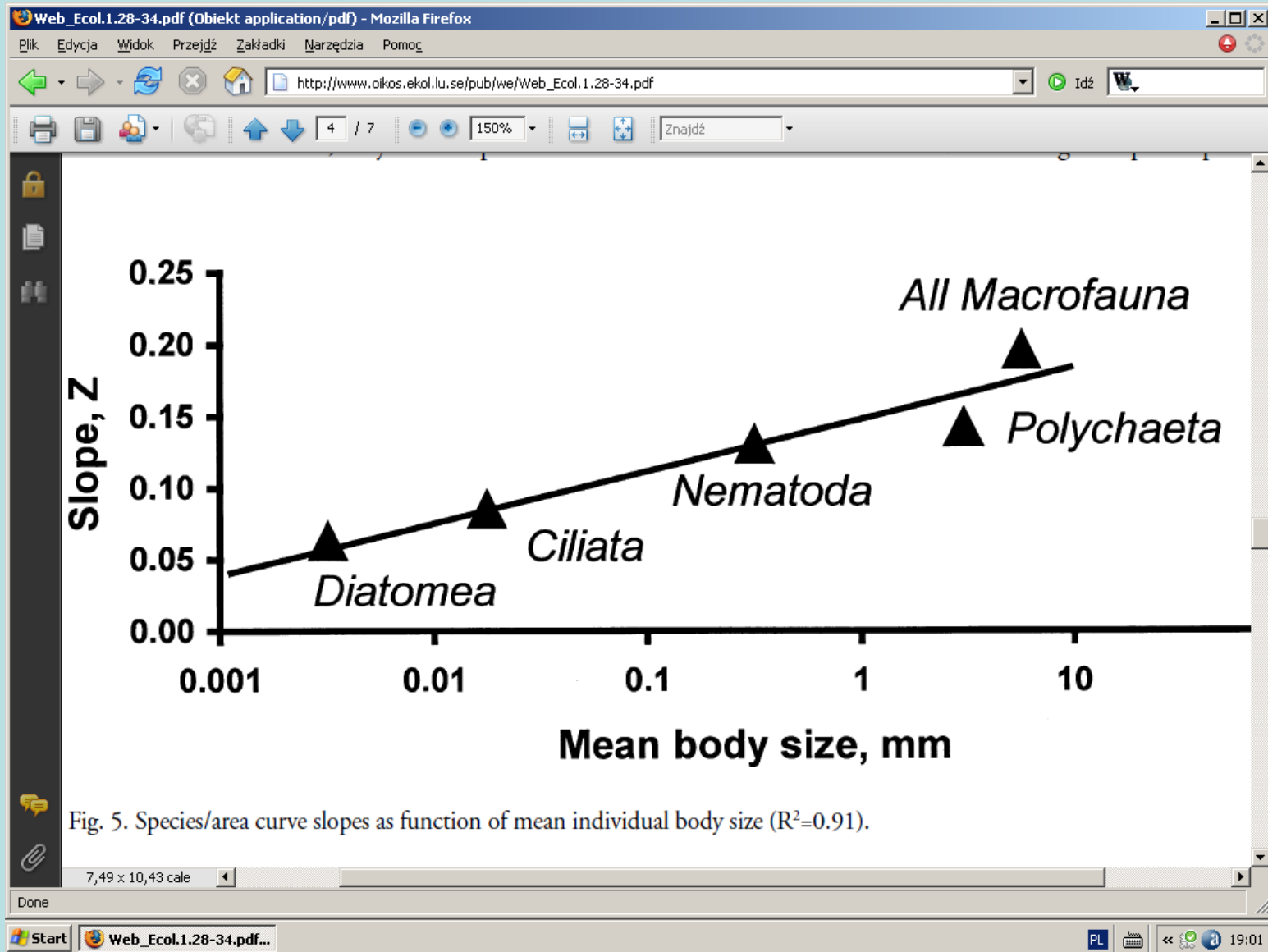
Smith i inni 2009, PNAS 106, 42
wpływ temperatury na wielkość organizmów glebowych
w trzeciorzędzie



