Advanced e-Learning and e-Testing in Pharmaceutical Biology

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Why eLearning?

- The directors of the studies programme suggested to test the e-Learning environment
  - Administrative reasons
  - Didactic reasons

Administrative reasons

- Increasing number of new students

Maximum: 120 workstations for our students/year

Blackboard - Platform

universität wien

Kursliste | Barrierefreiheit | Hilfe | Abmelden

rstellen | Lehren | Studentenansicht

Biologie für Pharmazeuten - WS2007_VLZ.Nr.320016

Kurstools

- Kursinhalt
- Kalender
- E-Mail
- Bekanntmachungen
- Foren
- Chat
- Tests (H)
- Aufgaben (H)
- Lernmodule (H)
- Medienbibliothek (H)
- SCORM (H)
- Suchen (H)
- Lehrplan (H)
- Webverknüpfungen (H)
- Wer ist online? (H)

Ausgeblendet

Dozententools

- Kurs verwalten
- Testerstellungs-Manager
- Aufgabendropbox
- Leistungsübersicht
- Gruppen-Manager
- Verfolgen
- Notizen (H)
- Selektive Freigabe
- Benotungsformulare

Ihr Standort: **Startseite**

Habe die **VO-Unterlagen** u.a. Dokumente an die Front gelegt. Vielleicht koennen sie hier besser genutzt werden?

Anatomie_kurs_07_M_O_B0

VO_unterlagen_biologie_07_Teil1

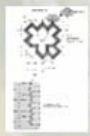
VO_unterlagen_biologie_07_T

VO_unterlagen_biologie_07_Teil3

VO_unterlagen_biologie_07_Teil4

VO_unterlagen_Biologie_07

Baume_Straucher_kurs_07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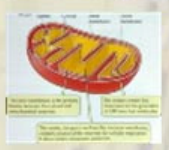
Biologie_07_Leber

Biologie_07_Licht_Photosynthese.pdf

Biologie_07_Tiere_Systematik.pdf


Biologie_07_Zellatm

Mykorrhiza_Merkblatt_35_d.pdf

buecherliste.htm

Lehrplan

(Ausgeblendet)

UNI-Links

Wissensaustausch für die Prüfung

Sprechstunde

Onlinesprechstunde mit
Vortragenden, jeweils D
zwischen 19.45 und 20.1

Anmeldung zur Prüfung

TESTS

Gemeinsamer Raum

Dies ist ein Standardrau

LERNMATERIALIEN

Selbsttest 1

Nicht benoteter Selbsttest

Selbsttest 2

Nicht benoteter Selbstte

What types of training/testing tools are available

- Accordances
- True/False Statements
- Missing Terms
- Multiple Choice Questions

- Most questions are supported by photographs

Aims

- Enhance the knowledge base of learners
  - optical comprehension
  - technical terms
  - architecture of different organisms
  - basics in organic chemistry and physics
  - recognition of numerous organisms
  - principles of taxonomy
- Enhance cross-linked thinking
  - realise cross-linking of facts
- Boost the competences in the field of Pharmaceutical Biology
- .....

Multiple Choice Question

A. die 4 Arten sind alle dicotyl
B. die 4 Arten sind alle einjährig
C. 1, 2 und 3 sind annuell, 4 ist bien
D. die 4 Arten sind alle monocotyl
E. die 4 Arten sind alle zweijährig

