

dr hab. Adam T. Halamski
Instytut Paleobiologii PAN

Biologia ewolucyjna

Przebieg i zapis kopalny ewolucji

Wykład dla III roku biologii SGGW
Plan i spis cytowanej literatury

Część pierwsza: Faktografia

IV. Ewolucja roślin

Literatura podstawowa: George Ledyard STEBBINS. *Zmienność i ewolucja roślin*. Wyd. polskie PWN 1958.

American Journal of Botany – numer specjalny o ewolucji roślin – wrzesień 2004 (tom 91, zeszyt 10): dostępny w sieci

<http://www.amjbot.org/content/91/10.toc>

1. Miejsce roślin w świecie żywym: endosymbioza.

Cavalier-Smith, T., 2002. The phagotrophic origin of eukaryotes... *Int. J. Sys. Evol. Microbiol.*, **52**: 297-354.

Keeling PJ 2004. Diversity and evolutionary history of plastids and their hosts. *Am. J. Bot.* 91 (**10**): 1481–1493.

2. Czy rośliny ewoluują inaczej? Hybrydyzacja, poliploidyzacja.

William J. Sutherland & Andrew R. Watkinson, 1986. Do plants evolve differently? *Nature*, **320**: 305.

Prelli R 2001 *Les fougères et plantes alliées de France et d'Europe*. Belin.

Vogel, J. et al., 1999. Where are the glacial refugia in Europe? Evidence from pteridophytes. *Biol. J. Linn. Soc.*, **66**: 23-37.

Mallet, J., 2007. Hybrid speciation. *Nature*, **446** (15th March 2007): 279–283.

Watson, *Kew Bull.* 1910, p. 325

Upcott M 1939. The nature of tetraploidy in *Primula kewensis*. *Journal of Genetics*, **39** (1): 79–100.

Ernest Brown BABCOCK, 1947. *The Genus Crepis*.

Wendel JF 2015. The wondrous cycles of polyploidy in plants. *Am. J. Bot.*, **102** (11): 1753–1756.

Halamski, A.T., Dunkel, F.G. & Temsch, E.M., 2019. *Ranunculus kobendzae*, a new species of the *R. auricomus* complex (*Ranunculaceae*) from Poland. *Annales Botanici Fennici*, **56**: 123–134.

3. Podstawowe szczeble ewolucji roślin: Wyjście na ląd, powstanie roślin naczyniowych, powstanie nasion, powstanie roślin kwiatowych.

Literatura podstawowa: P. Kenrick & P. R. Crane, 1997. *The Origin and Early Diversification of Land Plants. A Cladistic Study*. Smithsonian Inst. Press.

E. M. Friis, K. Raunsgaard Pedersen, P. R. Crane, 2006. Cretaceous angiosperm flowers, etc. *Palaeogeography, Palaeoclimatology, Palaeoecology*, **232**: 251-293.

Butterfield et al., *Science* **250**: 104-106, 1990

Butterfield, N., 2004: A vaucheriacean alga from the middle Neoproterozoic of Spitsbergen. *Paleobiology*, **30** (2): 231-252.

Frederic Orpen Bower 1908. *The Origin of a Land Flora*.

Linda E. Graham, 1993. *Origin of Land Plants*. John Wiley.

L. E. Graham et al., 2000. The origin of plants: Body plan changes... *PNAS*, **97** (9): 4535-4540.

Wellman et al., *Nature*, **425**: 282-284, 2003

K. A. Pirozynski & D. W. Malloch, 1975. The origin of land plants: a matter of mycotrophism? *BioSystems*, **6**: 153-164.

Taylor et al., 2004. *Proc. R. Soc. Edinb., Earth Sci.*, **94**: 457-473.

Knack JJ et al. 2015. Microbiomes of streptophyte algae and bryophytes suggest that a functional suite of micro-biota fostered plant colonization of land. *Int. J. Plant Sci.*, **176** (5): 405-420.

Shaw, J.A. et al., 2011. Bryophyte diversity and evolution: Windows into the early evolution of land plants. *American Journal of Botany*, **98** (2): 352-369

Bateman, R.M. & DiMichele, W.A., 1994. Heterospory: the most iterative key innovation... *Biological Reviews*, **69** (3): 345-417.

