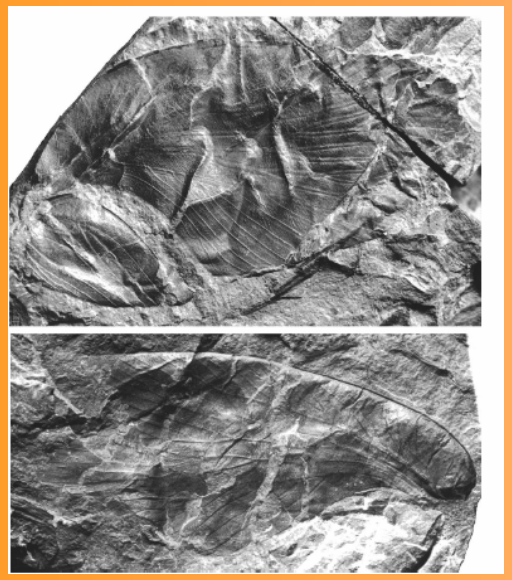
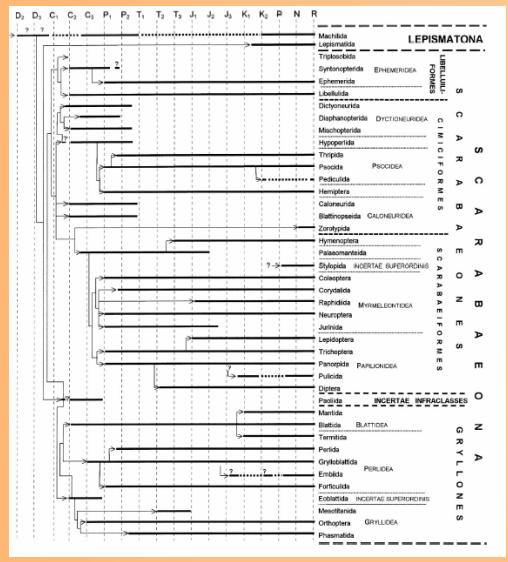




Paleoentomologie

Blok č. 1

Přednášející: Mgr. Ondřej Dostál

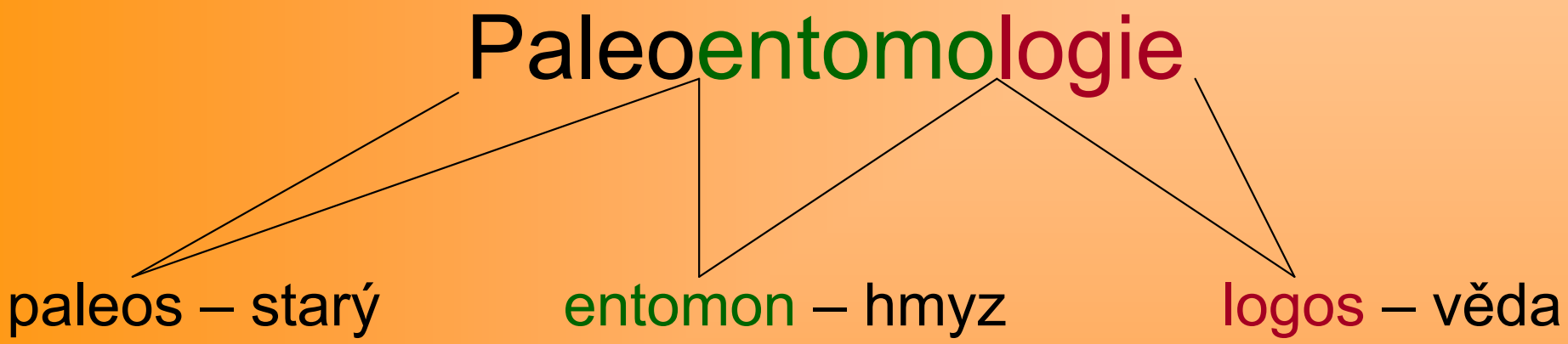
Informační zdroje

- Rasnitsyn et al. 2002. *History of Insects*, Kluwer Academic Publishers
- Carpenter, F.M. 1992. *Treatise on Invertebrate Palaeontology. Pt. R. Arthropoda 4.Vol. 3. Superclass Hexapoda.* Geol. Society of America, Boulder, Colorado, and Univ. of Kansas, Lawrence, Kansas: 655 p.
- EJE – European Journal of Entomology
- Journal of Paleontology
- Nature
- Canadian Entomologist

- Struktura přednášky
  - Co je to paleoentomologie
  - Historie oboru
  - Podmínky zachování hmyzu
  - Prostředí umožňující zachování