- 1. A, C
- 2. C, D
- 3. A, B
- 4. D, E

Note | Schließen

Note für: *Grundwissen 1*

Answer slide

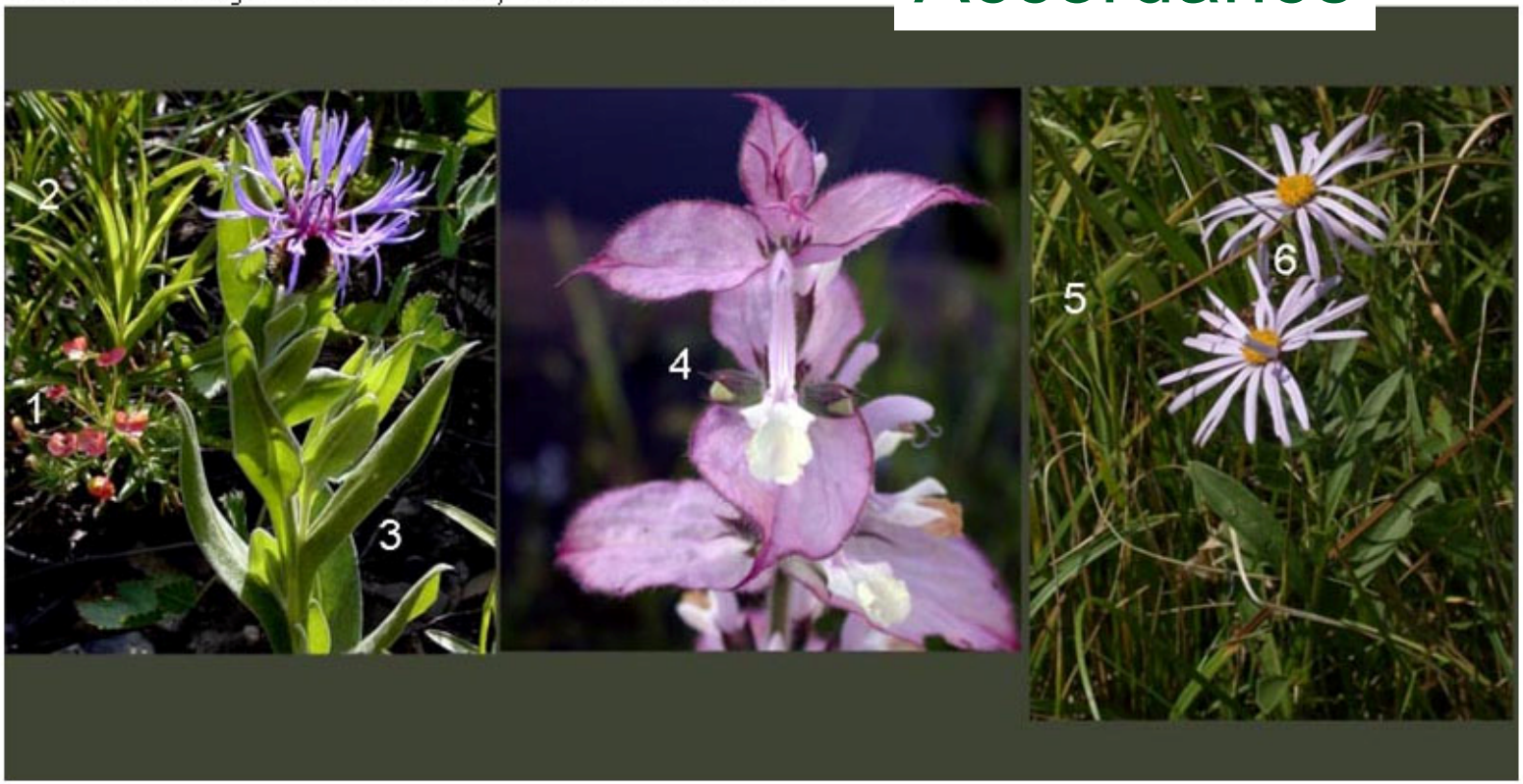
A. die 4 Arten sind alle dicotyl
B. die 4 Arten sind alle einjährig
C. 1, 2 und 3 sind annuell, 4 ist bien
D. die 4 Arten sind alle monocotyl
E. die 4 Arten sind alle zweijährig

	Studentenantwort	Wert	Richtige Antwort	Feedback
1.	A, C	100%	✓	
2.	C, D	0%		
3.	A, B	0%		
4.	D, E	0%		
	Ergebnis:	100%		

Pflanzengruppenzuordnung 1

Welche Nummern gehören zu welcher systematischen Einheit?

Accordance



Übereinstimmende Paare

1	- Auswahl treffen -
2	- Auswahl treffen - (monokotyl, dikotyl, Farn, Pilz, Moos)
3	
4	
5	- Auswahl treffen -
6	- Auswahl treffen -

Note | Schließen

Answer slide

e für: *Pflanzengruppenzuordnung 1*

che Nummern gehören zu welcher systematischen Einheit?

