

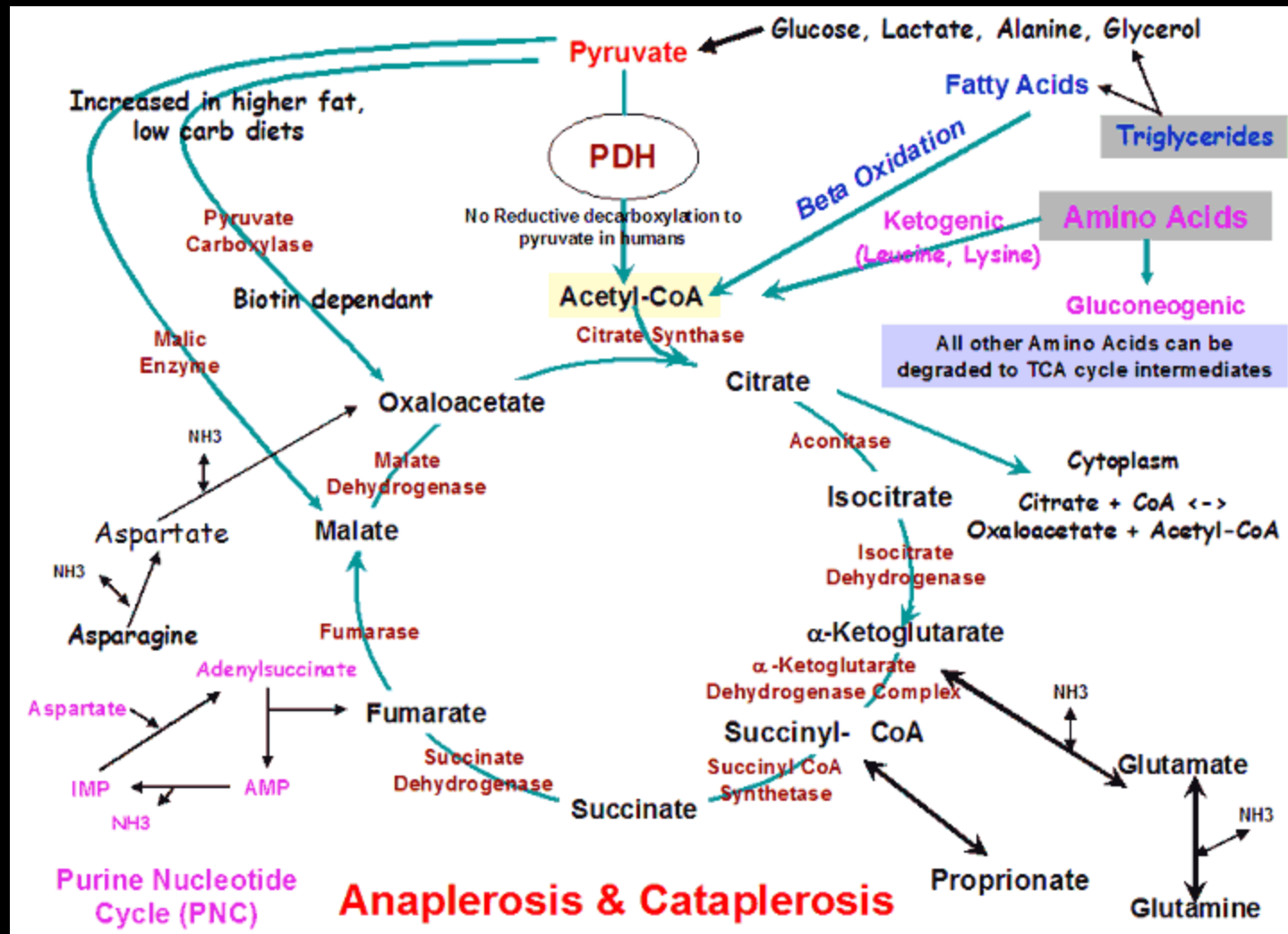
Gaasivahetus

Alo Vanatoa

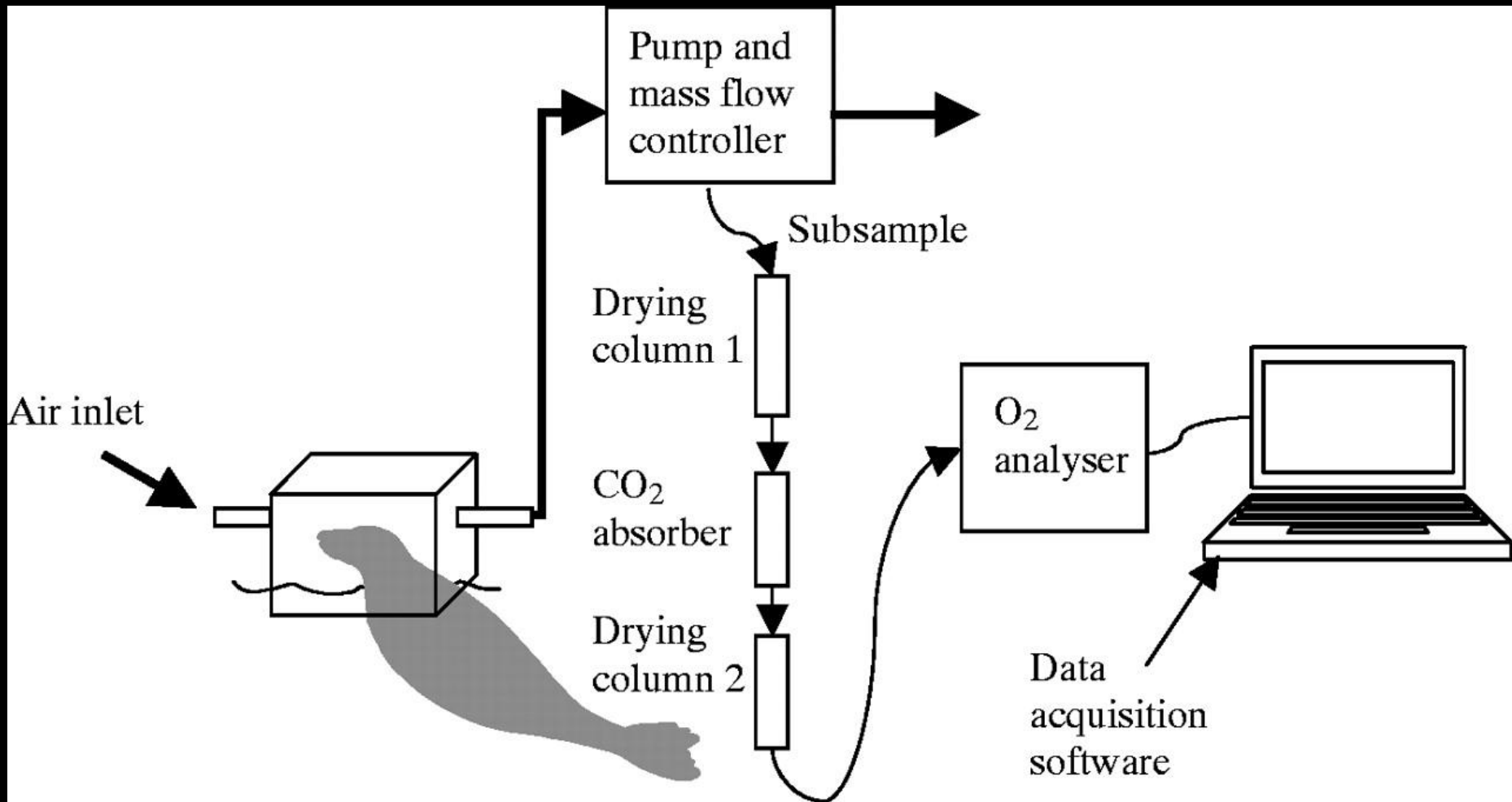
- Kolm faasi
 - väliskeskkond ja hingamispinnad
 - sisekeskkond
 - koed
- Teine ja kolmas alati veekeskkonnas
- Difusioon
 - Fick'i seadus



