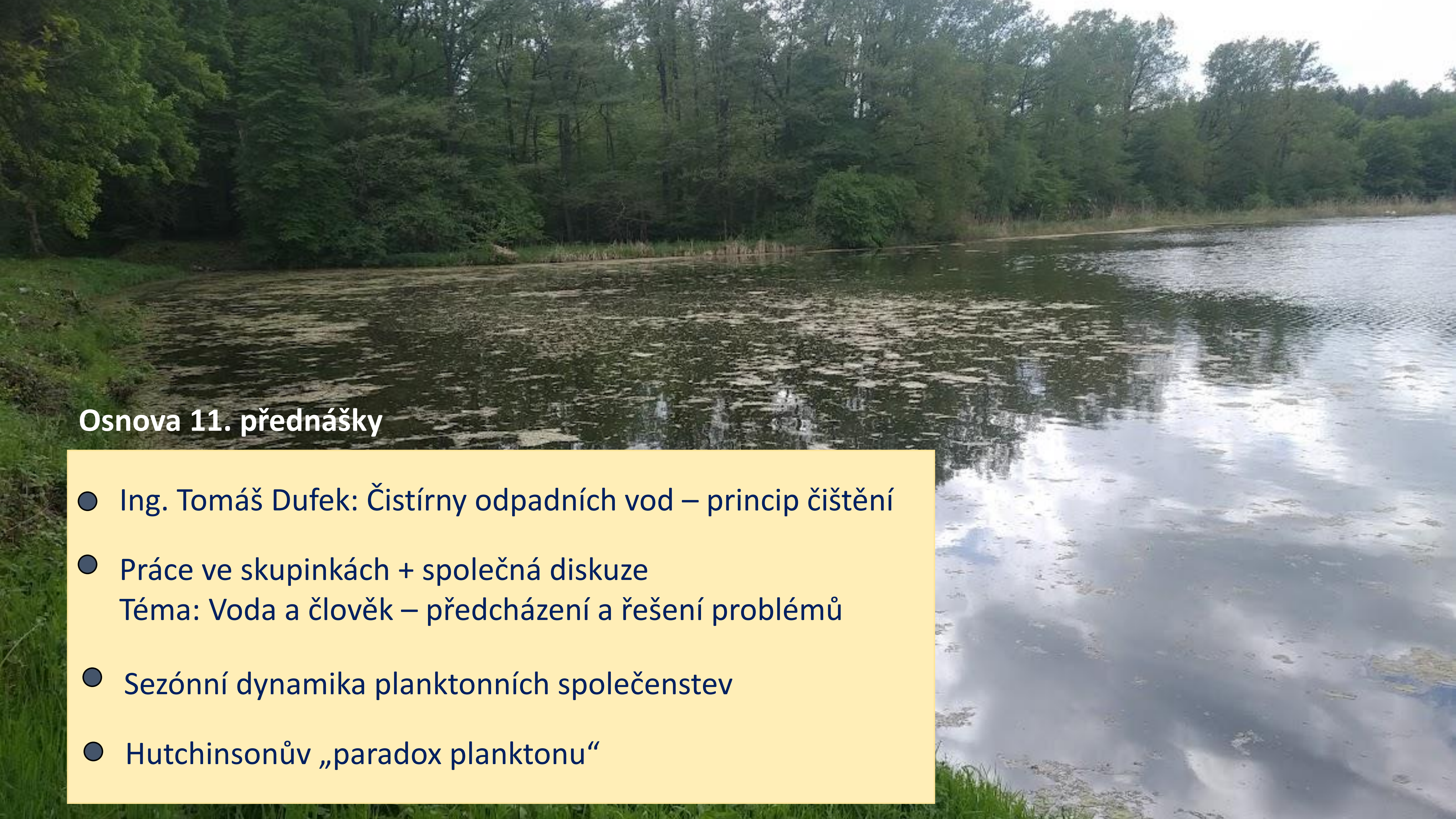
11. přednáška

Martina Štrojsová

HYDROBIOLOGIE

Euglena



Osnova 11. přednášky

- Ing. Tomáš Dufek: Čistírny odpadních vod – princip čištění
- Práce ve skupinkách + společná diskuze
  Téma: Voda a člověk – předcházení a řešení problémů
- Sezónní dynamika planktonních společenstev
- Hutchinsonův „paradox planktonu“

Rozvoj technologií na úsporu vody

Horizontální srážky

Investice do výzkumu a vývoje technologií na úsporu vody a čištění odpadní vody

Vzdělávací programy

údržba vodních infrastruktur (minimalizace ztrát úniky)

Podpora recyklace vody: zejména v průmyslu a zemědělství, kde není vyžadována např. pitná voda

Neplýtvat – úspora vody i všeho ostatního..