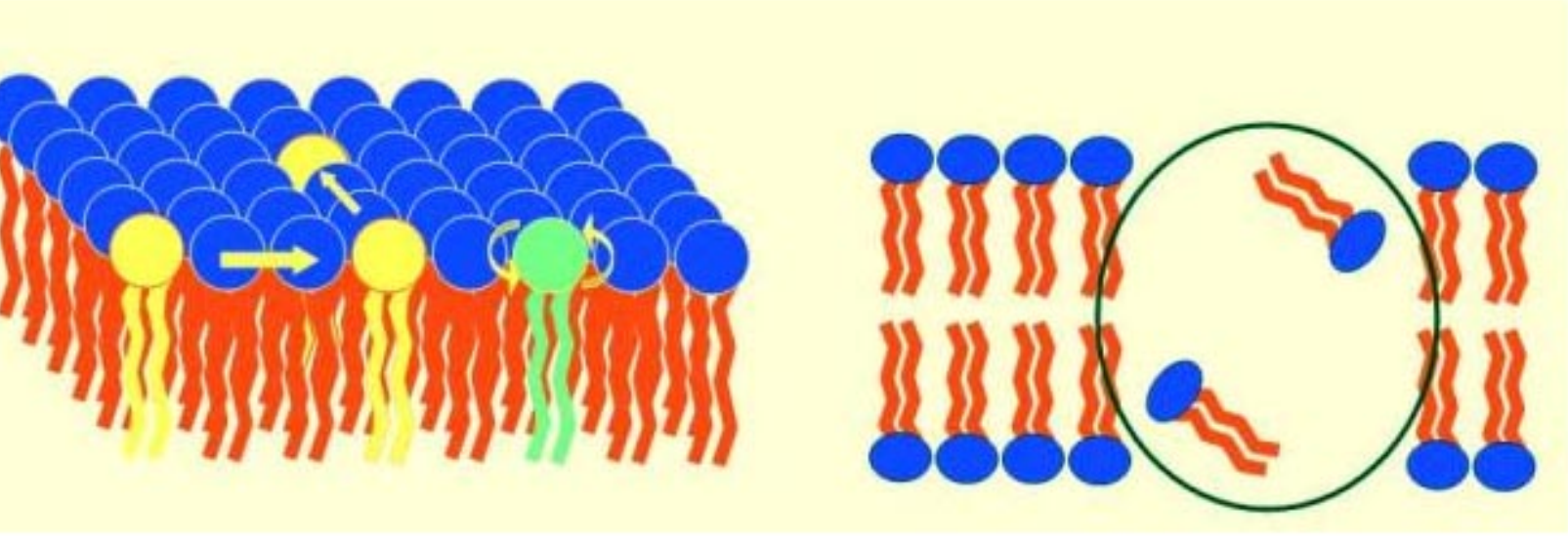
weisung	Antwort	Wert	Richtige Übereinstimmung
	dikotyl	16.66%	dikotyl
	monokotyl	16.66%	monokotyl
	dikotyl	16.66%	dikotyl
	dikotyl	16.66%	dikotyl
	monokotyl	16.66%	monokotyl
	dikotyl	16.7%	dikotyl
gebnis		**100.0%**	

emeines dback: 1) Euphorbia - dicotyl; 2) Orchidaceae - monocotyl; 3) Centaurea - dicotyl: 4) Salvia - dicotyl; 5) Poaceae - monocotyl; 6) Aster - dicot

True/False Statements

22-Seitenwechsel bei Phospholipiden in Membran

nnerhalb von Biomembranen können Phospholipide um die eigen chse rotieren oder seitliche Bewegungen ausführen. Auch ein eitenwechsel ist leicht möglich.