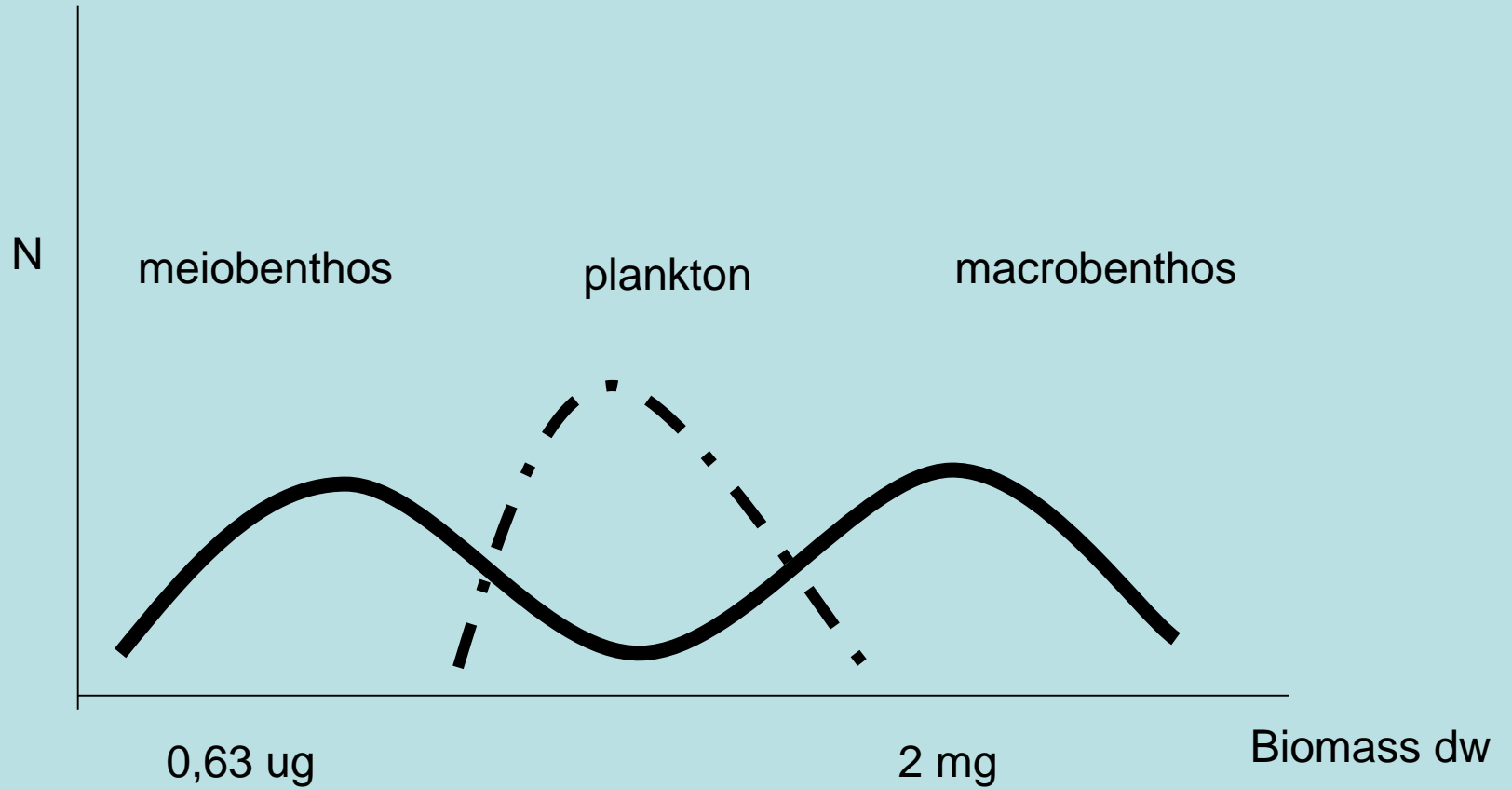
Wielkość organizmu i sieć troficzna wg. Aquatic Food Web, 2005