Modrozelená infrastruktura

Zlepšení zemědělských metod (kapkové zavlažování, mulčování, způsob orby..)

Podpora samočistících procesů

Rozšiřovat chráněná území

Ochrana přírodních vodních zdrojů (retence - mokřady, lesy)

Chytré dotace

Skladba jídelníčku

Redukce používání fosilních paliv

Sezónní dynamika planktonních společenstev, “clear water”

"Clear water" - voda, která má malé množství suspendovaných částic nebo jiných látek způsobujících zakalení nebo zhoršení průhlednosti. “Clear water„ je transparentní s velkou průhledností

Clear water - typická pro čisté řeky, jezera, moře a oceány, kde není přítomna vysoká koncentrace organických či anorganických látek.

Ovlivněno – množství planktonu, eroze půdy, znečištění odpady z lidské činnosti, biologická aktivita a přirozené procesy, jako jsou například vlnění a proudění vody.

Fáze “clear water”

specifická fázi vývoje jezerního/rybničního ekosystému, kdy je snížená biomasa fytoplanktonu vody způsobená predačním tlakem velkého zooplanktonu - vysoká průhlednost.

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and
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Climate and food web effects on the spring clear-water phase in two north-temperate eutrophic lakes

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Abstract

Although climate change has shifted the phenological timing of plankton in lakes, few studies have explicitly addressed the relative contributions of climate change and other factors, including planktivory and nutrient availability. The spring clear-water phase is a period of marked reduction in algal biomass and increased water transparency observed in many lakes. Here, we quantified the phenological patterns in the start date, maximum date, duration, and magnitude of the clear-water phase over 38 yr in Lakes Mendota and Monona, and examined the effects of water temperature, total phosphorus, and food web structure (proportion of large-bodied *Daphnia pulicaria* and density of invasive *Bythotrephes*) and interactions between temperature and other predictors on these clear-water phase metrics. We found that climate and food web structure affected the clear-water phase, but the effects differed among the metrics. Higher water temperature led to earlier clear-water phase start dates and maximum dates in both lakes. The proportion of *D. pulicaria* affected all clear-water phase metrics in both lakes. When *D. pulicaria* proportion was higher, the clear-water phase occurred earlier, lasted longer, and the water was clearer. Moreover, high *Bythotrephes* density delayed clear-water phase start dates (both lakes), and decreased clear-water phase duration (Lake Mendota) in the following year. These results suggest that variation in food web structure changes the full phenological dynamics of the clear-water phase, while variation in climate condition affects clear-water phase timing only. Our findings highlight the importance of large-bodied grazers for managing water quality under climate change.