Wahr ○ Falsch

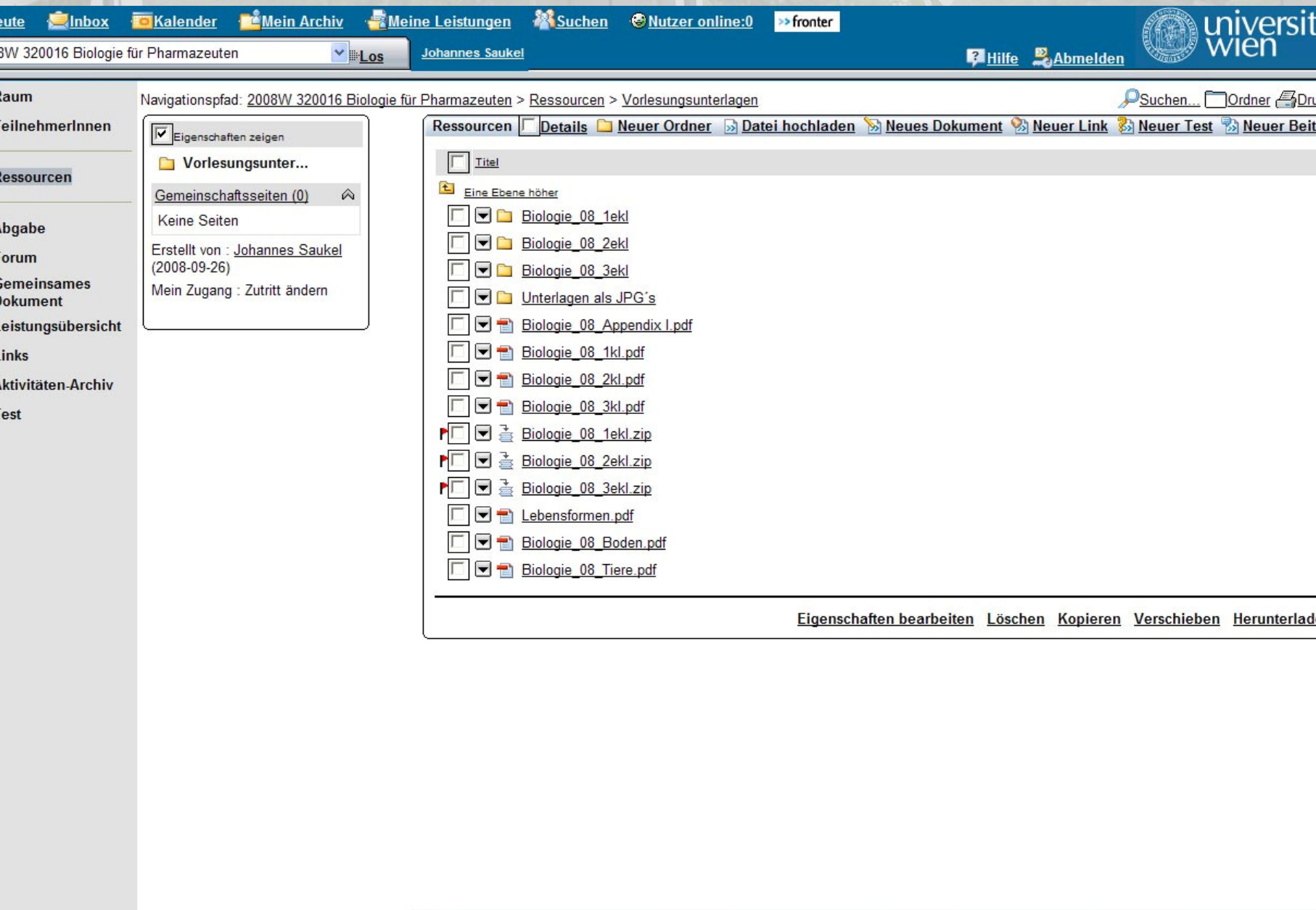
Note | Schließen

Development in e-Testing

- Nearly 1000 Questions for Online-Testing have been developed and used for three different courses

- And then?

Fronter - Platform



>> fronter

Easy to use tools for learning and collaboration online.

>> fronter 82

PERSONAL WORK
Personal Learning Environment (PLE)

- **Today portal**: Latest info from rooms in Fronter and external RSS feeds.
- **E-mail client**: Complete e-mail client with support for POP3 and IMAP.
- **My contacts**: List of personal contacts and friends.
- **My calendar**: Organise personal appointments and meetings.
- **My resources**: Network-based hard drive for personal files and content.
- **My portfolio**: Personal portfolio and display folder.
- **Fronter Instant Messenger (FIM)**: Internal instant messaging system.
- **Blog client**: Edit your external blogs from directly within Fronter.
- **Meeting**: Personal real-time meeting tool for 3 users. Features incl. video, app. sharing, whiteboard etc.
- **Stickies**: Internal messaging system in Fronter.
- **My homepage**: Personal web page.
- **My public resources**: Share a selection of your personal documents.
- **Information central**: Quick overview of new elements on Today portal.
- **To-do list**: Personal task list with progress indication.
- **RSS reader**: Display RSS feeds from external sources on the Today portal.
- **My RSS feed**: Personal RSS feed from your Today portal.