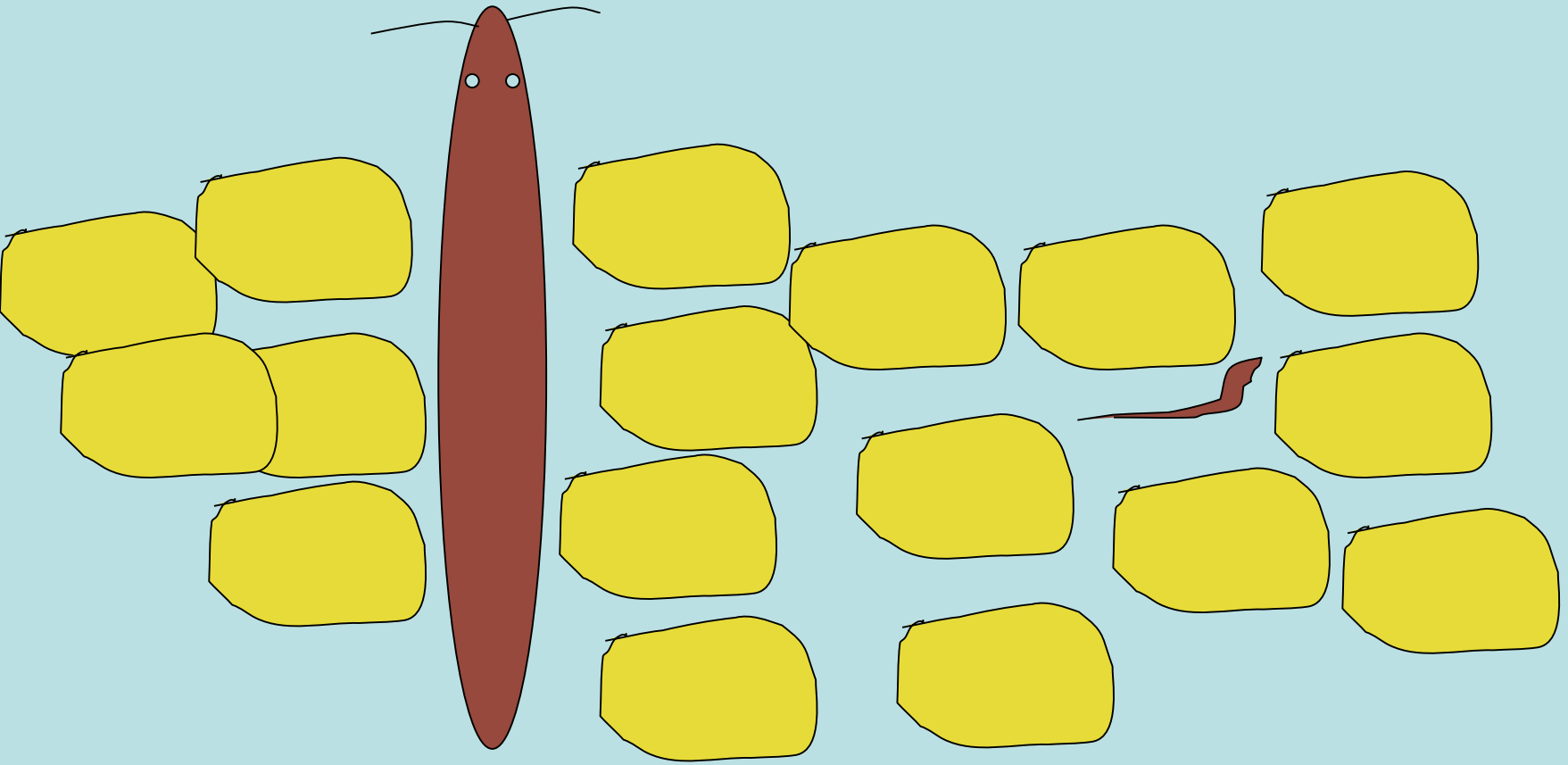
- Złożoność sieci troficznej spada ze wzrostem energii w systemie, P/B zwiększa się (preferowane małe, szybko rosnące organizmy)
- W systemach o niskiej energii, złożoność sieci troficznej rośnie, P/B zwiększa się, (przewagę uzyskują duże, wolno rosnące organizmy)