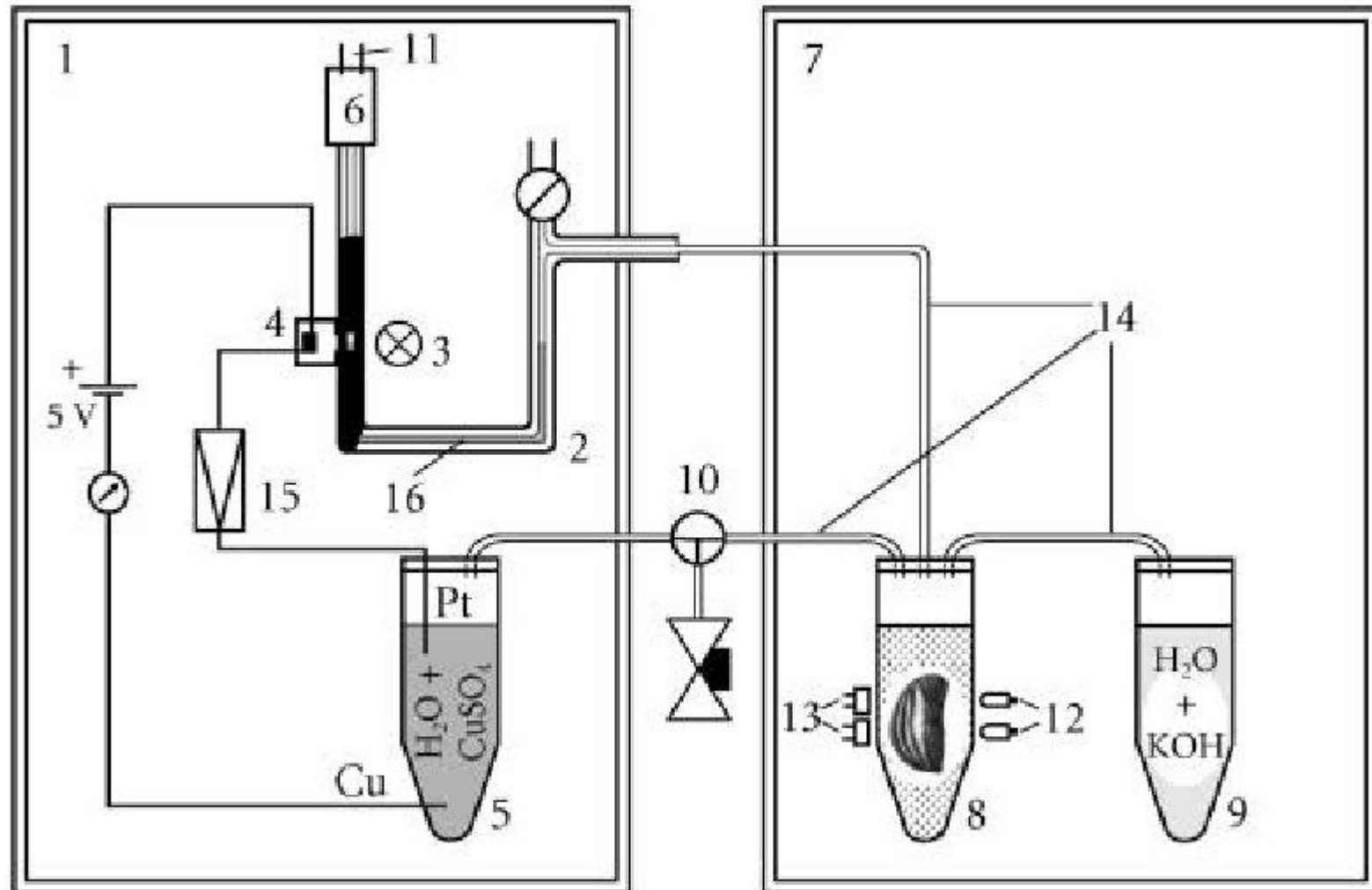
Syringammina fragilissima



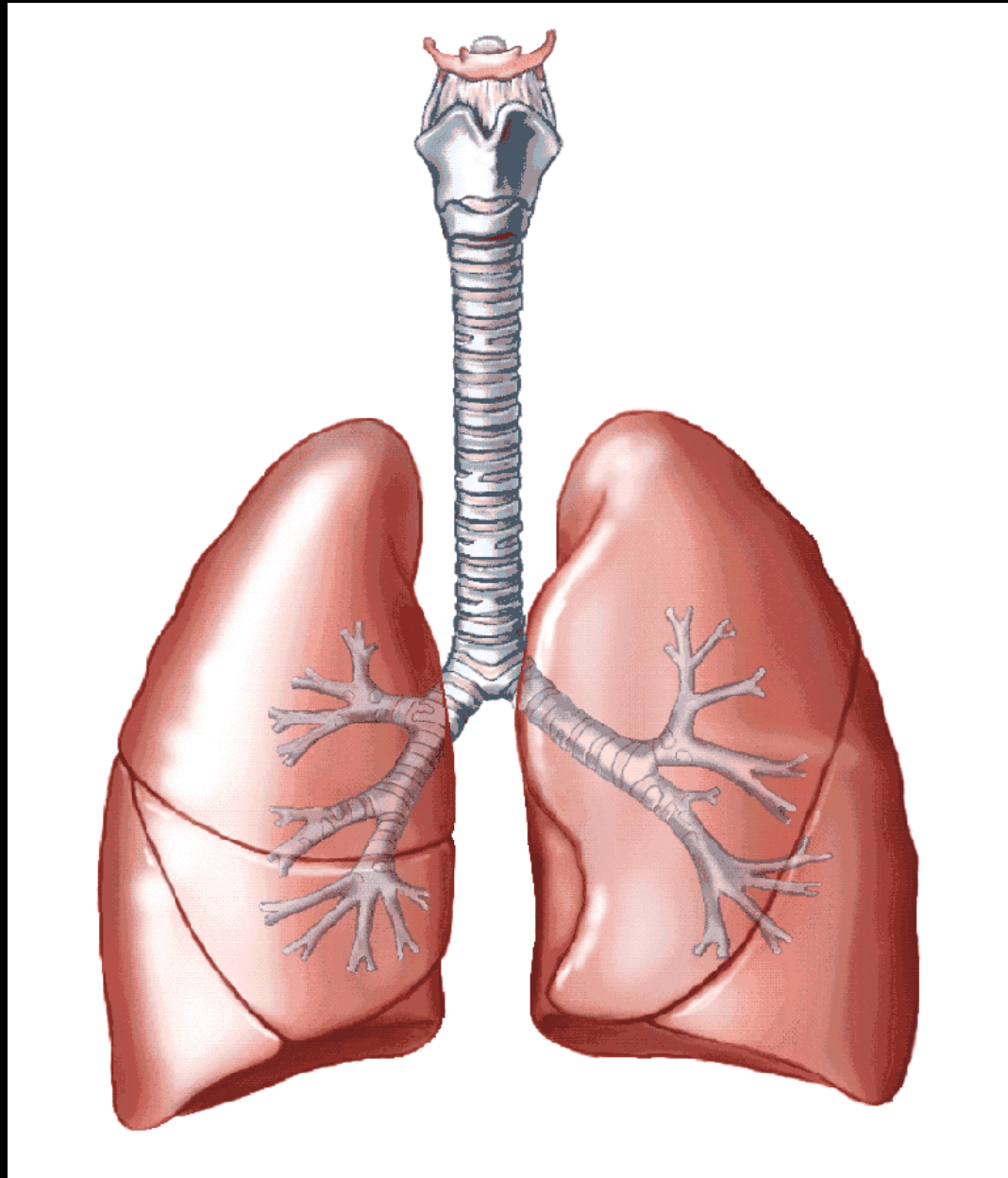
Avatud respiromeetria



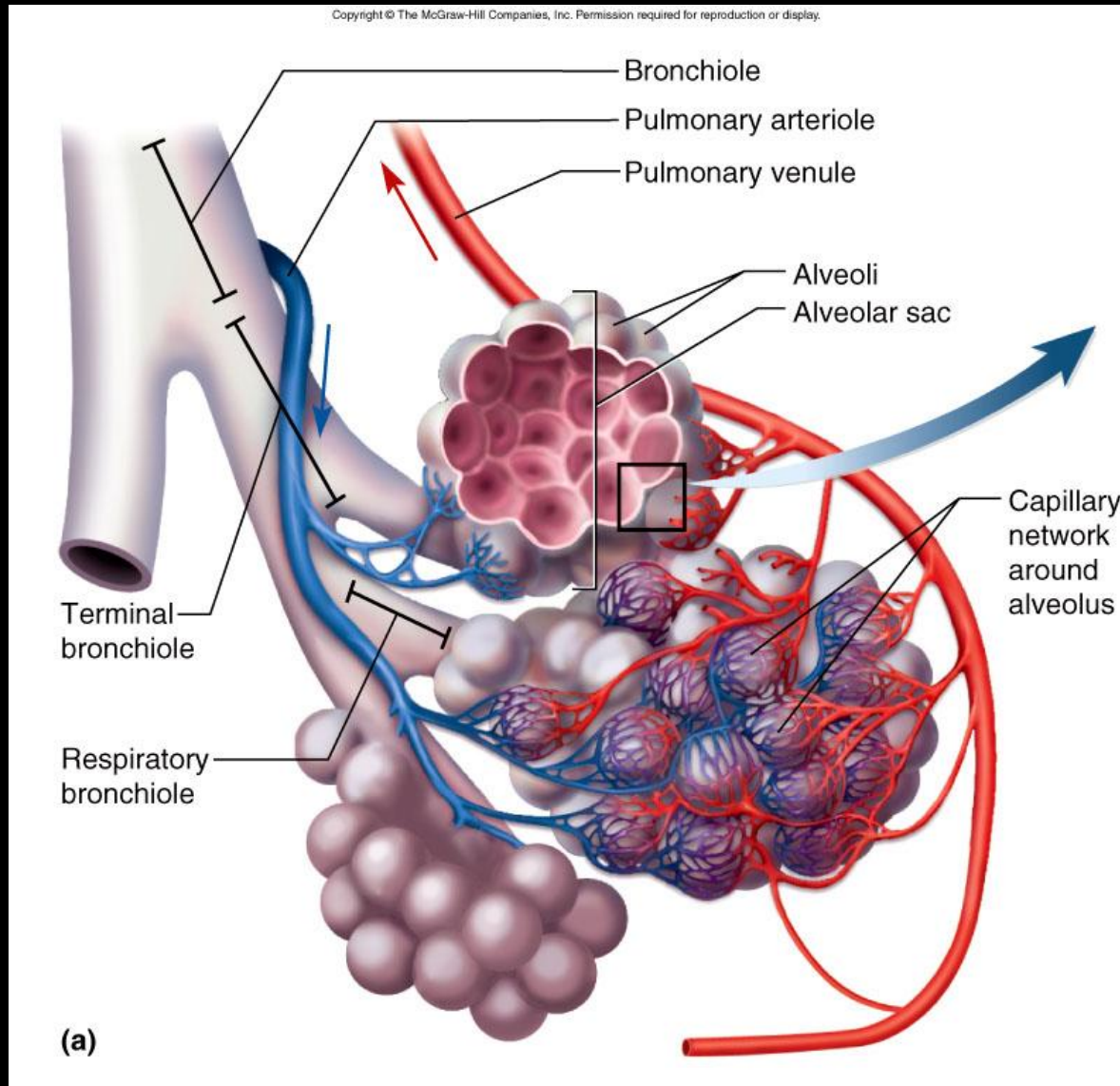
Suletud respiromeetria



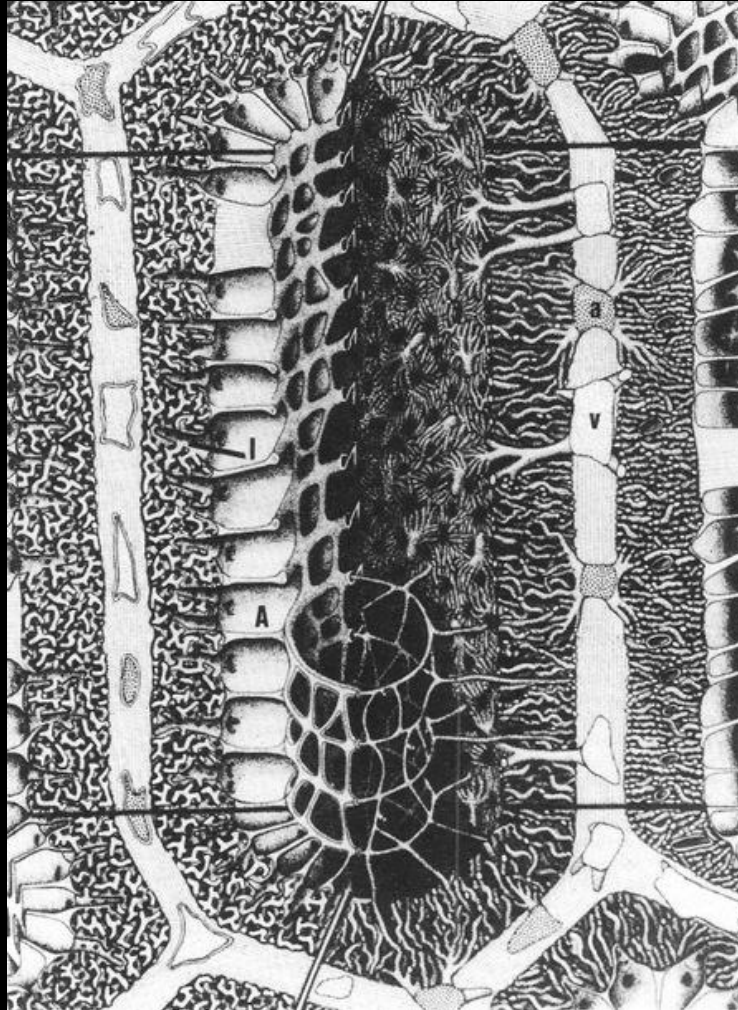