  - příště – systém a časový výskyt hmyzu

Co je to paleoentomologie



Vědní obor zabývající se studiem hmyzu

v geologické minulosti Země

Hraniční obor mezi paleontologií a biologií

Historie oboru

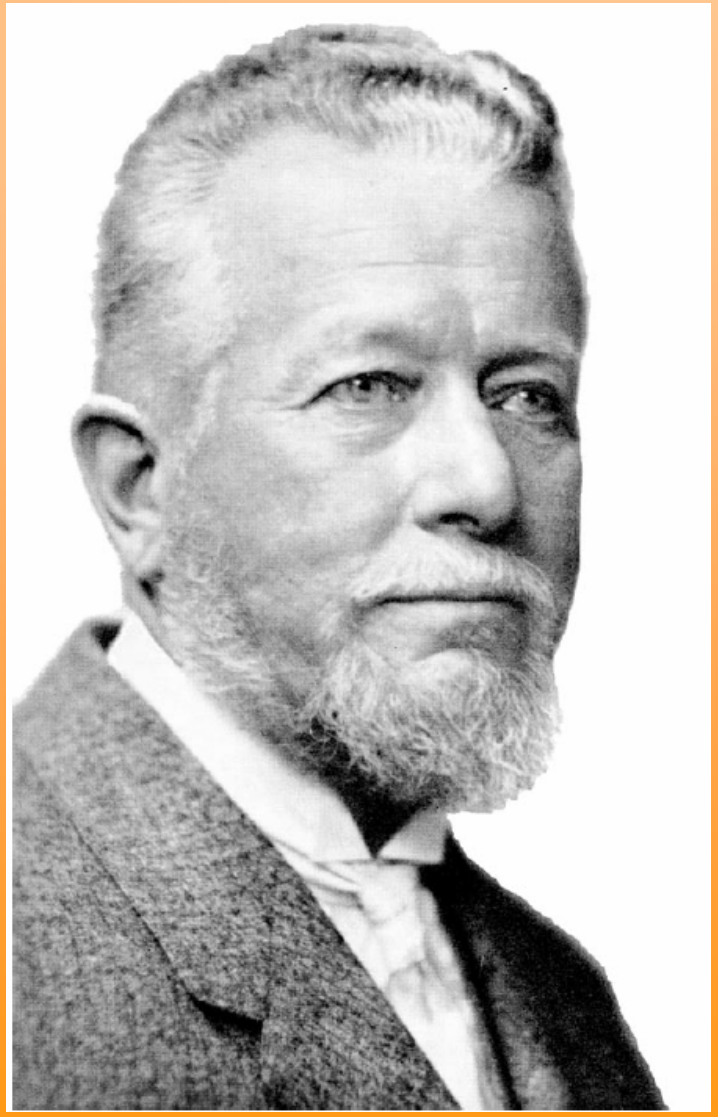
- Původně spojena s biologickými studiemi

Marcus Elieser Bloch (1723-1799)

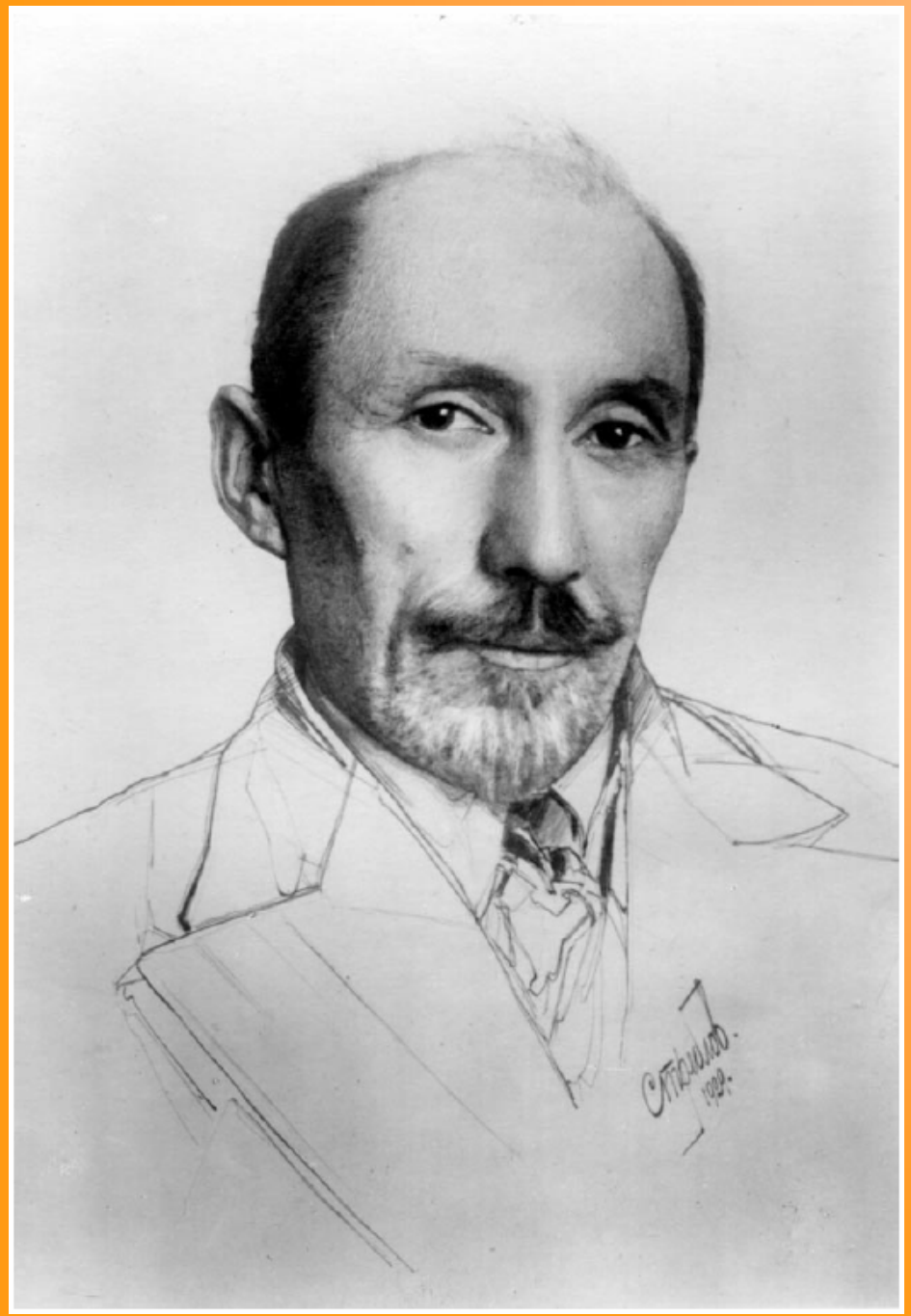
Ernst Friederich Germar (1786-1859)