Azovsky 2000, OIKOS, Web Ecology

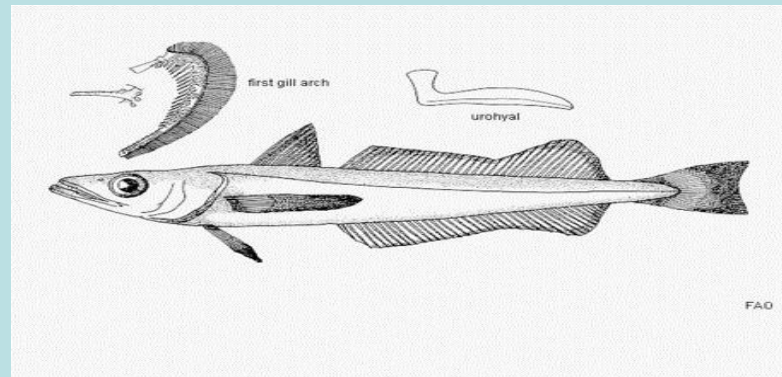


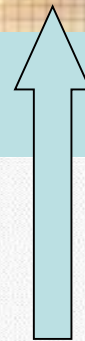
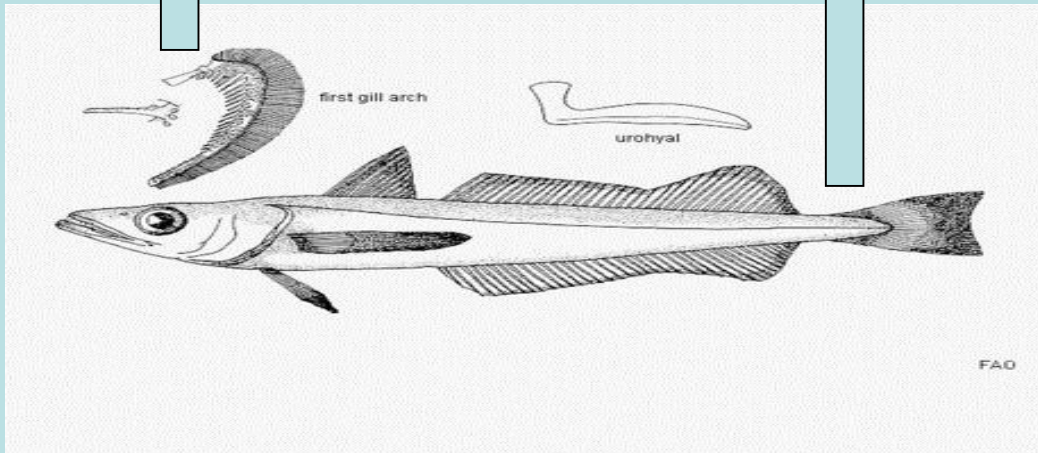
Warwick 1992, size structure in benthos