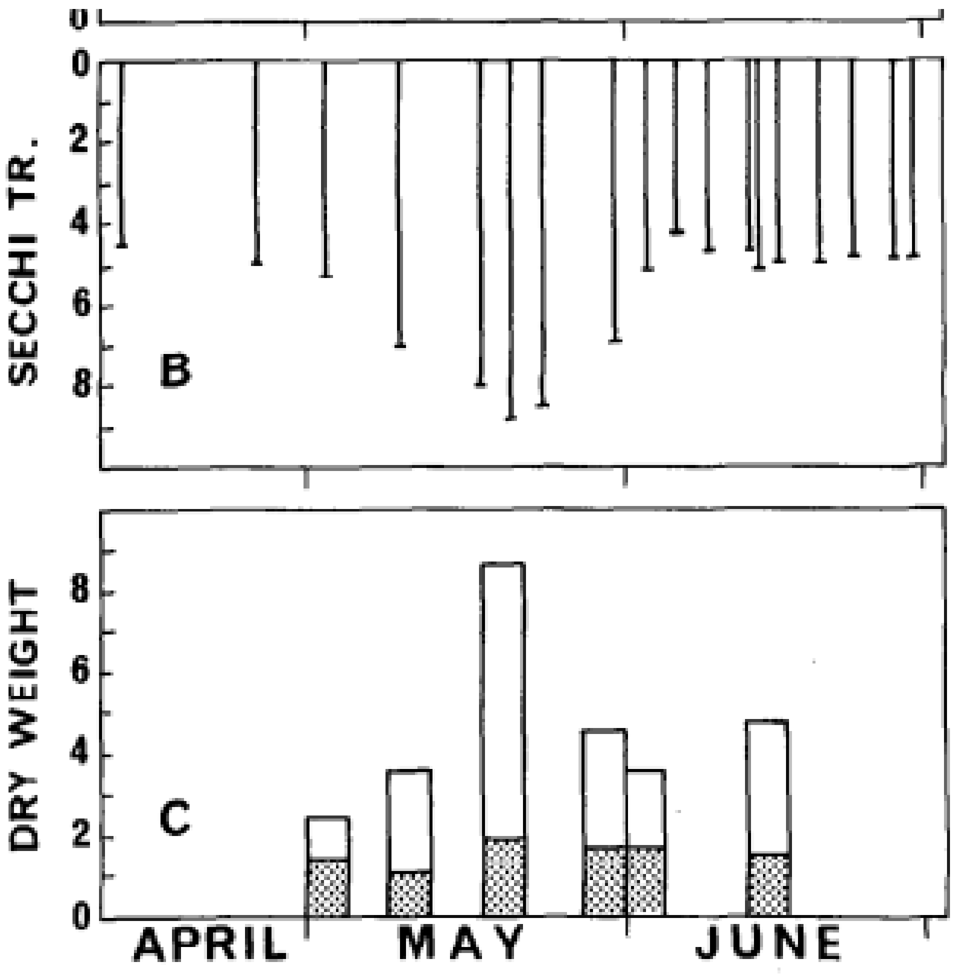
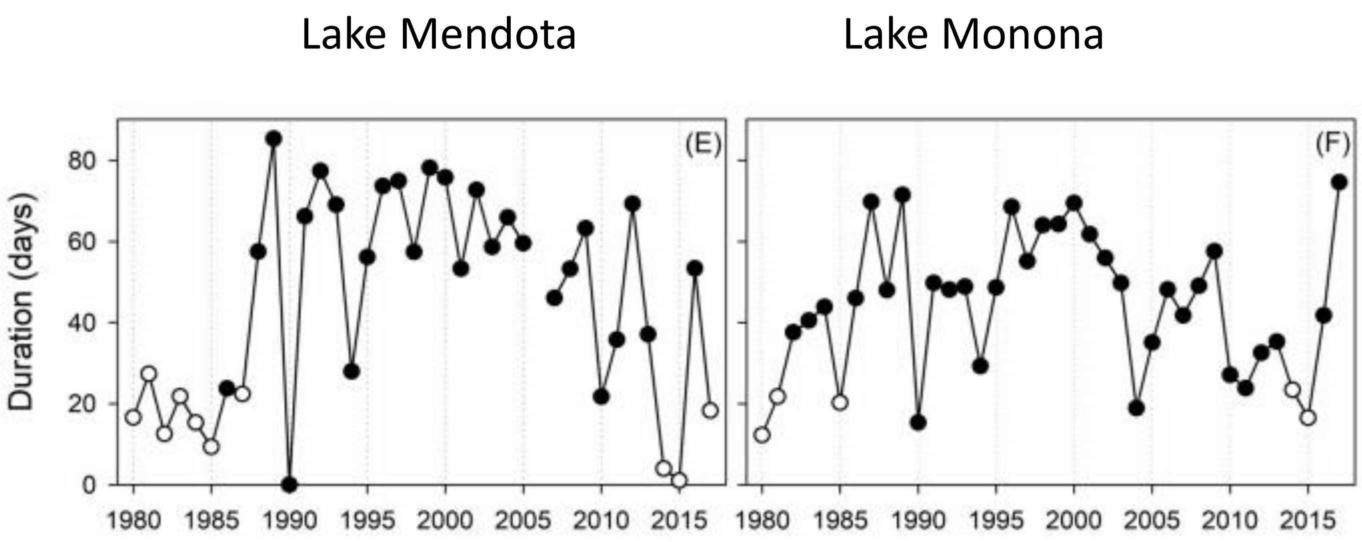


Fig. 2. Clear-water phase 1983 in Schöhsee. A. Concentration of particulate carbon (mg liter^{-1}) in different size fractions. Numbers indicate the mesh size (μm) through which the water had been sieved before the carbon determination. B. Secchi transparency (m). C. Biomass of dominant zooplankton (g m^{-2}). Open area: *Daphnia* spp.; stippled area: *Eudiaptomus* spp.



Sezónní dynamika planktonních společenstev - PEG model

The **PEG-model** of seasonal succession of planktonic events in fresh waters

U **Sommer**, ZM Gliwicz, W Lampert... - Archiv für ..., 1986 - pure.mpg.de

... and ponds which have been studied by the listed members of **PEG**. The confrontation of the **model** with empirical data reveals a major dichotomy in the successional pathways which ...