LEARNING
Learning Management System (LMS)

- **Hand-in**: Folder for submission of assignments and evaluation.
- **Test**: Tool for test creation with options for format and design.
- **Learning path**: Structuring of learning pages to facilitate directed learning.
- **Individual Learning Plan (ILP)**: Individual assessment of progress.
- **Question database**: Shared database for test questions.
- **Course import**: Import of IMS, SCORM and AICC courses.
- **Statistics**: Complete report of activity in a room.
- **Learning goals**: Import and customisation of learning goals for goal-oriented work.
- **Portfolio**: Overview of learning process and work progress.
- **Result matrix**: Summary of user results.
- **Notes**: Short notes linked to learning objects.
- **Whiteboard**: Real-time whiteboard tool.
- **Video**: Show video clips and other multimedia files from the resources.
- **External repository search**: Search in predefined external repositories.
- **Parental Log-in**: Unique access to your child's portfolio.

- Time for reflection!

Developed Organisms composed of?

Which association has a greenhorn in biology with this images and the written headline?

It depends on the individual knowledge base!

eLearning - Theoretical Background

- Anchored Instruction (1990)
- Instructional Transaction Theory (1999)
- Cognitive Apprenticeship (1989)
- 4C/ID Theory (2002)
- Cognitive Load Theory (1991)

Anchored Instruction

J.D. Bransford (1990)

- Anchored instruction
  - requires putting the students in the context of a problem-based story.
- The students "play" an authentic role while
  - investigating the problem,
  - identifying gaps to their knowledge,
  - researching the information needed to solve the problem
  - developing solutions.
- For example, the students should play the role of an amoeba to learn about the needs of this organism.
- The teacher facilitates and coaches the students through the process.
- Is not easy practicable in big auditorium!

http://www.ed.psu.edu/NASA/achrtxt.html

Instructional Transaction Theory

M. David Merrill (1999)

- What to teach and how to teach.
- What to teach has two considerations
- Selection
- Representation.
  - what are the knowledge components required for a given type of instruction? And how should these knowledge components be represented to facilitate instructional design?
- How to teach specifies the way that these knowledge components are presented to the student in order to engage the student in an interaction which is appropriate for promoting the acquisition of knowledge or skill

http://id2.usu.edu/Papers/ITT_Intro.PDF

Instructional Transaction Theory

M. David Merrill (1999)

- **Component Transactions**
  - IDENTIFY name and remember information about parts of an entity
  - EXECUTE remember and do steps in an activity
  - INTERPRET remember events and predict causes in a process (e.g. natural law)
- **Abstraction Transactions**
  - JUDGE order instances
  - CLASSIFY sort instances
  - GENERALIZE group instances
  - DECIDE select among alternatives
  - TRANSFER apply steps or events to a new situation

Instructional Transaction Theory

M. David Merrill

- **Association Transactions**
  - PROPAGATE acquire one set of skills in the context of another set of skills
  - ANALOGIZE acquire steps of an activity or events of a process by likening to a different activity or process
  - SUBSTITUTE extend one activity to learn another activity
  - DESIGN invent a new activity
  - DISCOVER discover a new process

Cognitive Apprenticeship

J. S. Brown, A. Collins, P. Duguid (since1989)

- Modeling
- Scaffolding
- Coaching
- Exploration
- Articulation
- Reflection

http://www.coe.uga.edu/epltt/cognitiveapprenticeship.swf

Cognitive Apprenticeship Steps

J. S. Brown, A. Collins, P. Duguid

- Modeling
  - in cognitive apprenticeship means showing how a process unfolds and giving reasons why it happens that way
- Scaffolding
  - is a kind of cooperative problem-solving effort by teachers and students in which the express intention is for the students to assume as much of the task on his own as possible

Cognitive Apprenticeship Steps

J. S. Brown, A. Collins, P. Duguid

- Coaching
  - Basically, coaching is giving the learner any type of assistance necessary to complete a task. Coaching includes scaffolding
  - not practicable in case of hundred students!
- Exploration
  - in this field is pushing students to try out their hypotheses methods, and strategies with the similar processes that experts do to solve problems.