RPA – Benguela Current – Man/Arctocephalus/Merluccius

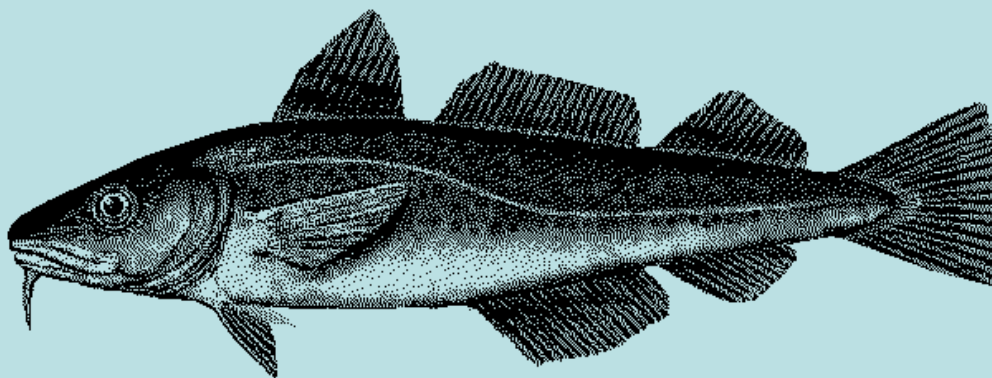




Morze Barentsa- czterech dużych drapieżników



Prawie równo po około 25%



Hopcraft i inni 2009, TREE – selective and oportunistic predators

herbivoressavanahTREE.pdf - Adobe Reader
Plik Edycja Widok Dokument Narzędzia Okno Pomoc

121 (3 z 10) 98,2% Znajdź

Review *Trends in Ecology and Evolution* Vol.25 No.2

Figure 2 consists of two panels, (a) and (b), each with two vertically stacked graphs. The x-axis for both graphs is 'Prey body mass'.
Panel (a) illustrates size-nested predation. The upper graph shows 'Predator diet (%)' vs. 'Prey body mass'. It features three curves: a dotted line for small predators peaking at low prey mass, a dashed line for medium-sized predators peaking at intermediate prey mass, and a solid line for large predators peaking at high prey mass. The solid line starts at zero and remains at zero until a certain prey mass, then rises to a plateau. The lower graph shows 'Herbivore mortality caused by predation (%)' vs. 'Prey body mass'. It features a single solid curve that starts at a high mortality rate for small prey and decreases as prey mass increases. Three vertical arrows point downwards from the x-axis to the curve, indicating that mortality is higher for smaller prey sizes.
Panel (b) illustrates size-partitioned predation. The upper graph shows 'Predator diet (%)' vs. 'Prey body mass'. It features three bell-shaped curves, each peaking at a different, non-overlapping prey mass range. The lower graph shows 'Herbivore mortality caused by predation (%)' vs. 'Prey body mass'. It features a single solid curve that remains at a low, constant mortality rate for most prey sizes and then drops sharply to zero for very large prey. Three vertical arrows point downwards from the x-axis to the curve, indicating that mortality is higher for intermediate-sized prey.

Figure 2. The relationship between the degree of herbivore mortality owing to predation and the diet selection of the predators. (a) If large predators (solid line in upper panel) are opportunists and consume prey of all sizes, whereas small predators (dotted line) only kill small prey, then the prey base of small predators is nested within that of large predators (size-nested predation). Medium-sized predators are indicated by the dashed line. The cumulative mortality on small prey is greater than on large prey (lower panel) because they are exposed to more predators. (b) If predators are selective, and only consume prey of a specific size class (size-partitioned predation), then large predators do not supplement their diet with small prey. When predation is size-partitioned as opposed to size-nested, the cumulative mortality owing to predation on

TRENDS in Ecology & Evolution

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Do końca XIX w. dobór łowiecki to usuwanie największych osobników z populacji



100 lat później zauważyli to biolodzy morza.....

atmosphere and magnetosphere. Explanations of the varying period of the radio clock have appealed to changing conditions that are either external to Saturn's magnetosphere (such as the speed of the solar wind⁸) or internal to it (such as the mass injected from the vapour plume of Saturn's small moon, Enceladus⁹). But evidence that such effects cause the observed drift in the period has been sketchy.