- Charles Brongniart (1859-1899), entomologist in Paris

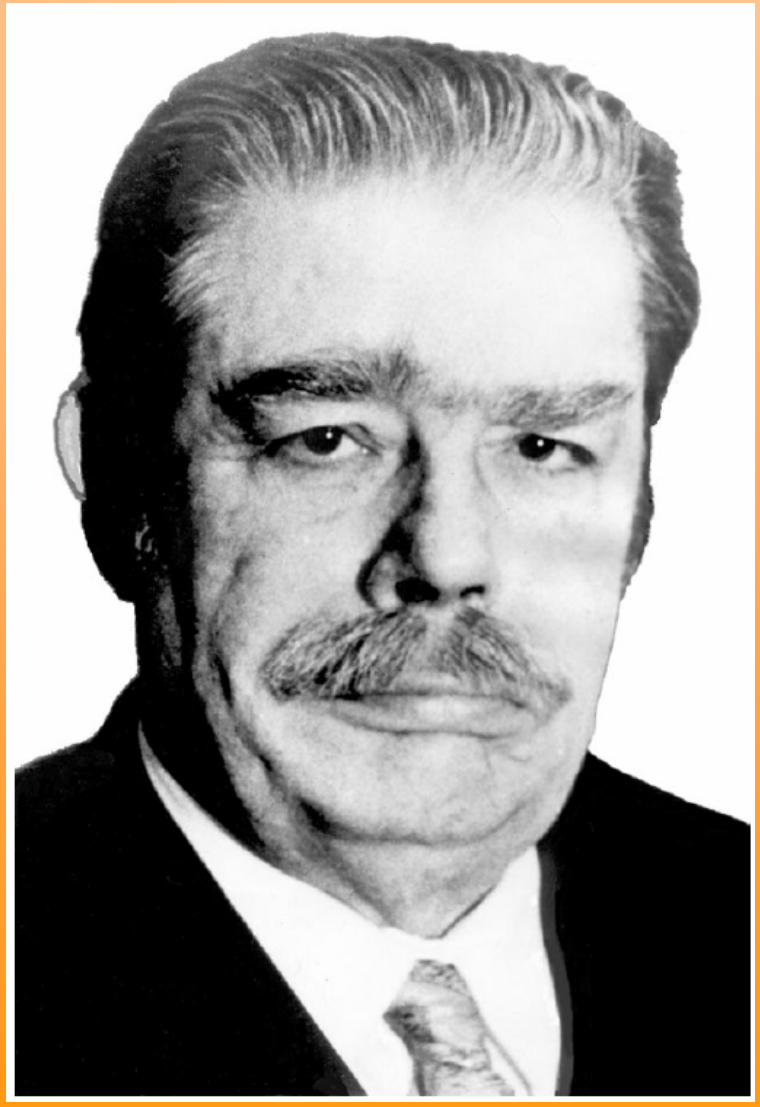
- Anton Handlirsch (1865-1935), professor in Wien