Abstract

A model is proposed which consists of 24 sequential statements which describe step by step the seasonal events which occur in the phytoplankton and zooplankton of an idealized 'standard' lake, which is based upon the well-studied Lake Constance. These statements have been confronted with the real situations which exist in 24 different lakes, reservoirs and ponds which have been studied by the listed members of PEG. The confrontation of the model with empirical data reveals a major dichotomy in the successional pathways which occur in lakes with and without elevated levels of summer algal biomass. This dichotomy together with other significant features such as the extent of grazing pressure are compared with the traditional distinction of water bodies into trophic types (eutrophic, oligotrophic). Succession in plankton is understood to be predictable and directional although it may be disturbed by irregular physical events.

Beyond the Plankton Ecology Group (PEG) Model: Mechanisms Driving Plankton Succession

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View Affiliations

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The seasonal succession of plankton is an annually repeated process of community assembly during which all major external factors and internal interactions shaping communities can be studied. A quarter of a century ago, the state of this understanding was described by the verbal plankton ecology group (PEG) model. It emphasized the role of physical factors, grazing and nutrient limitation for phytoplankton, and the role of food limitation and fish predation for zooplankton. Although originally targeted at lake ecosystems, it was also adopted by marine plankton ecologists. Since then, a suite of ecological interactions previously underestimated in importance have become research foci: overwintering of key organisms, the microbial food web, parasitism, and food quality as a limiting factor and an extended role of higher order predators. A review of the impact of these novel interactions on plankton seasonal succession reveals limited effects on gross seasonal biomass patterns, but strong effects on species replacements.

Keyword(s): food quality, grazing, lakes, light, oceans, overwintering, parasitism, pelagic zone, seasonal patterns

Hutchinsonův „paradox planktonu“

Fenomén popsaný britským ekolog G. Evelyn Hutchinson v 50. letech 20. století

Popisuje zdánlivě nesmyslnou koexistenci velkého počtu druhů planktonu v otevřených mořích a sladkovodních tělesech, které jsou relativně homogenní a nabízejí podobné ekologické podmínky

Podle klasických principů ekologie by konkurence měla vyřadit většinu druhů z prostředí, které nabízí omezené zdroje

Ale v planktonu se vyskytuje mnoho druhů současně, i když sdílejí podobné nároky na životní prostředí a zdroje

Hutchinsonův „paradox planktonu“ - vysvětlení

Různé časové a prostorové zdroje: specializace na využití různých časově proměnných nebo prostorově omezených zdrojů v ekosystému. chaotický pohyb vody

Různé adaptace: odlišnosti v různých adaptacích na konkrétní podmínky, což jim umožňuje soupeřit o zdroje v různých částech prostředí. vyžírací tlak zooplanktonu

Změny v prostředí: dynamika prostředí, jako je například sezónní změny, může vytvářet proměnlivé podmínky, které umožňují různým druhům planktonu být úspěšné v různých částech cyklu.

Lytické viry – hypotéza „**Kill the winner**“ (ovlivňují biochemické cykly prvků a horizontální transfer genů)

Viruses in the sea

Curtis A. Suttle

Nature **437**, 356–361 (2005) | Cite this article

Marine viruses — major players in the global ecosystem

Curtis A. Suttle

Abstract | Viruses are by far the most abundant 'lifeforms' in the oceans and are the reservoir of most of the genetic diversity in the sea. The estimated 10^{30} viruses in the ocean, if stretched end to end, would span farther than the nearest 60 galaxies. Every second, approximately 10^{23} viral infections occur in the ocean. These infections are a major source of mortality, and cause disease in a range of organisms, from shrimp to whales. As a result, viruses influence the composition of marine communities and are a major force behind biogeochemical cycles. Each infection has the potential to introduce new genetic information into an organism or progeny virus, thereby driving the evolution of both host and viral assemblages. Probing this vast reservoir of genetic and biological diversity continues to yield exciting discoveries.

Abstract

Viruses exist wherever life is found. They are a major cause of mortality, a driver of global geochemical cycles and a reservoir of the greatest genetic diversity on Earth. In the oceans, viruses probably infect all living things, from bacteria to whales. They affect the form of available nutrients and the termination of algal blooms. Viruses can move between marine and terrestrial reservoirs, raising the spectre of emerging pathogens. Our understanding of the effect of viruses on global systems and processes continues to unfold, overthrowing the idea that viruses and virus-mediated processes are sidebars to global processes.