Zarka *et al.*¹ use roughly three years of Cassini radio-wave data to provide compelling support for the hypothesis that external effects contribute to the modulation of the radio period. They find that the total power within a defined range of radio frequencies integrated over a full Saturn rotation period of 10.75 hours fluctuates on timescales of about 20–30 days. The properties of the solar wind are known to fluctuate at the solar rotation period of 25 days, and also to show trends over longer timescales. Zarka *et al.* find that cross-correlations with the speed of the solar wind are high, especially when Cassini's colatitude (the difference between its latitude and 90°) remains relatively constant, relative to Saturn's spin axis. The correlations with other properties of the solar wind (such as dynamic pressure) are weak.

Given evidence that the source of the radio emissions seems to be localized in the morning to noon sector⁸, it was previously proposed⁹ that changes in the period of the radio clock would occur if the source location shifts with changing solar-wind velocity. Such shifts could arise (and vary systematically with solar-wind velocity) if the emissions are triggered where

Nets versus nature

David O. Conover

The life-histories of pike adjust quickly to shifts in the opposing forces of fishing and natural selection. Such rapid changes suggest that evolutionary dynamics must be incorporated into fisheries management.

People like to catch big fish, sometimes so much so that fish sizes overall become greatly diminished. According to one view, the continual removal of large fish from a population sets the stage for rapid, undesirable evolutionary changes, including slower growth, earlier adult maturation and permanently smaller size^{1,2}. This occurs because removing the largest fish directly opposes natural selection, which tends to favour large size.

What happens when these two forces simultaneously oppose one another? Can evolution respond quickly enough to track changes in fishing selection, or does natural selection counteract it? Writing in *Proceedings of the National Academy of Sciences*³, Eric Edeline and colleagues illustrate the outcome of this dynamic tug-of-war between the forces of natural selection and fishing selection.

Until now, the theory underlying the management of fisheries has been based on ecological models that predict how the productivity of an exploited population changes in relation to its density, and the age and size at which fish are caught. The goal is to ensure a maximal but sustainable catch in perpetu-