Andrey Vassilievich Martynov (1879-1938), professor in Leningrad and Moscow

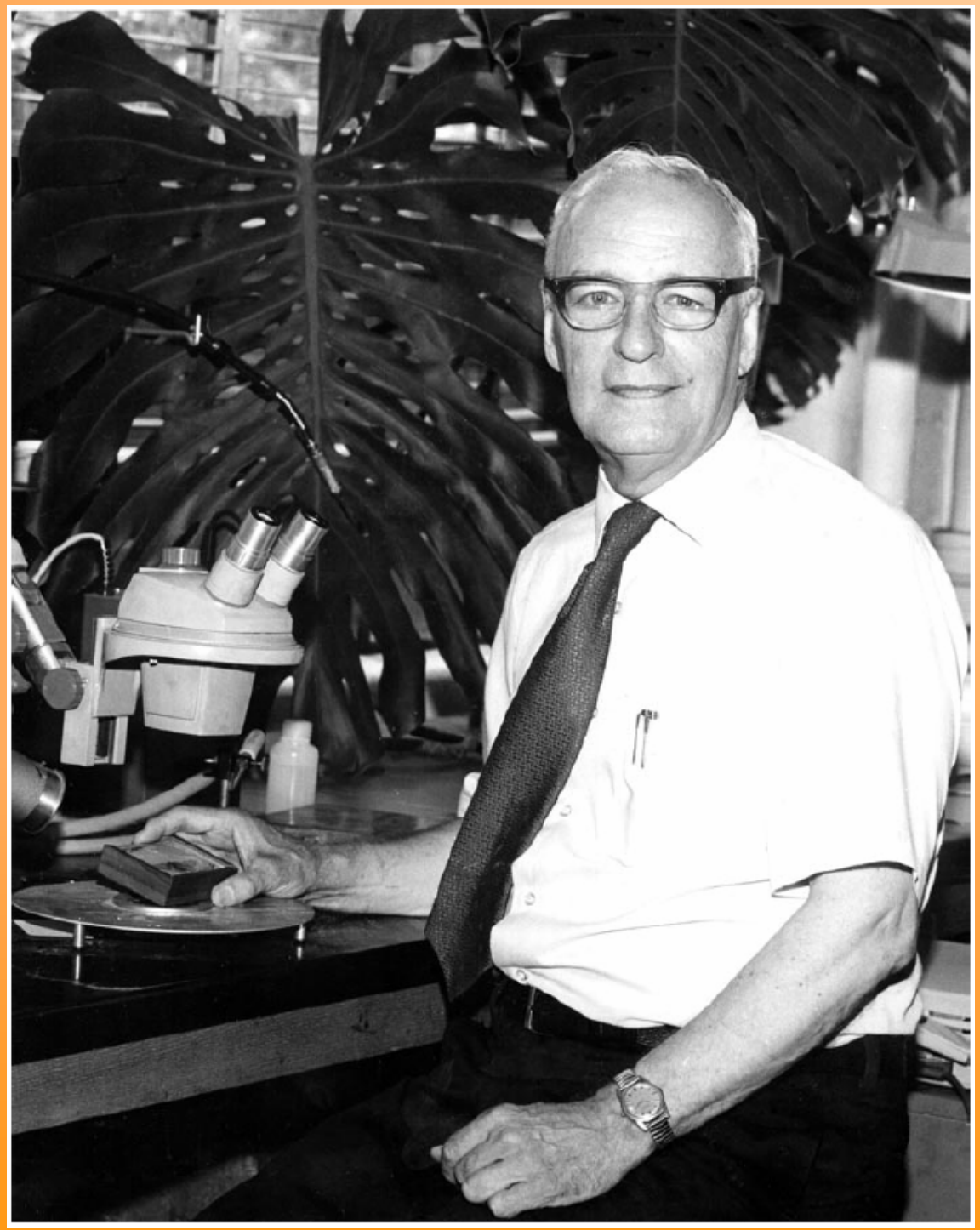


Boris Borissovich Rohdendorf
(1904-1977), professor in Moscow