Imetaja kops



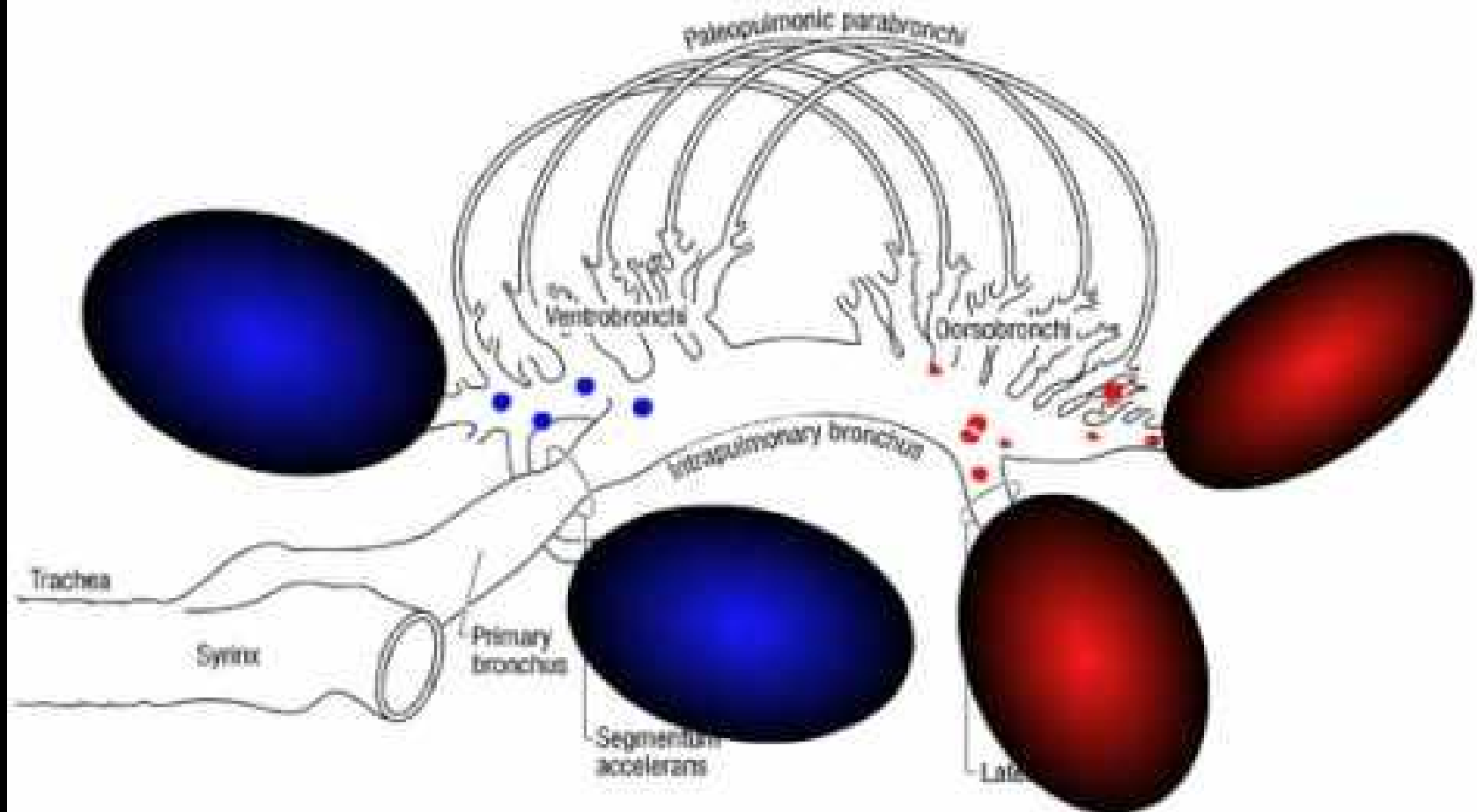
Imetaja kops



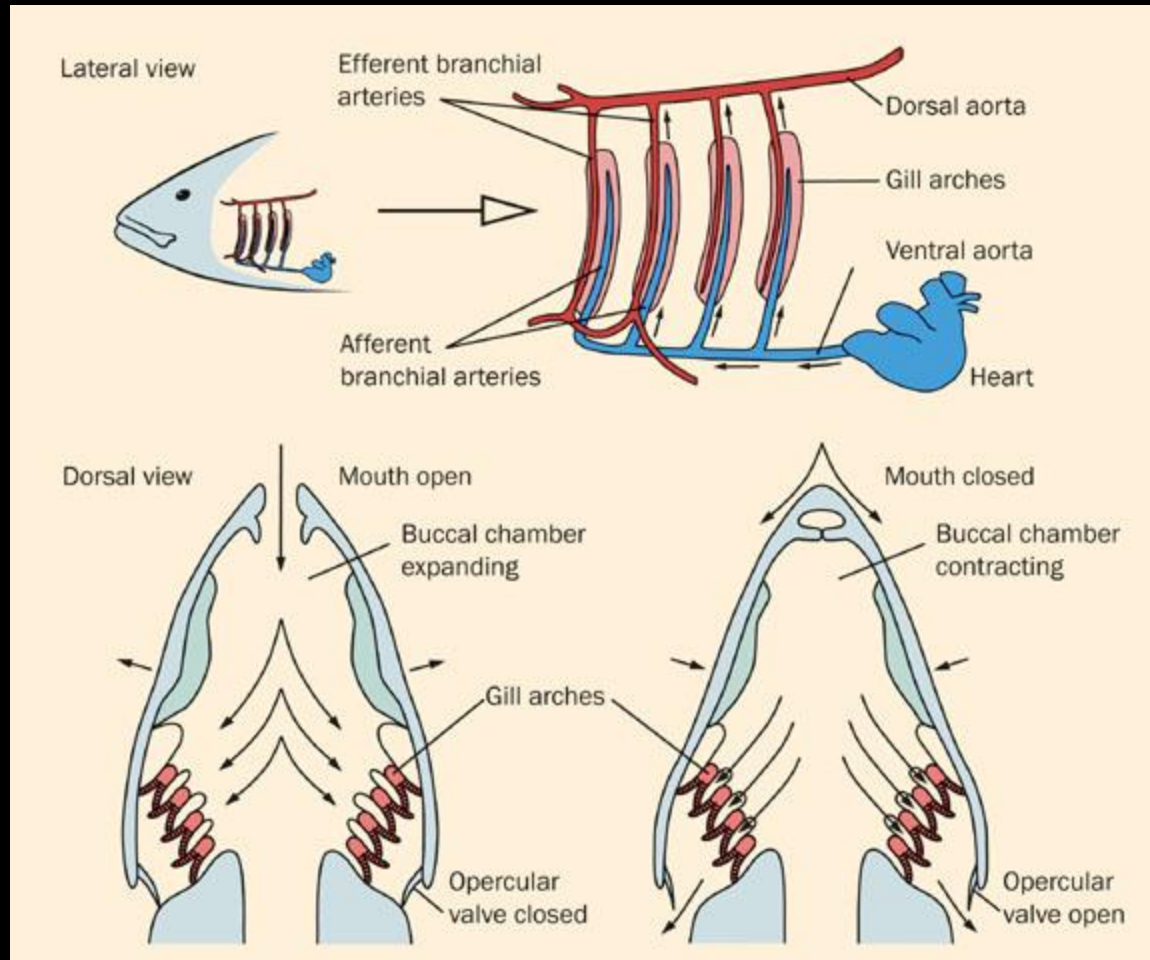
Linnu kops



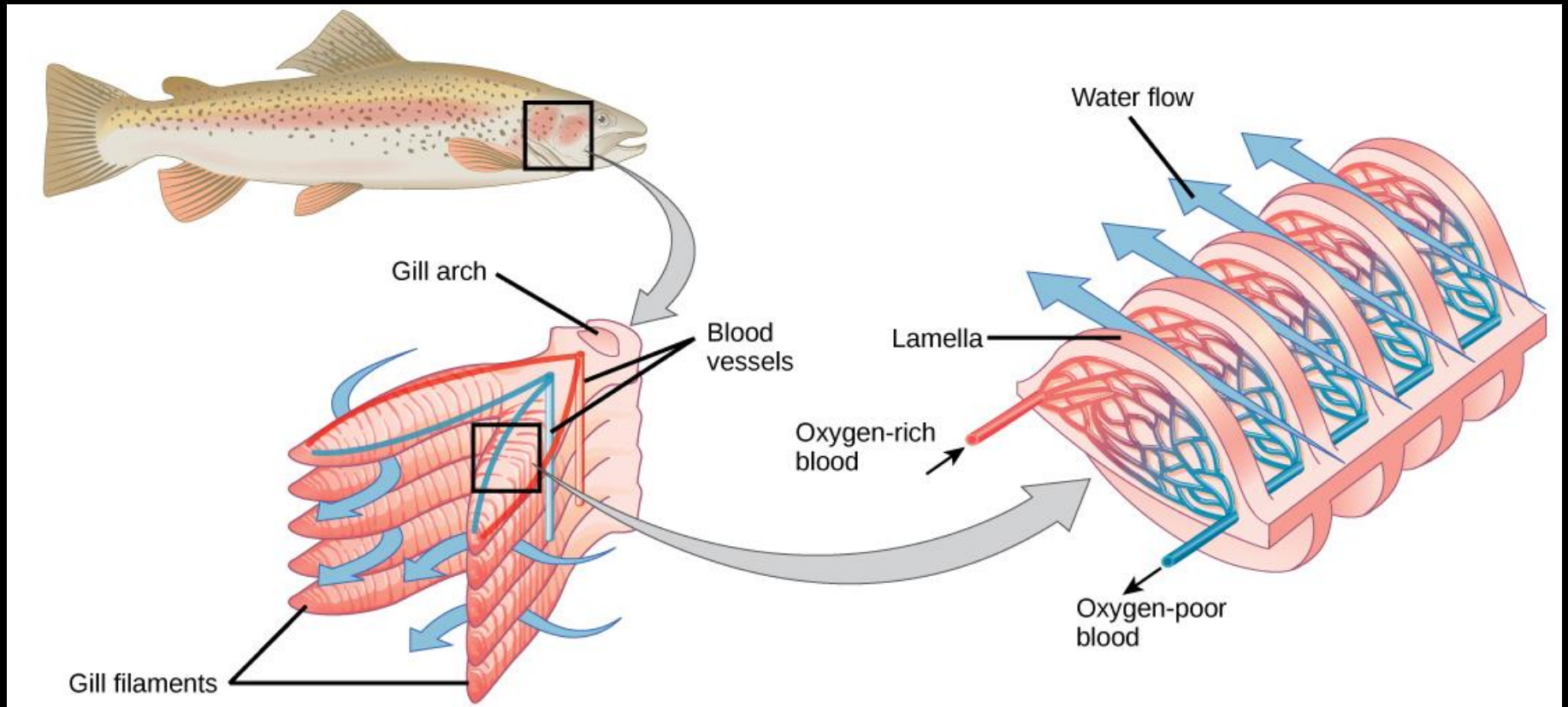
EXHALATION



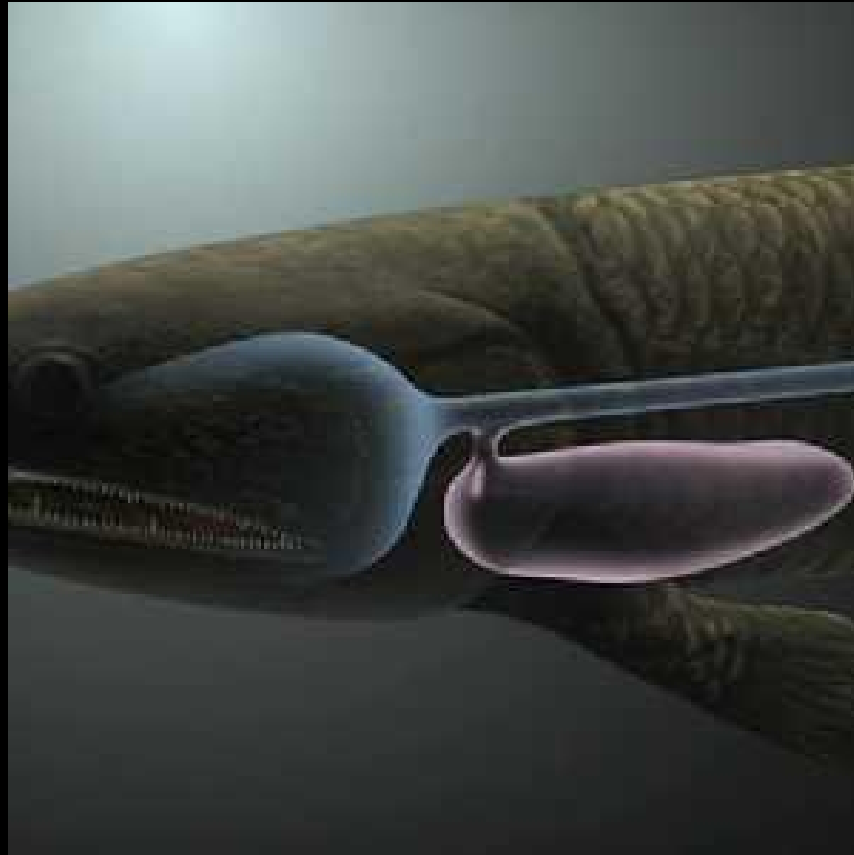