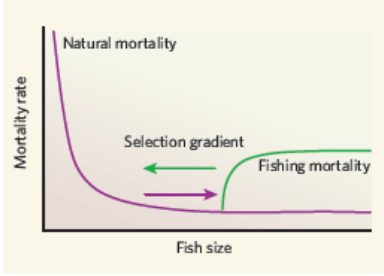


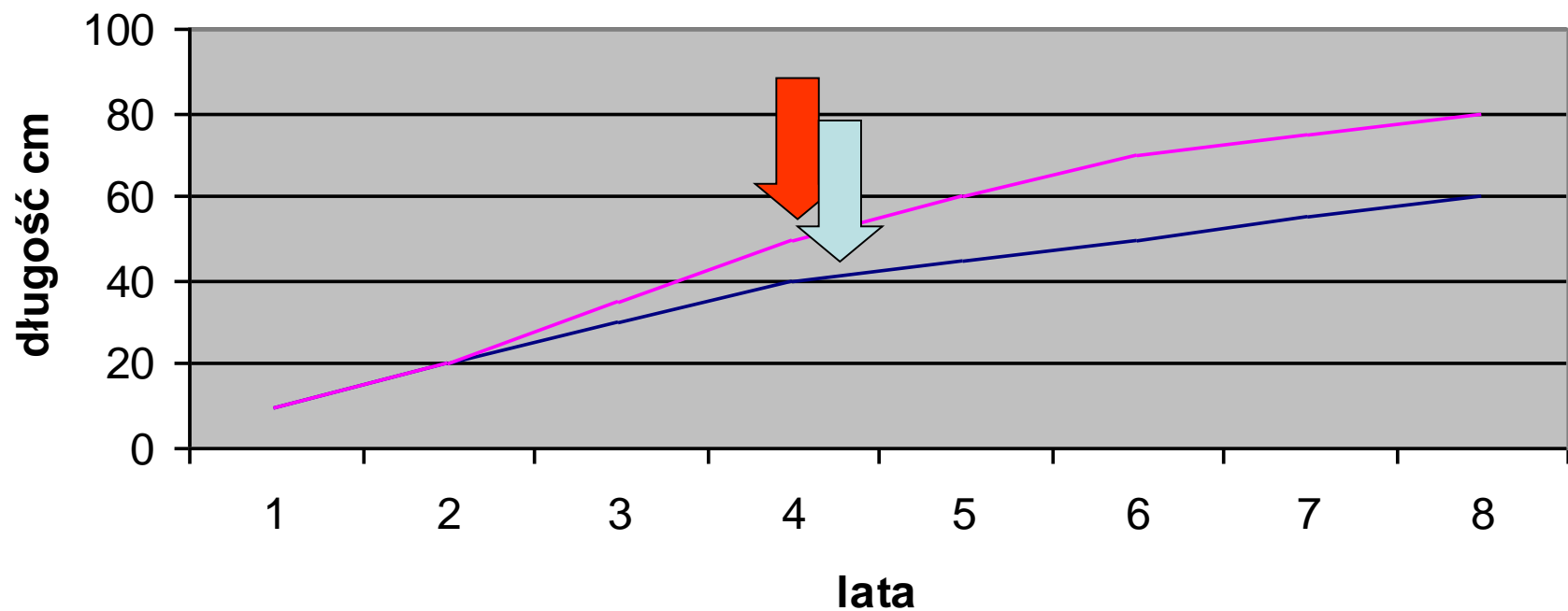
Figure 1 | The darwinian struggle between natural selection and fishing selection. The graph depicts the contrast between mortality rates as a function of fish size in the absence and presence of mortality due to fishing. Natural rates of mortality decline dramatically with increasing size early in life, until reaching a low level for the remainder of life (purple). Fishing greatly increases the mortality of large fish (green). Arrows represent the direction of selection on body size in the absence (purple arrow) and presence of fishing (green arrow).

increases fitness — that is, the likelihood that one's genes will be passed on to future genera-

Updater

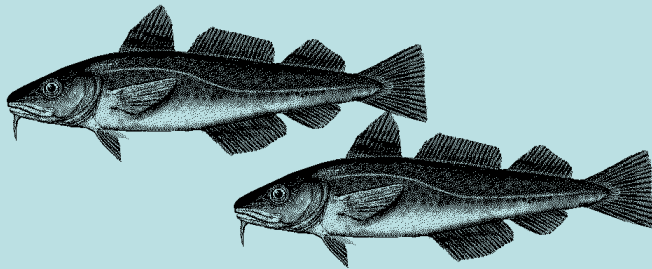
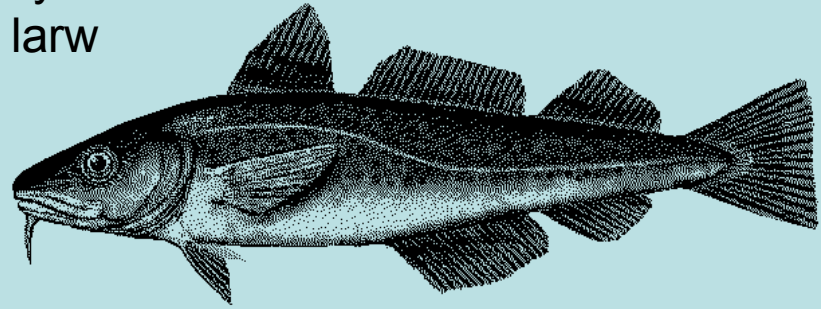
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wielkość ryby i jej rozród 1960 i 2005