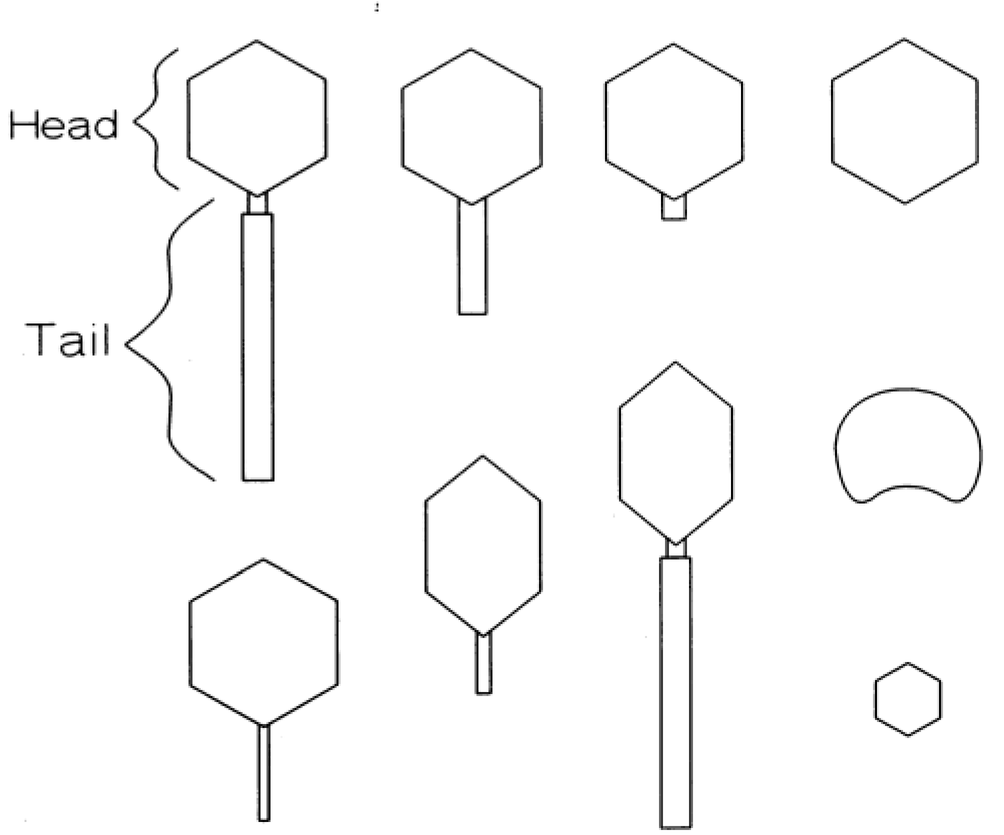


Fig. 1: General morphologies of viruses (primarily bacteriophages), modifie from Ackermann and DuBow (1978). Another common term for the head i "capsid." Typical head diameters are 20-200 nm, although some larger one are known. Of the types shown, the only ones readily recognized in electro micrographs from seawater are those with polyhedral heads (see Fig.2). Fila mentous ones, which are very flexible and are represented by the long thin rec tangle on the right, and irregularly shaped ones are not easily distinguishe from other filaments or similar sized "blobs" in seawater.