Lõpused



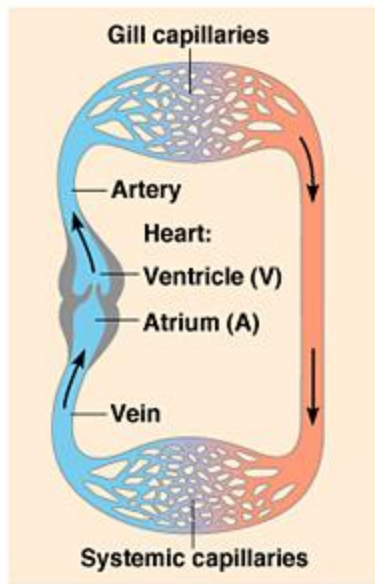
Lõpused



Kopskala

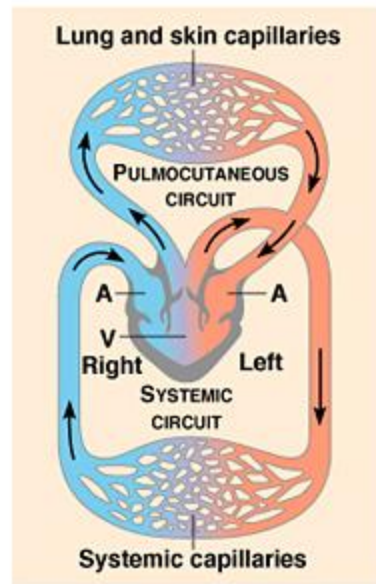


Ringeelundkond

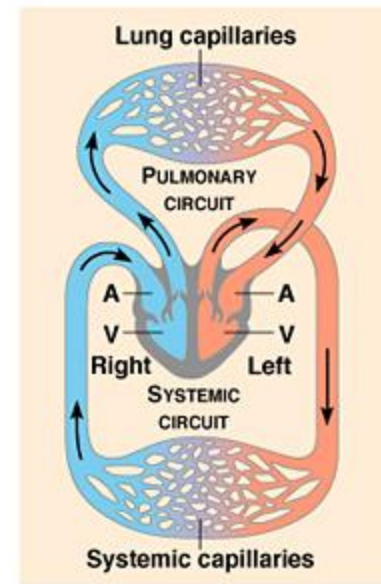


(a) Fish

©1999 Addison Wesley Longman, Inc.