James A. Doyle & Leo J. Hickey, 1976. Pollen and Leaves from the Mid-Cretaceous Potomac Group and Their Bearing on Early Angiosperm Evolution. In: Charles C. Beck (Ed.) *Origin and Early Evolution of Angiosperms*. Columbia University Press.

Chanderbali AS et al. 2017. Evolution of floral diversity: genomics, genes and gamma. *Phil. Trans. R. Soc. B* **372**: 20150509.

Ge Sun, David L. Dilcher, Hongshan Wang and Zhiduan Chen (2011): A eudicot from the Early Cretaceous of China. *Nature* **471**: 625-628 (31th March 2011).

Friis EM et al. 2016. The emergence of core eudicots... *Proc. R. Soc. B*, **283**: 20161325.

Manchester S 1994. Fruits and seeds of the Middle Eocene Nut Beds Flora, Clarno Formation, Oregon. *Palaeontographica Americana*, **58**: 1-205.

4. Przykłady sekwencji ewolucyjnych.

Peter K. Endress, 2001. Evolution of floral symmetry. *Current Opinion in Plant Biology*, **4**: 86-91.

Luo D et al. 1999. Control of organ asymmetry in flowers of *Antirrhinum*. *Cell*, **99**: 367-376.

Donoghue MJ et al. 1998. Phylogeny and the evolution of flower symmetry in the Asteridae. *Trends in Plant Science*, **3**: 311-317.

5. Podsumowanie.

Literatura podstawowa: Arber, A. 1950. *The natural philosophy of the plant form*. Cambridge Univ. Press.

L. Emberger, *Les plantes fossiles dans leur rapports avec les végétaux contemporains*, 1944.

V. Ewolucja protistów.

Literatura podstawowa: Pawlowski, J. 2014. Protist evolution and phylogeny. In: *eLS*. John Wiley & Sons Ltd, Chichester.

<http://www.els.net> [doi: 10.1002/9780470015902.a0001935.pub2]

Lipps, J.H. 2006. Major features of protistan evolution. *Anuario do Instituto de Geociencias UFRJ*, **29** (1): 55–80.

1. Pochodzenie Eukaryota w świetle badań molekularnych.

Williams TA *et al.* 2013. An archaeal origin of eukaryotes supports only two primary domains of life. *Nature*, **504**: 231–236 (12 Dec 2013).

Spang A *et al.* 2015. Complex archaea that bridge the gap between prokaryotes and eukaryotes. *Nature*, **521**: 173–179 (14 May 2015).

Ettema TJG 2016. Mitochondria in the second act. *Nature*, **531**: 39–40 (3 Mar 2016).

Pittis AA & Gabaldon T 2016. Late acquisition of mitochondria by a host with chimaeric prokaryotic ancestry. *Nature*, **531**: 101–104 (3 Mar 2016).

2. Główne grupy Protista i ich zapis kopalny.

Porter SM *et al.* 2003. Vase-shaped microfossils from the Neoproterozoic Chuar Group. *J. Pal.*, **77** (3): 409–429.

Butterfield, N. J. 2015. Early evolution of the Eukaryota. *Palaeontology*, **58** (1): 5–17.

Cohen, PA & Knoll AH 2012. Scale Microfossils from the Mid-Neoproterozoic Fifteenmile Group, Yukon Territory. *Journal of Paleontology*, **86** (5): 775–800.

Knoll AH 2014. Paleobiological perspectives on early eukaryotic evolution. *Cold Spring Harb. Perspect. Biol.* 2014 Jan 1; **6** (1). pii: a016121. doi: 10.1101/cshperspect.a016121.

3. Ewolucja wielokomórkowości.

Niklas K.J. 2014. The evolutionary-developmental origins of multicellularity. *Am. J. Bot.*, **101** (1): 6–25.

4. Przykłady sekwencji ewolucyjnych: okrzemki; otwornice.

Sims P.A. *et al.* 2006. Evolution of the diatoms. *Phycologia*, **45** (4): 361–402.