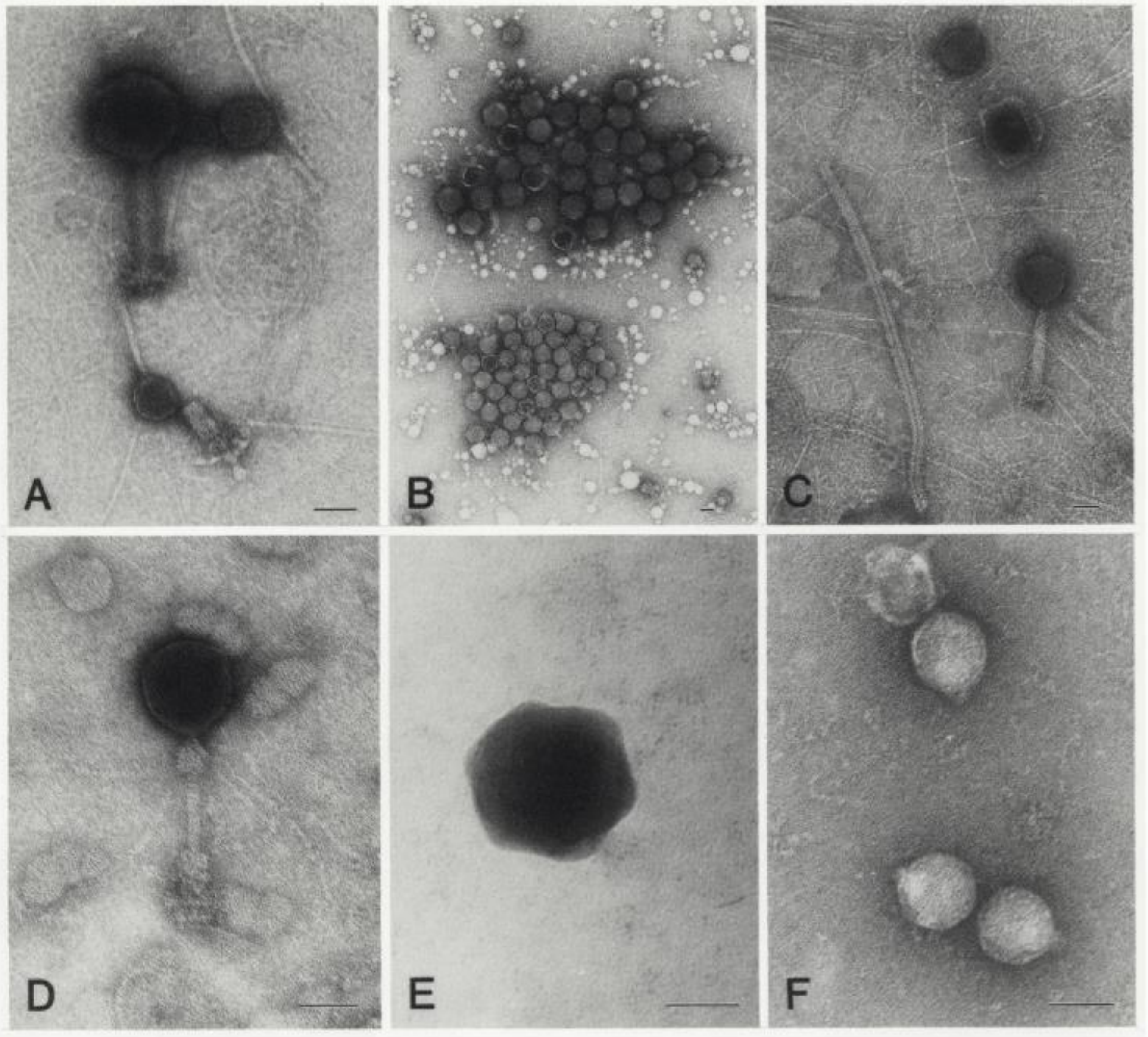
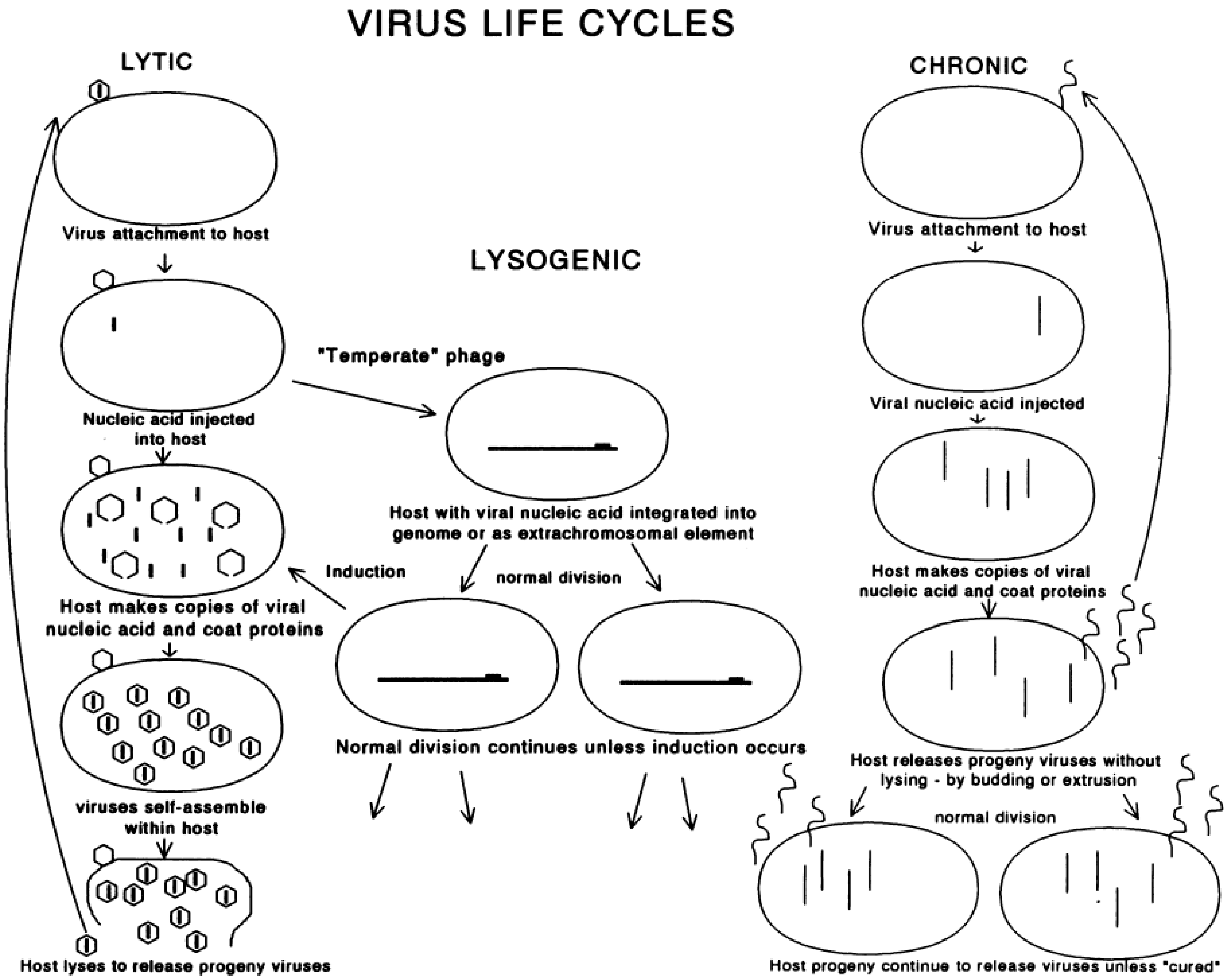