(b) Amphibian

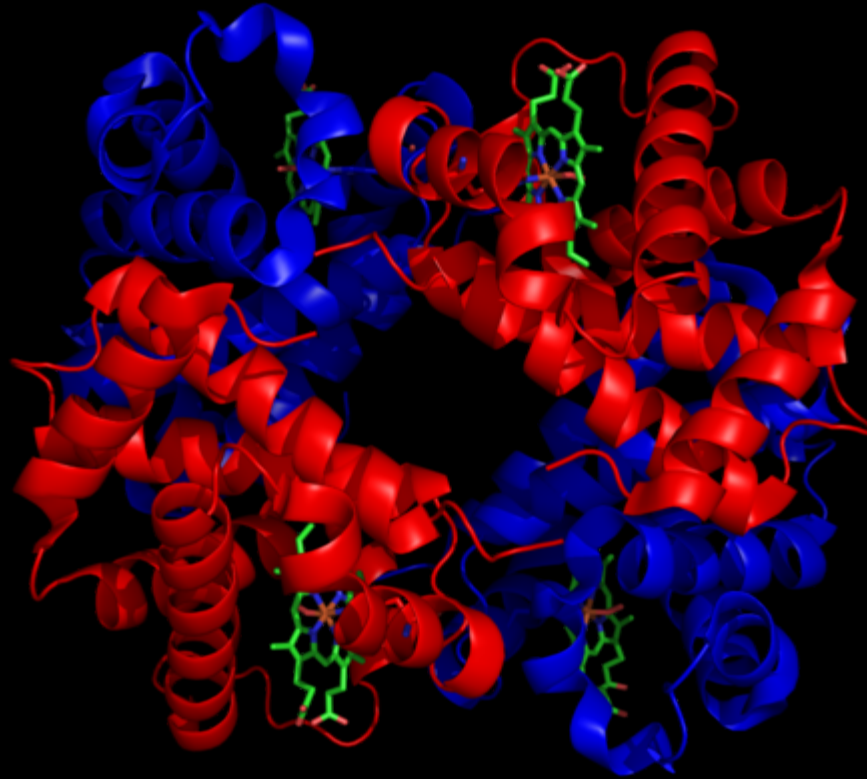


(c) Mammal

Hingamispigmentid

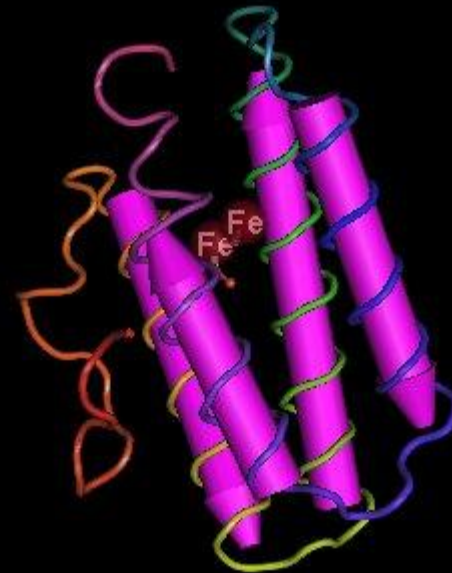
- hemoglobiin
- hemerütriin
- klorokruoriin
- müoglobiin
- hemotsüaniin

hemoglobiin

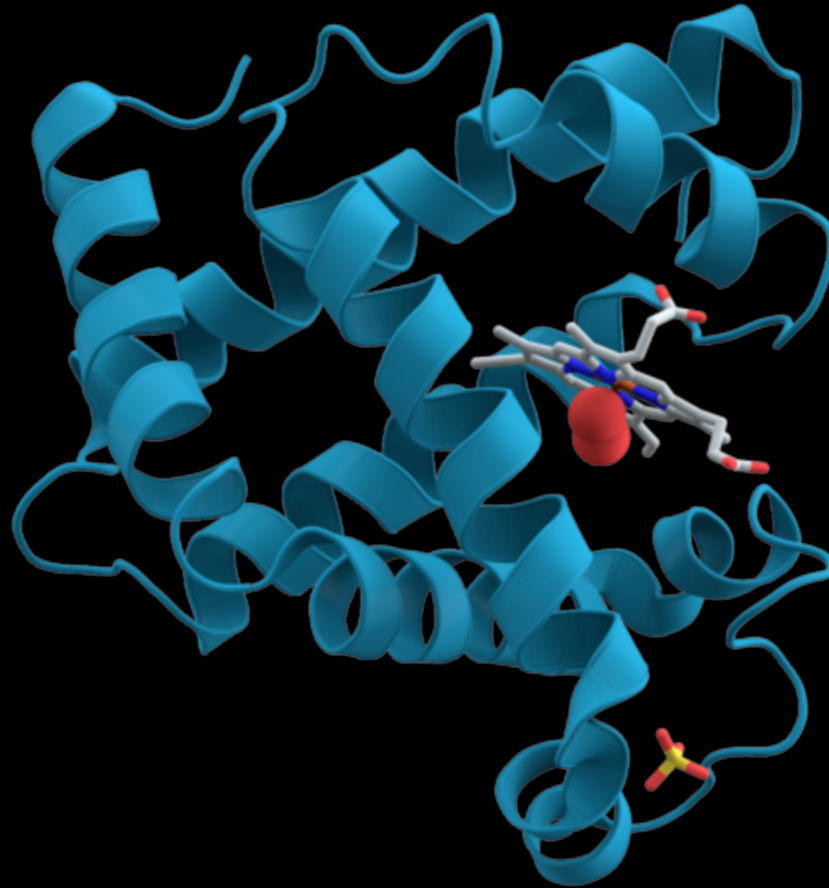


hemerütriin

- *Sipunculida*
- *Priapulida*
- *Brachiopoda*

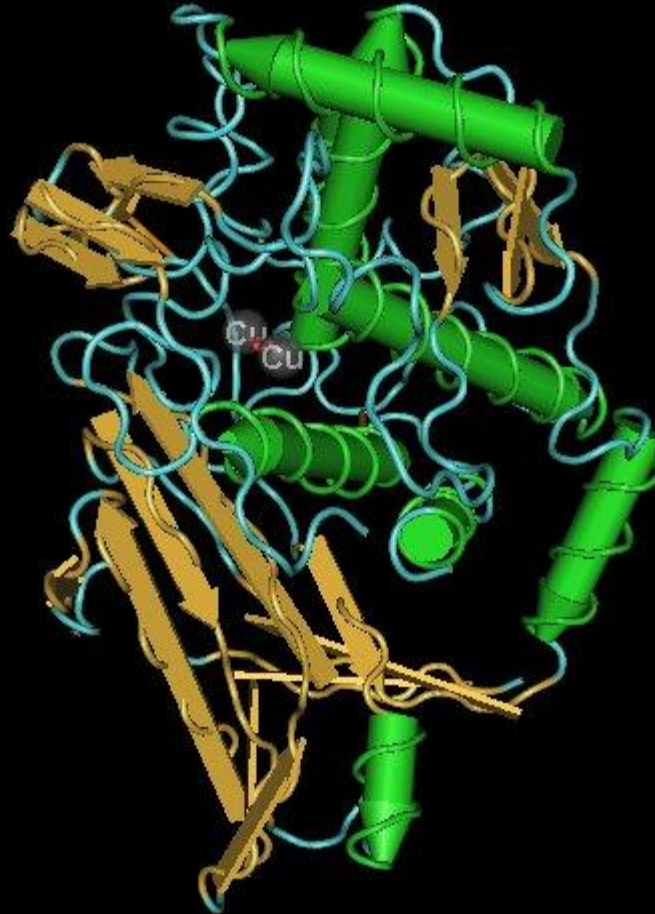


müoglobiin



hemotsüaniin (Cu)