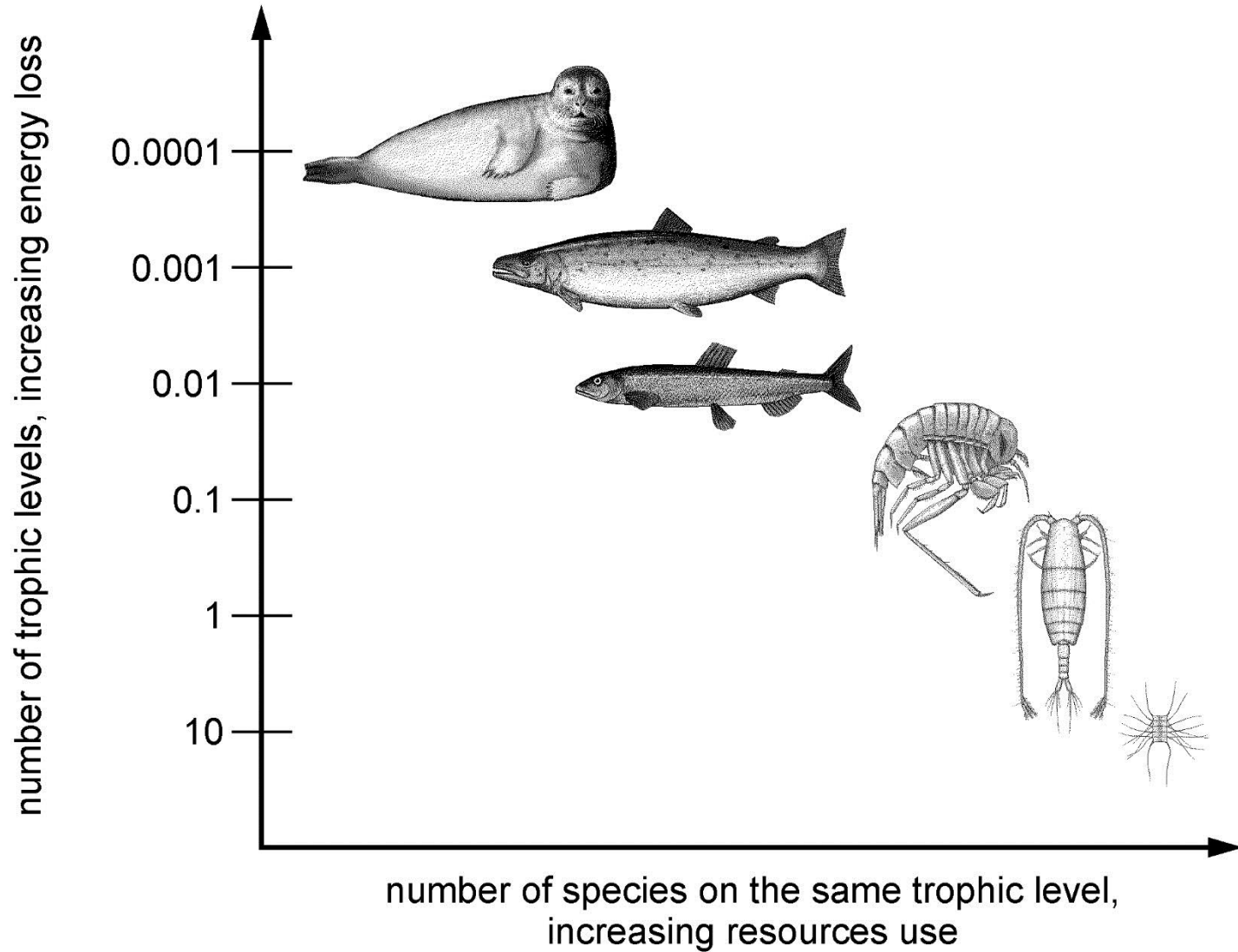
Efekt ewolucyjny intensywnych połowów

Duży osobnik – więcej, większej ikry
Więszy odsetek przeżywających larw



Selekcja w kierunku, coraz mniejszych,
szybciej rozradzających się osobników

Gatunki i poziomy troficzne



Wiadomość dla zarządu

*Jeżeli musisz konkurować o zasoby to
najlepiej z foką, od biedy z rybą, nie próbuj
z żebroptawem, a z wirusem nie masz
szans*