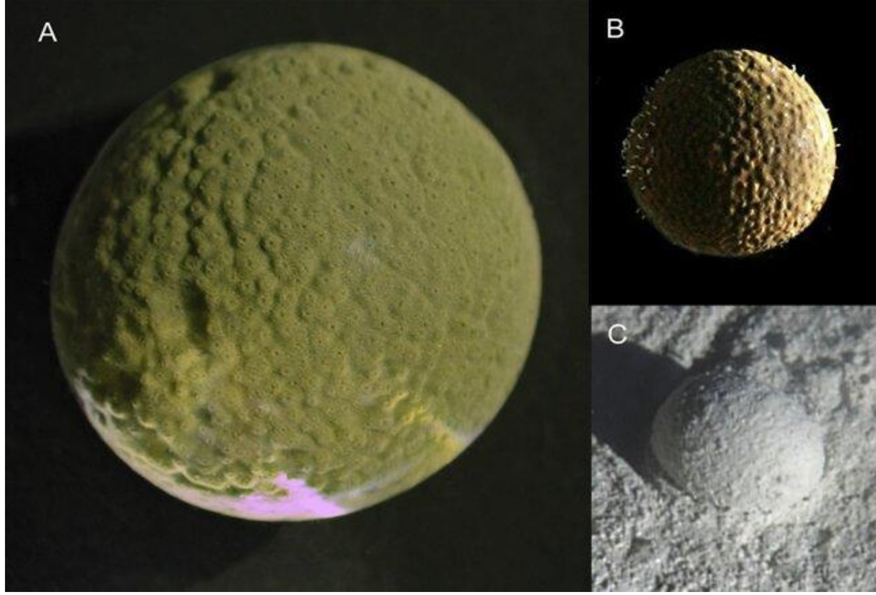
Fig. 2: Transmission electron micrographs showing the morphological diversity of marine viruses. A-C), Natural virus communities from the Gulf of Mexico; D and F), Cyanophages *(S-PWM4 & S-PWP1), which infect strains of* Synechococcus *spp.; E) Virus (MPV-SP1), which infects the photosynthetic flagellate* Micromonas pusilla. *Scale bar equals 100 nm.*