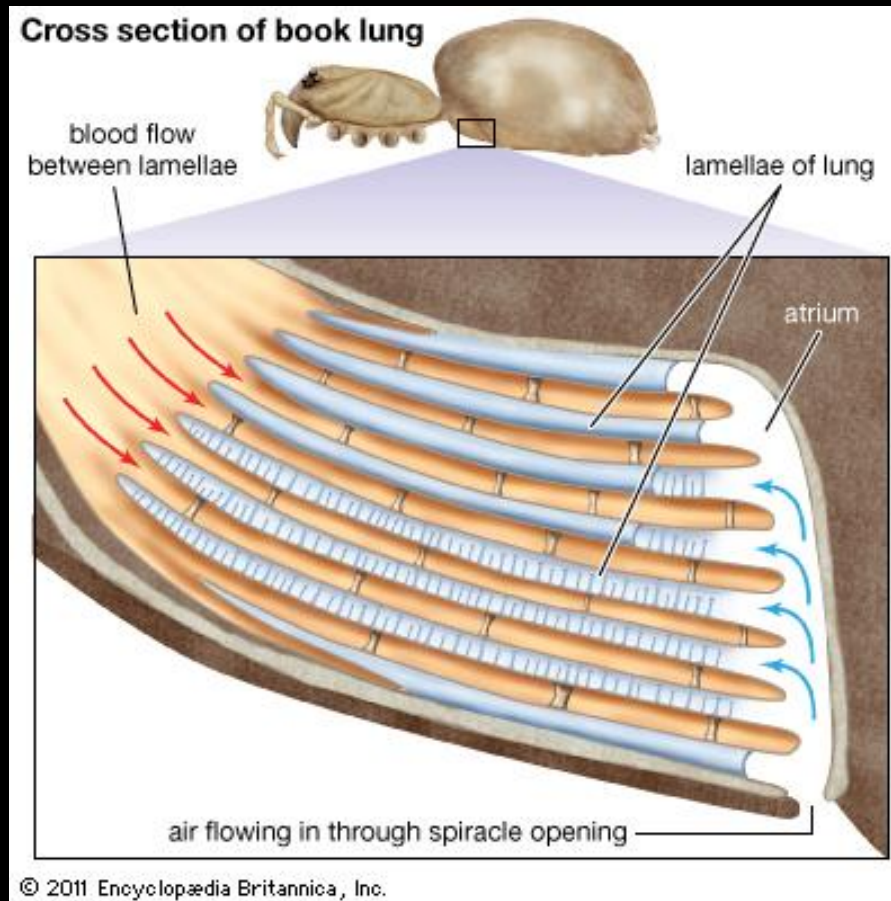
- *Cephalophoda*
- *Gastropoda*



Selgrootud

- Lõpused
- Raamatkops

Raamatkops



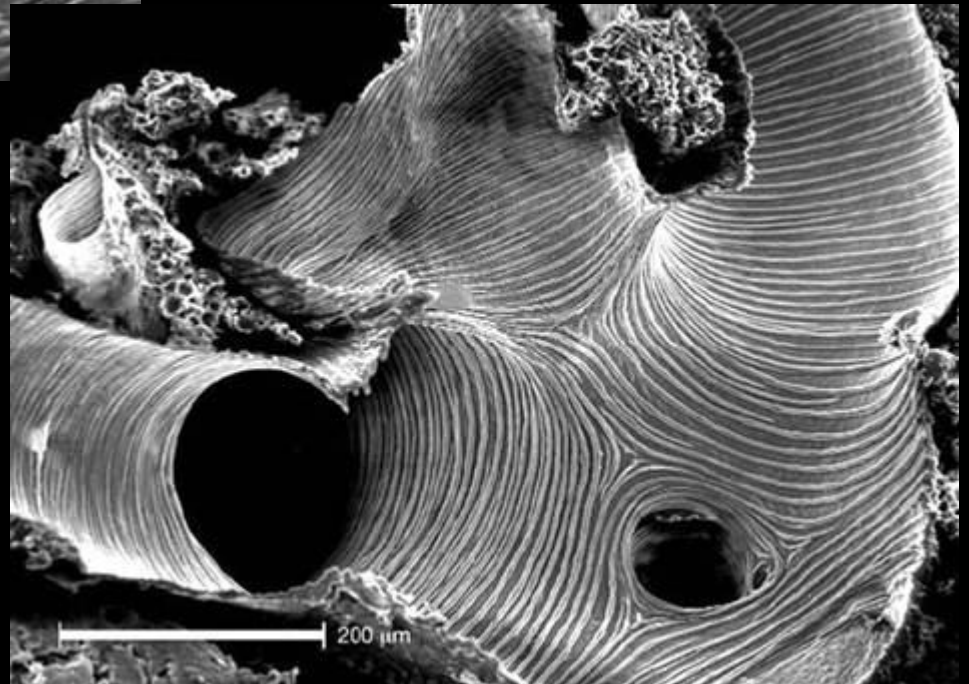
Selgrootud

- Lõpused
- Raamatkops
- Trahheesüsteem



Stigma

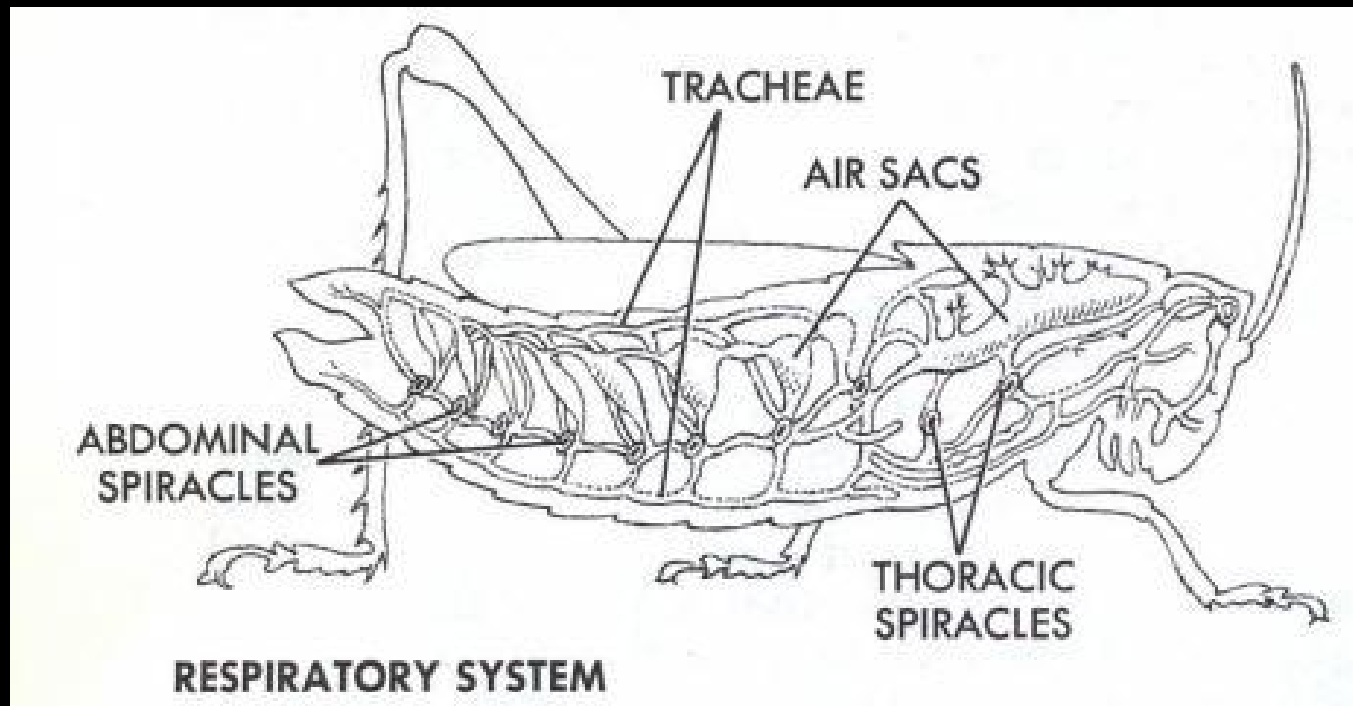
Traheool

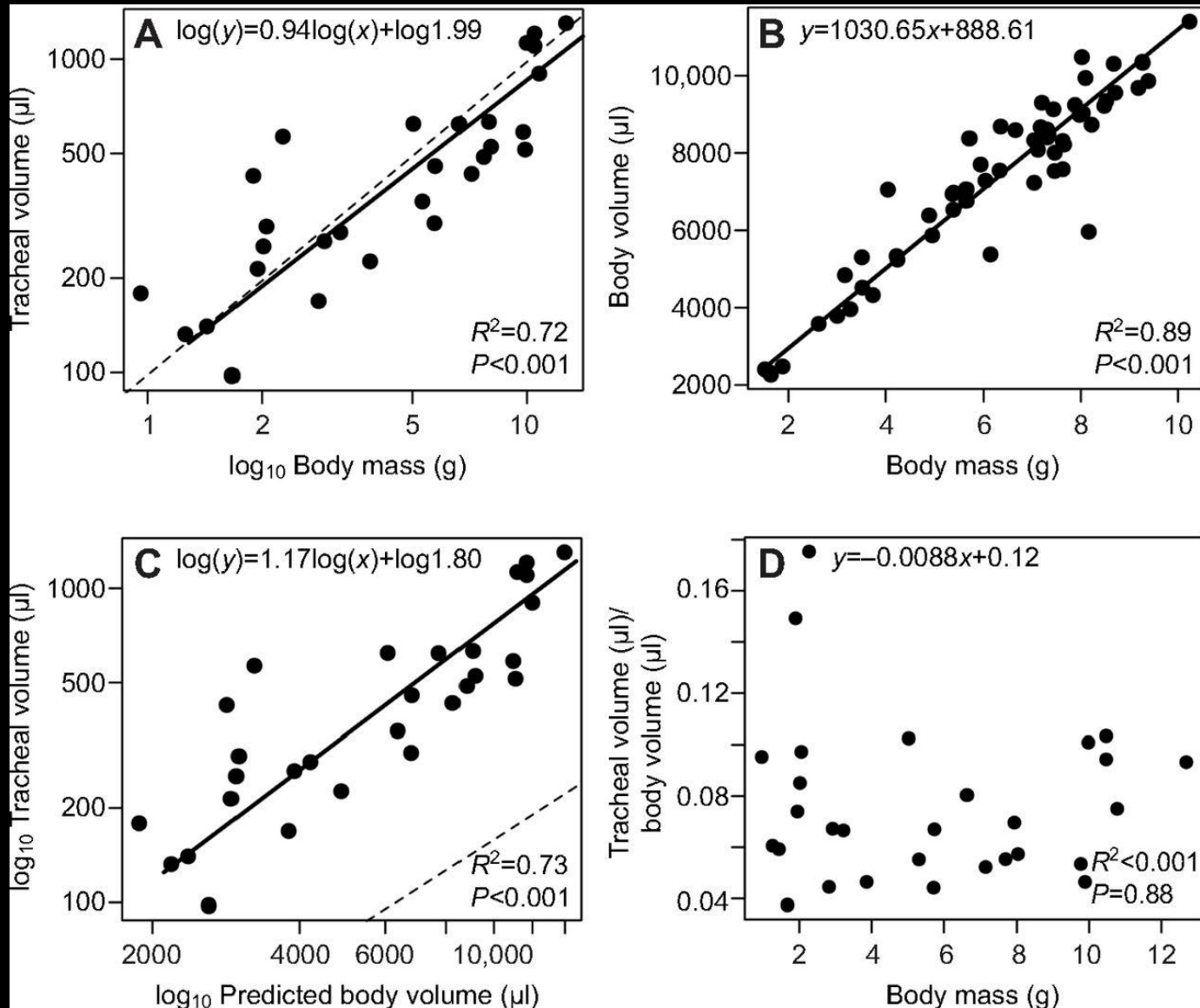