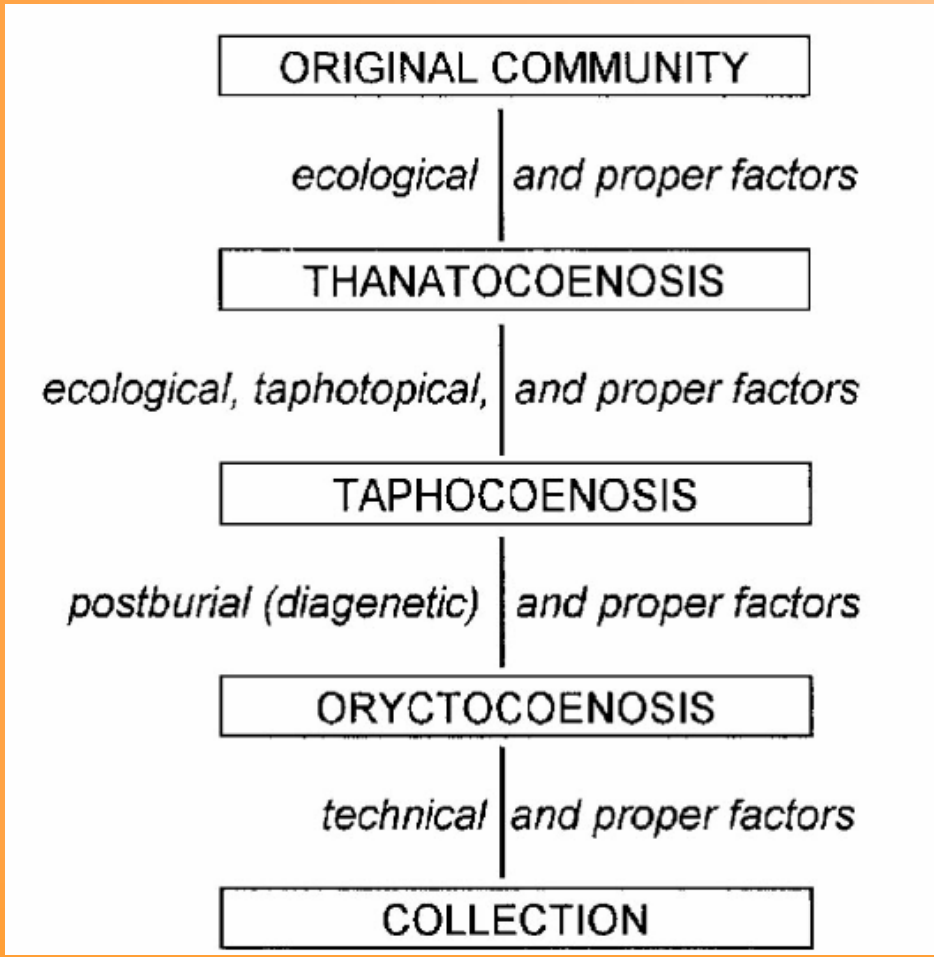


„Otec moderní paleoentomologie“

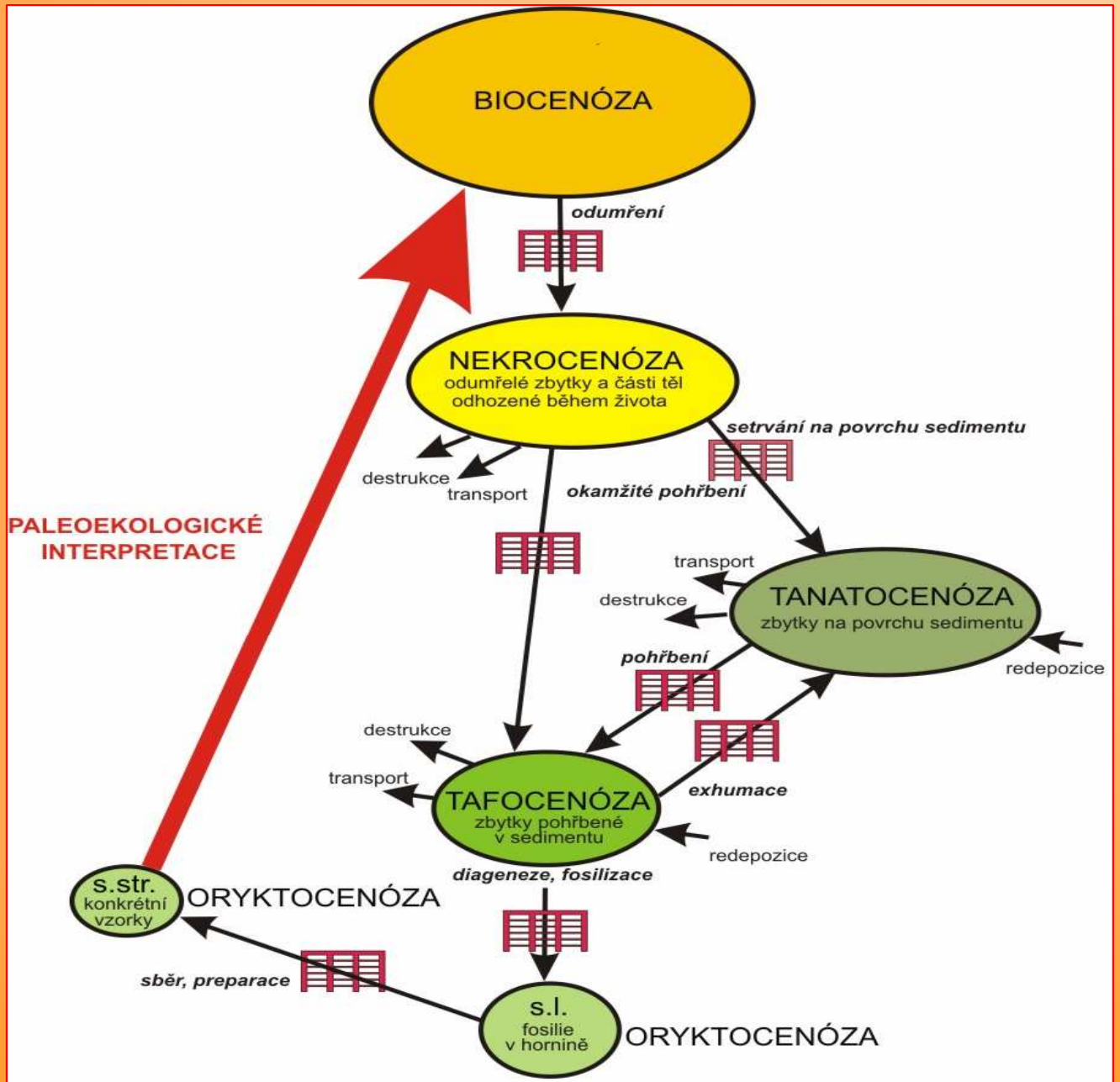
Frank Morton Carpenter
(1902-1994)