Pawlowski J *et al.* 2003. The evolution of early Foraminifera. *PNAS* **100** (20): 11494–11498.

McIlroy D *et al.* 2001. Palaeobiology... of the earliest Foraminifera. *Lethaia* **34**: 13–29.

Norris, RD 1996. Symbiosis as evolutionary innovation in... foraminifera. *Palaeobiology*, **22** (4): 461–480.

Lee JJ & Hallock P 1987. Algal symbiosis as the driving force in the evolution of larger Foraminifera. *Ann. N. Y. Acad. Sci.* **503**: 330–347.

Liebes S *et al.* 1998. *A Walk Through Time: from stardust to us*. John Wiley and Sons.

5. Etapy rozwoju producentów pierwotnych w morzu.

- Falkowski, PG et al. 2004. Why is the Land Green and the Ocean Red? 429–453. *In*: HR Thierstein & JR Young (eds), *Coccolithophores*. Springer.
- Knoll AH & Follows MJ 2016. *Proc. R. Soc. B.* **283**: 20161755.

VI. Koewolucja.

Literatura podstawowa: Futuyma F. 2008. *Ewolucja*. Wydawnictwa Uniwersytetu Warszawskiego.

- Nachev V et al. 2017 Cognition-mediated evolution of flow-quality floral nectars. *Science*, **335**: aah4219 (6 Jan 2017).
- Combes C 1999. *Ekologia i ewolucja pasożytnictwa*. PWN
- Ronsted N et al. 2005 60 million years of co-divergence in the fig-wasp symbiosis. *Proc. R. Soc. B*, **272**: 2593-2599.
- Machado CA et al. 2005 Critical review of host specificity and its coevolutionary implications in the fig/fig-wasp mutualism. *PNAS*, **102** (Suppl. 1): 6558-6565.
- Ehrlich PR & Raven PH 1965. *Butterflies and plants: A study in coevolution*. *Evolution* 18:586-608
- M. Berenbaum (1983). Coumarins and caterpillars: a case for coevolution. *Evolution*, **37** (1): 163-179.

Część druga: Interpretacja

1. Neodarwinowska syntetyczna teoria ewolucji.

- Zimmer C & Emlen DJ 2013. *Evolution: Making Sense of Life*. Roberts and Co. Publishers, Greenwood Village.

2. Szczegółowe zagadnienia biologii ewolucyjnej.

Literatura podstawowa: de Wever P, David B, Neraudeau D 2010. *Paléobiosphère : Regards croisés des sciences de la vie et de la Terre*. Vuibert, Paris.

- Tschopp P, Tabin CJ 2017 Deep homology in the age of next-generation sequencing. *Phil. Trans. R. Soc. B* **372**: 20150475.
- Albertin CA & Ragsdale CW 2018. More than one way to a central nervous system. *Nature* **553** (7686): 34–36 (4 Jan 2018)
- Van Valen L 1973. A new evolutionary law. *Evolutionary Theory* **1**: 1–30.
- Voje KL et al. 2015. The role of biotic forces in driving macroevolution: beyond the Red Queen. *Proc. R. Soc. B* **282**: 2015186.
- Zliobaite I et al. 2017. Reconciling taxon senescence with the Red Queen's hypothesis. *Nature* **552**: 92–95 (7 Dec 2017).
- Dzik J 1991. Features of the fossil record of evolution. *Acta Palaeontologica Polonica* **36** (2): 91–113.

- Ronshaugen M et al 2002. Hox protein mutation and macroevolution of the insect body plan. *Nature* **415**: 914–917.
- Chan YF et al 2010. Adaptive Evolution of Pelvic Reduction... *Science* **327** (5963): 302–305.
- Zamora S & Rahman IA 2014. Deciphering the early evolution of echinoderms with Cambrian fossils. *Palaeontology*, **57** (6): 1105–1119.

3. Biologia ewolucyjna jako synteza nauk biologicznych.

- Kutschera U & Niklas KJ 2004. The modern theory of biological evolution: an expanded synthesis. *Naturwissenschaften* **91**: 255–276.