Manduca sexta



Trahheesüsteem

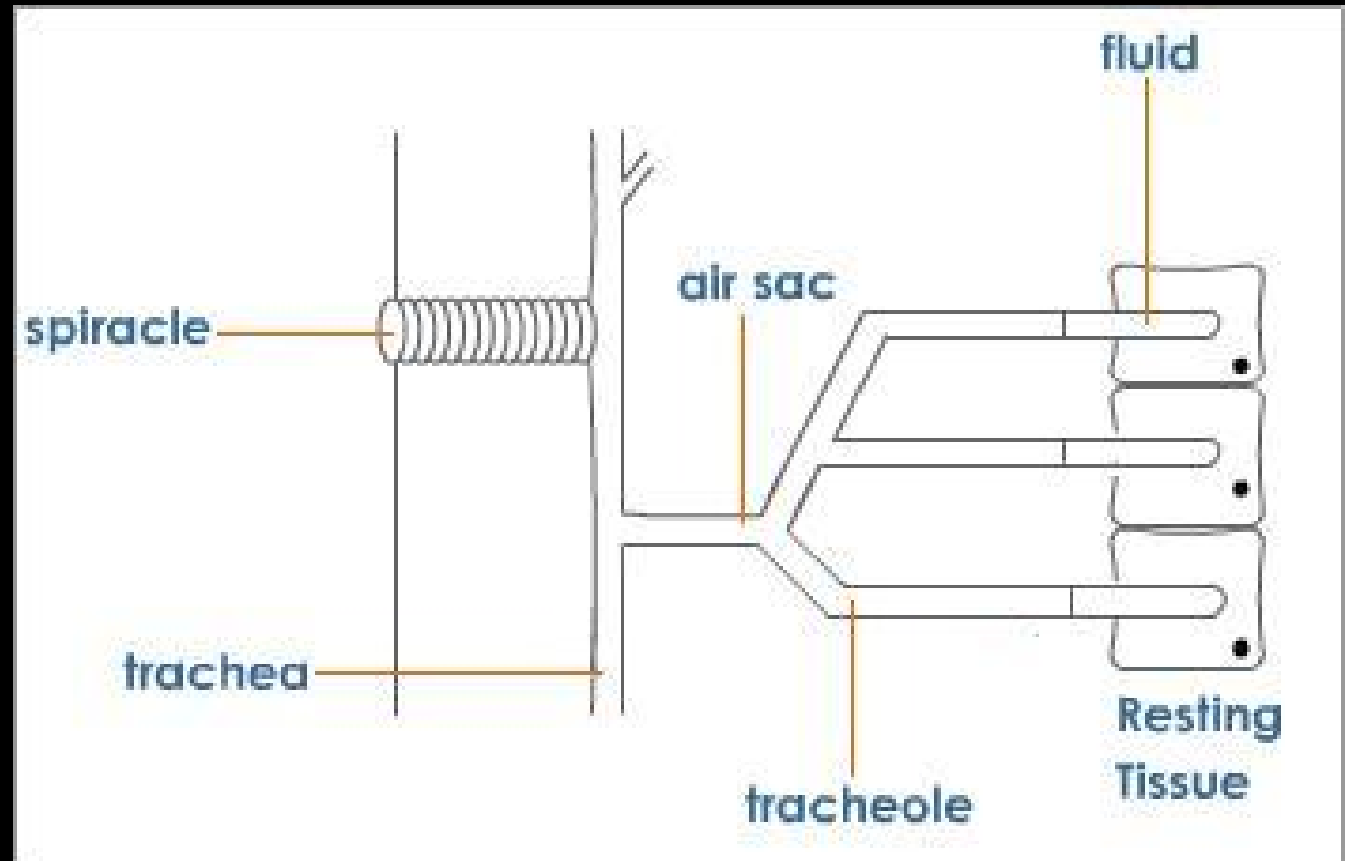




B. R. Helm & G. Davidowitz J Exp Biol 2013;216:4703-4711

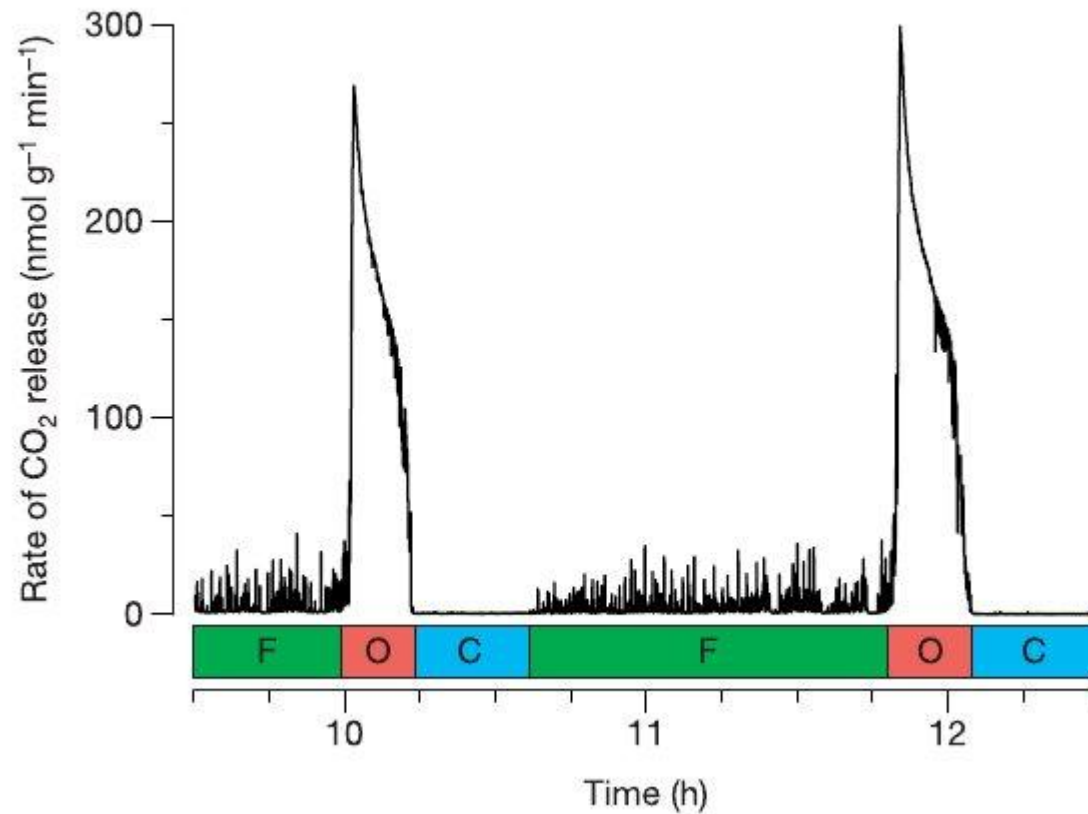
DGC

- *closed*
- *flutter*
- *open*

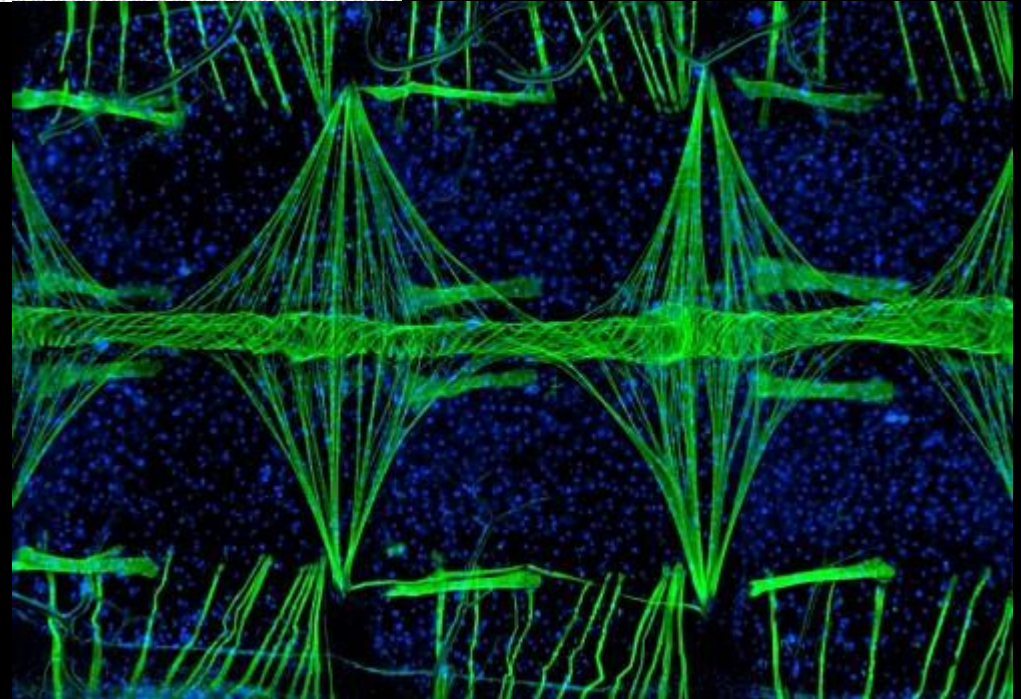
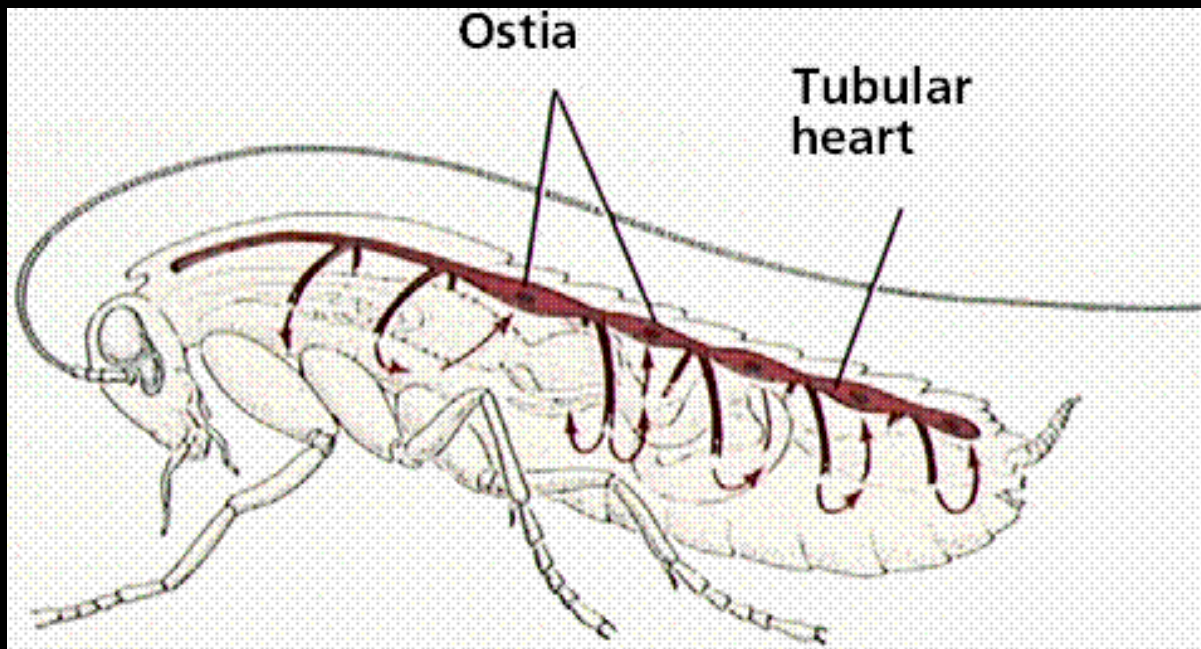