Tafonomie

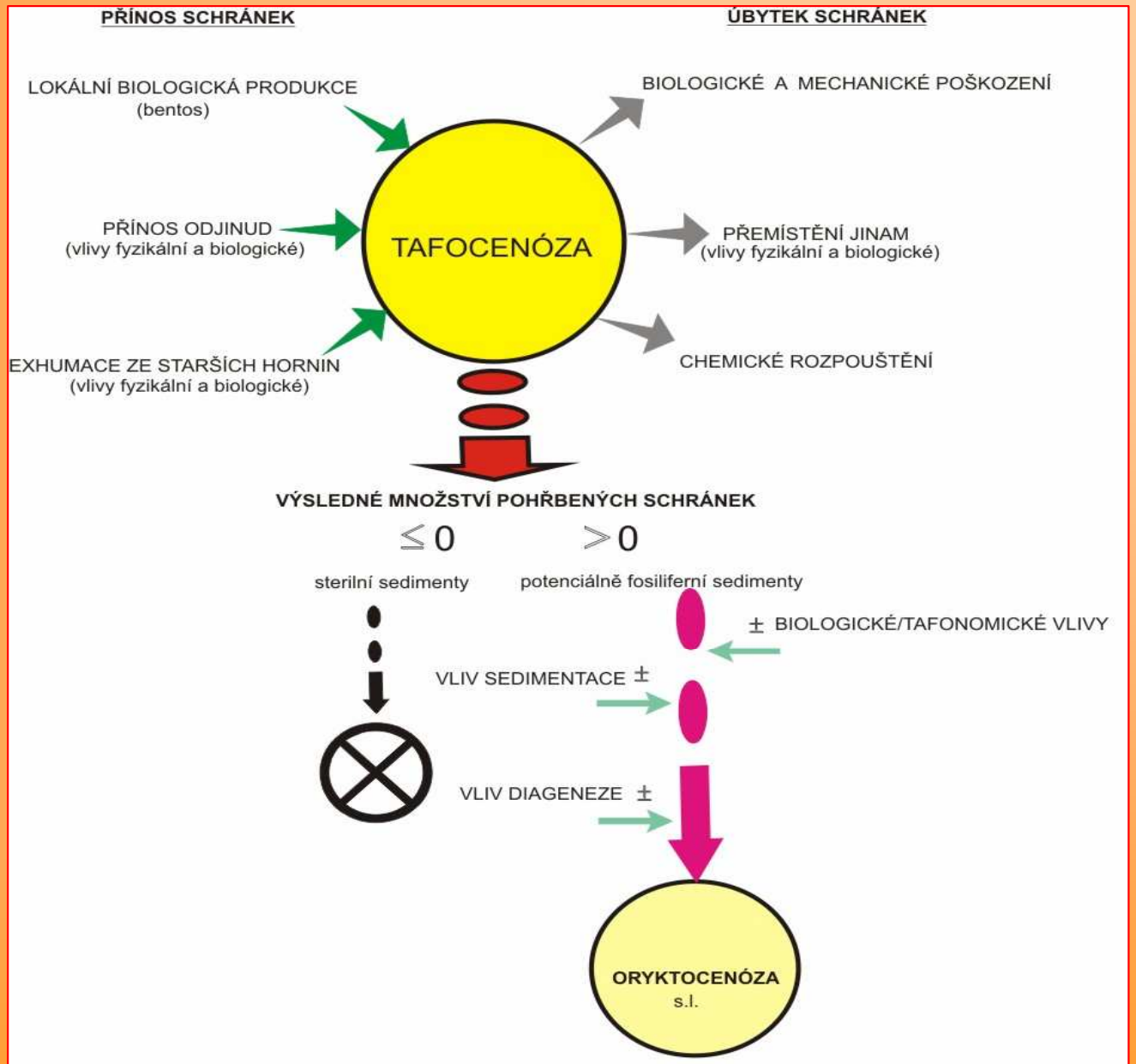

ORIGINAL COMMUNITY
ecological
and proper factors
THANATOCOENOSIS
ecological, taphotopical,
and proper factors
TAPHOCOENOSIS
postburial (diagenetic)
and proper factors
ORYCTOCOENOSIS
technical
and proper factors
COLLECTION

Tafonomický cyklus



Obr. 1:
Schematické znázornění jednotlivých etap tafonomického cyklu s uvedením základní terminologie (sensu Janin 1989, Marek, Krhovský in Pokorný 1992). Rozdělení na oryktocenózu s. l. a s. str. - viz text. Částečně podle Behrensmeyer, Kidwell (1985).

Faktory ovlivňující podobu oryktocenózy



Obr. 2:
Schematické znázornění faktorů, které ovlivňují vznik a výslednou podobu oryktocenózy s. l. Základním předpokladem pro vznik jakékoliv oryktocenózy je kladná hodnota přínosu schránek do tafocenózy, k čemuž dochází různými možnými výhodnými kombinacemi přínosů a úbytků. Podle Kidwell (1991), upraveno.

- 1. ***community or biocoenosis*** (all organisms inhabiting certain habitat)
- 2. ***thanatocoenosis, or death assemblage*** (all corpses in the habitat; the organisms predated upon or which drifted away have been removed while others may be transported in from the outside)
- 3. ***taphocoenosis, or burial assemblage*** (all organic remains entombed in unconsolidated sediments; the corpses consumed by scavengers, decayed, mechanically removed or destroyed have been excluded)
- 4. ***oryctocoenosis, or fossil assemblage*** (all fossils preserved inside the rock after its lithification; those crushed by pression or crystallisation, chemically dissolved, *etc*., have been lost)
- 5. ***collection*** (all fossils in hands; the specimens overlooked or badly damaged during collecting have been abolished).