Fuhrma and Curtis https://www.jstor.org/stable/43924641



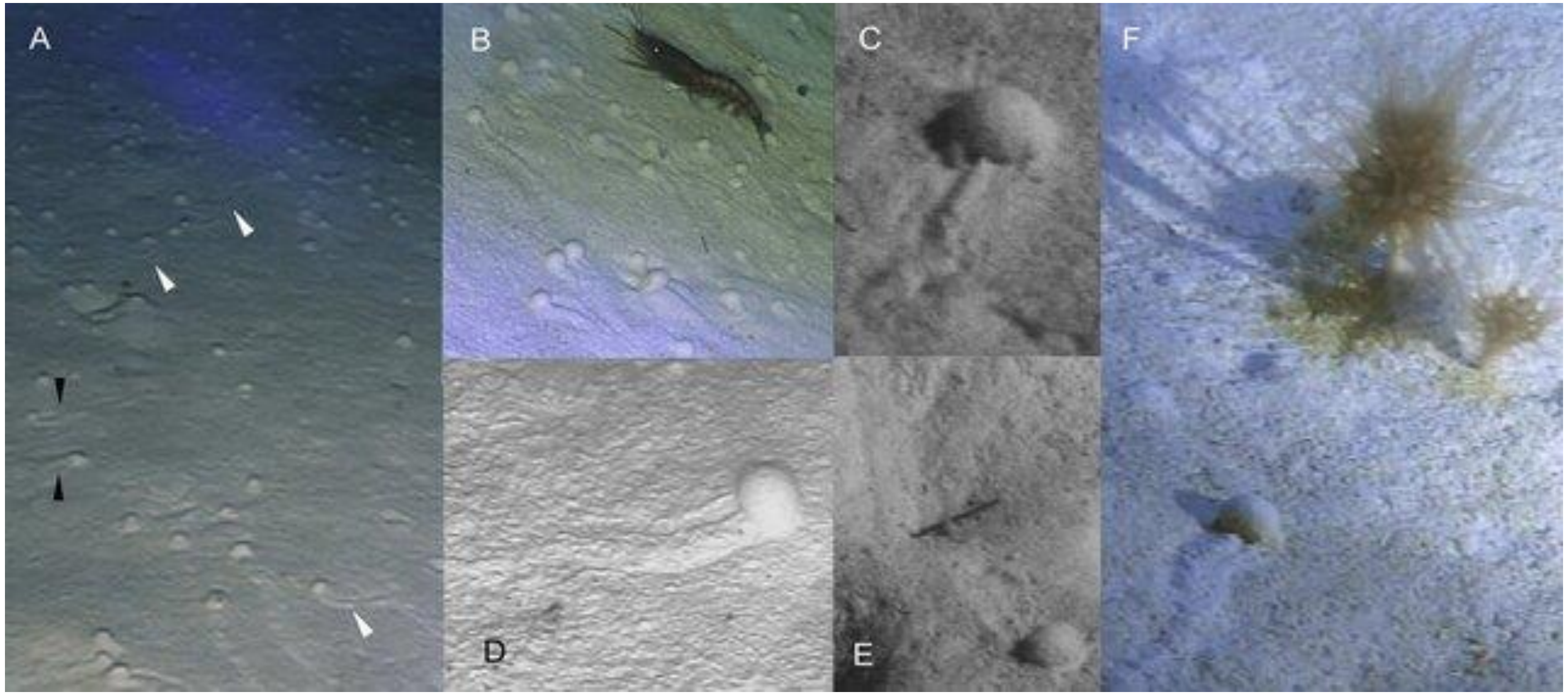
VIRUS LIFE CYCLES
LYTIC
Virus attachment to host
Nucleic acid injected into host
Host makes copies of viral nucleic acid and coat proteins
viruses self-assemble within host
Host lyses to release progeny viruses
LYSOGENIC
"Temperate" phage
Host with viral nucleic acid integrated into genome or as extrachromosomal element
Induction
normal division
Normal division continues unless induction occurs
CHRONIC
Virus attachment to host
Viral nucleic acid injected
Host makes copies of viral nucleic acid and coat proteins
Host releases progeny viruses without lysing - by budding or extrusion
normal division
Host progeny continue to release viruses unless "cured"

Obří měňavka vysvětluje fosilní záhadu

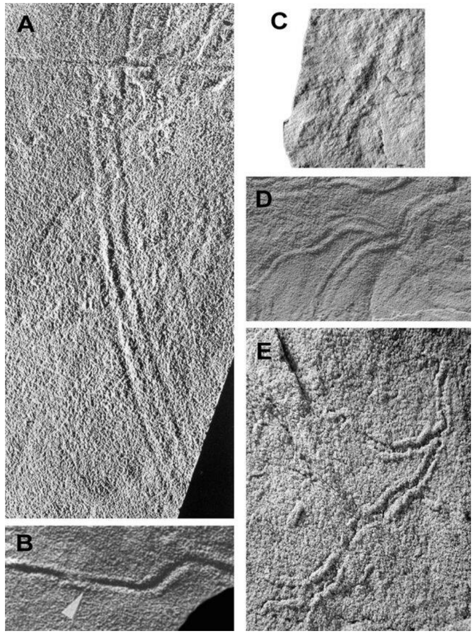


Gromia sphaerica - *v* hloubkách od 800 - 1700 metrů
na bahnitém dně améby o průměru **4 cm**.

záhadné fosilní stopy staré 1,8 miliardy let
Vznik mnohobuněčných živočichů podle dosavadních teorií
před 530 miliony let (kambrická exploze)



Stopy pohybu měňavky v bahně



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Zdroje

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