CFO

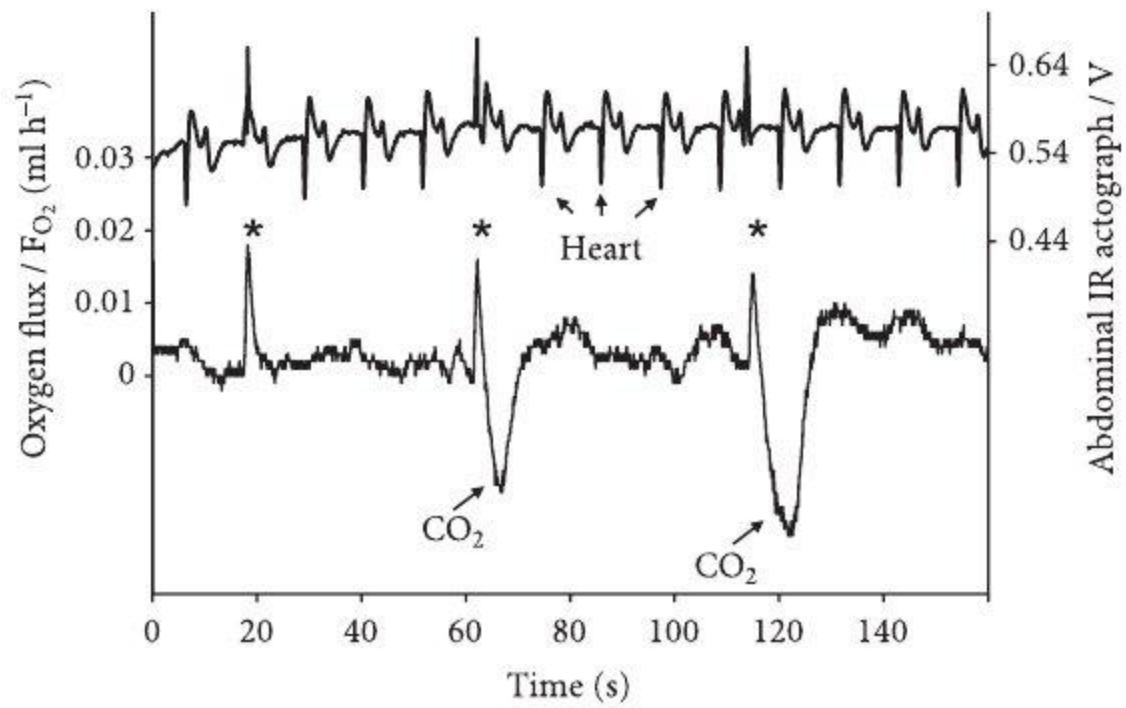
- Stigmad suletud
 - pO_2 langeb (min ca 5%)
 - pCO_2 madal (seotakse hemolüümi)
- Stigmad värelevad
 - O_2 gradient tugevalt sisemuse suunas
 - CO_2 endiselt seotud
- Stigmad avatud
 - CO_2 vabaneb suurtes kogustes

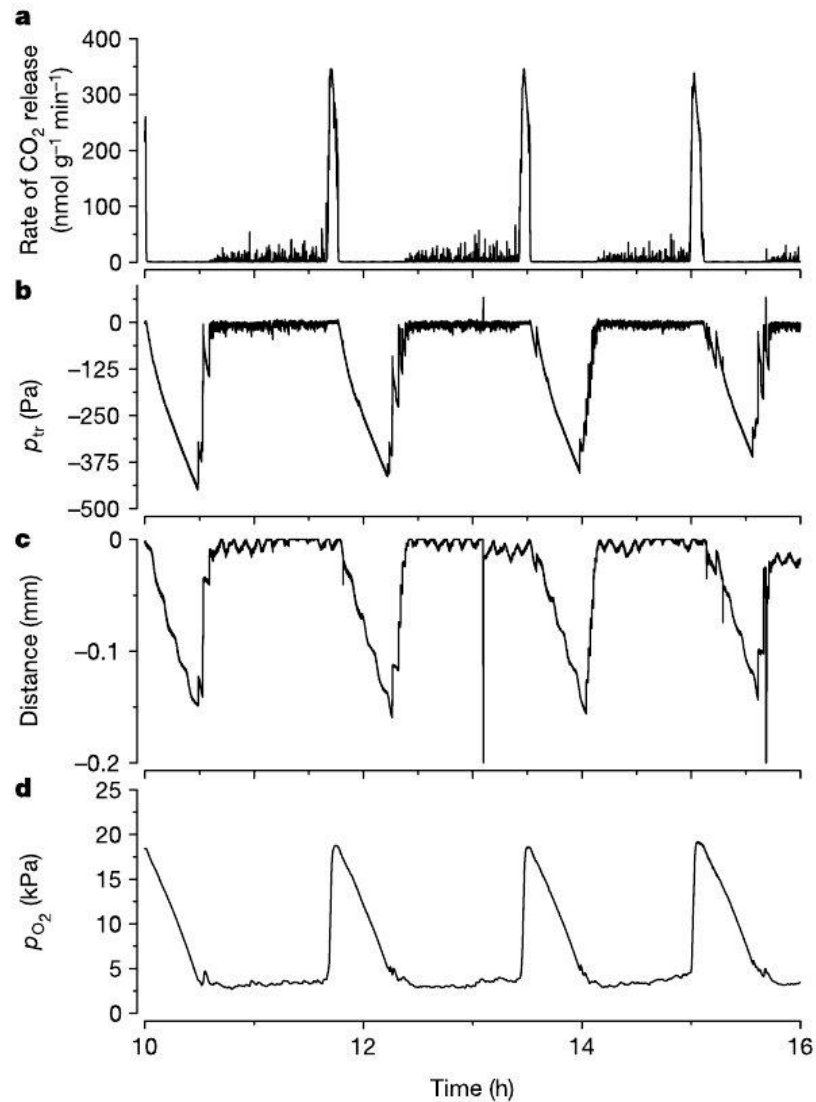


S.K. Hetz & T. J. Bradley 2005 Nature 433: 516-519



Seljasoon



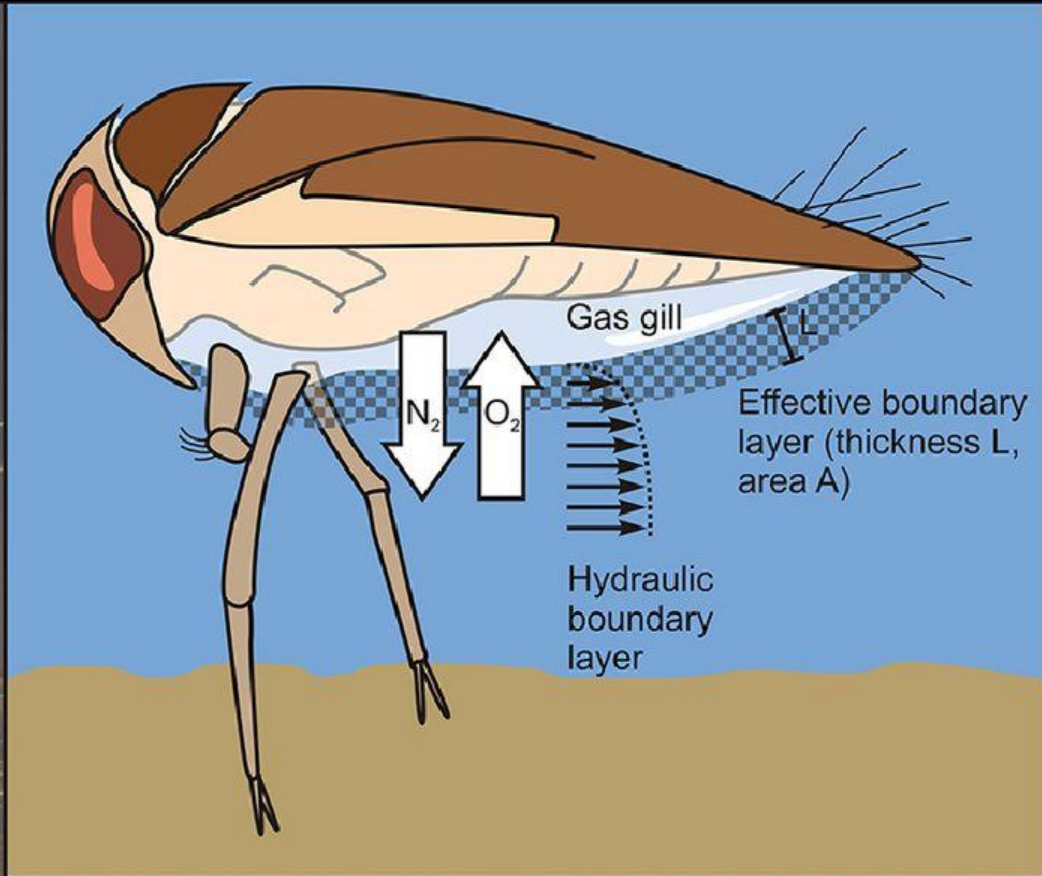


S.K. Hetz & T. J. Bradley 2005 Nature 433: 516-519

DGC evolutsioon

- Vee kokkuhoid
- Hüperkapniline keskkond
 - Vee kokkuhoid + CO₂
- Oksüdatiivne stress
- ~~Parasiitide vältimine~~

Füüsikaline lõpus



Agraptocorixa eurynome



Credit: Stefan Hetz, from Jo. of Experimental Bio.

Ekstreemsed keskkonnad

- Kõrgmäestik
 - alpi maja
- Sukeldumine
 - kessoontõbi
 - sukelrefleks