Environments

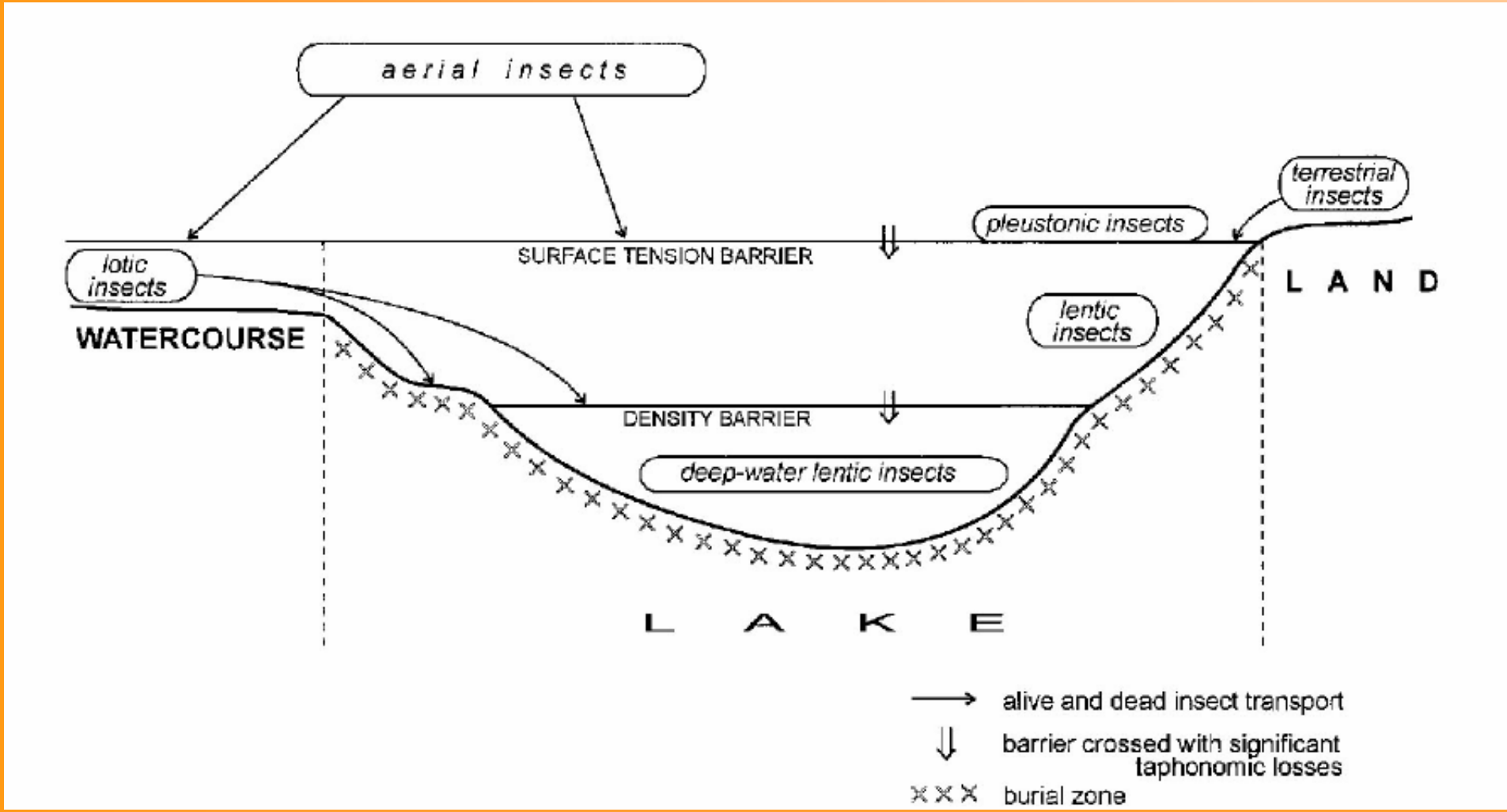
- 1. ***biotope*** (***habitat***)
- 2. ***thanatotope*** (death environment)
- 3. ***taphotope*** (burial environment)
- 4. ***oryctotope*** (fossilisation environment)
- 5. ***depository***

Factors

- 1. ***autotaphonomical***, ***intrinsic*** (characteristics of organisms which may be important at any stage of the taphonomical process)
- and ***allotaphonomical***
- 2. ***ecological or pre-burial*** (environmental factors operating within bio- and thanatotopes including both biotic and abiotic agents)
- 3. ***taphotopical or burial*** (related to burial environments)
- 4. ***post-burial*** (depending on diagenetic, metamorphic, and hypergenetic rock alteration)
- 5. ***technical*** (depending on methods of collecting, conservation and studying of fossils).

- Each class may be further subdivided into taphonomically ***positive*** (*i. e.* favouring to preservation) and ***negative*** factors.

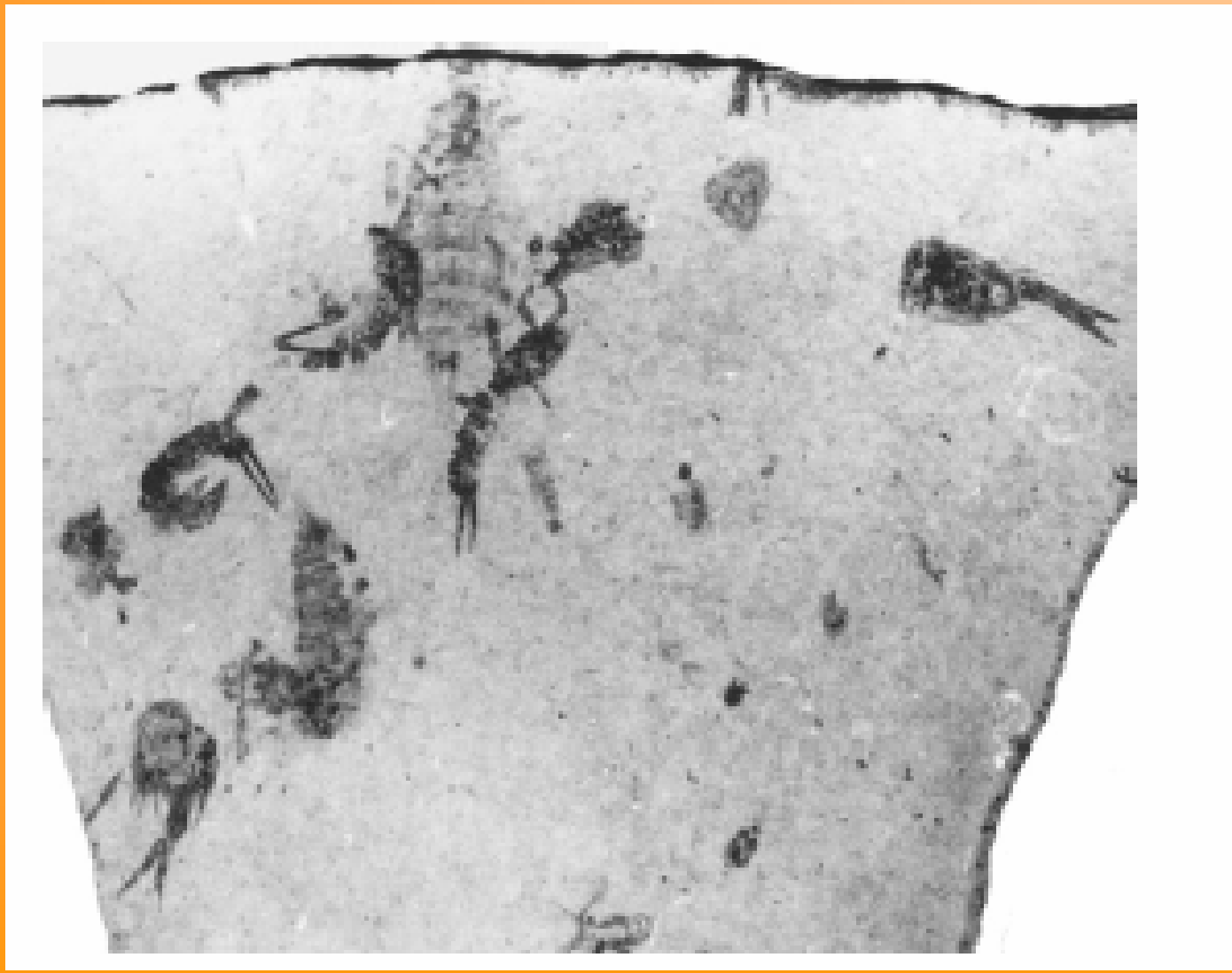
Direct burial



Autotaphonomical factors

- The **chitinous exoskeleton**
- **development with ecdysis**
- **capacity of flight**
- **small body size**
- Mass **migrations**
- **Circadian activity**
- The **polarised light reflected by water surfaces**
- **swarming behaviour**
- The **swimming ability**
- The **mode of oviposition** and of **adult emergence**
- The **disarticulation pattern**

- A merocoenosis composed of moulting casts of aquatic immatures of the heptageniid mayfly *Ephemeropsis melanurus* Cockerell (dark, wide in the uppermost left and lowermost right corners; note their shrivelled condition indicating drying-out), coptoclavid beetle *Coptoclava longipoda* Ping (dark, slender, numerous), and hemeroscopid dragonfly *Hemeroscopus baissicus* Pritykina (pale, wide) in the Early Cretaceous of Baissa in Siberia (PIN 3064/6642, photo by D.E. Shcherbakov); slab 92 mm high as shown.



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Ecological factors

- weather
- environmental dynamics

Mortality factors

- **place of death (*thanatotope*)**
- **Mortality rate**
- **natural traps**.
- **Weather conditions**
- **Volcanic eruptions**
- The **biotic factors of mortality**
- **parasites** and **pathogens** may

Post-morten ecological factors

- **surface tension**
- **Wind**
- **Water density**
- **Water current**
- **Weathering**
- **Rapid mineralisation**
- **shore vegetation**
- The **benthic scavenger activity**
- **Microbial activity**

Taphotopical factors

- The **sedimentation rate**
- **Thermal conditions**
- The **mechanical composition** of sediments
- **Infaunal benthos activity**
- The **subaerial taphotopes**

Postburial factors

- ***diagenesis***

Technical factors

- **The availability of fossiliferous rocks for sampling**
- **Techniques** of collecting and studying fossils

INDIRECT BURIAL IN FOSSIL CONTAINERS.

- FOSSIL RESINS
- Chemically the resins are composed by a complex mixture of diverse terpenoids, *i. e.* mono-, di-, tri- and polymers of the isoprene unit
- CH3
- |
- — CH2 — C = CH — CH2 —

Products of the taphonomical process: insect fossils and ichnofossils in different palaeoenvironments and modes of their preservation

- Marine deposits
- Non-marine subaquatic palaeoenvironments
- Lacustrine deposits
- Swamp, marsh and other wetland deposits
- Fluvial deposits
- Spring deposits
- Subaerial palaeoenvironments