Cognitive Apprenticeship Steps

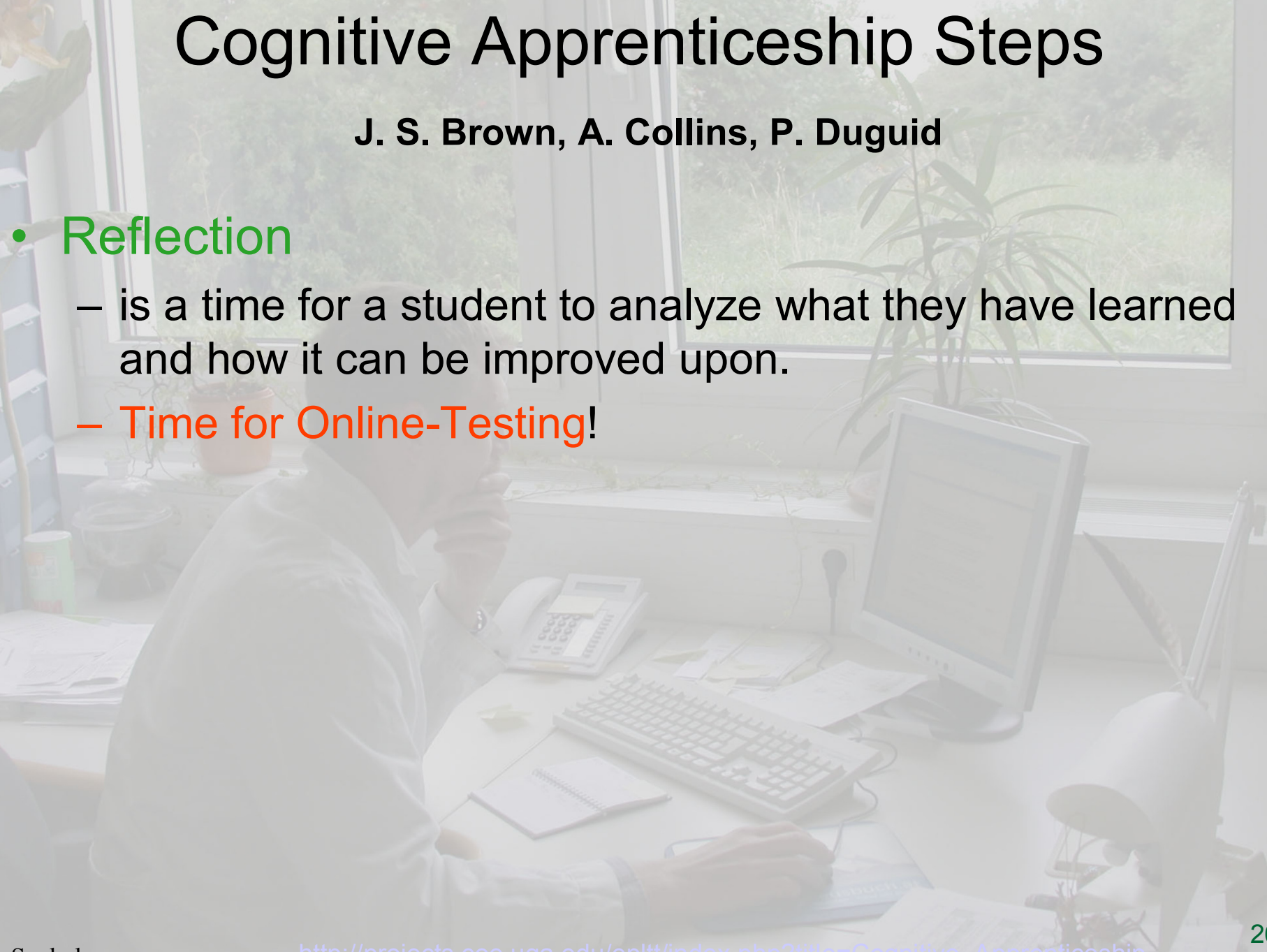
J. S. Brown, A. Collins, P. Duguid

- Articulation
  - Through articulation, the learner expresses his/her learning so that classmates have a basis of information to refine and extend their understanding.
  - not practicable in case of hundred students!

Cognitive Apprenticeship Steps

J. S. Brown, A. Collins, P. Duguid

- Reflection
  - is a time for a student to analyze what they have learned and how it can be improved upon.
  - Time for Online-Testing!



4C/ID Four Components Instructional Design

van Merriënboer (1997) and others

- Learning Tasks
- Supportive Information
- Procedural Information (Just-in-time-Information)
- Part-Task Practice

http://edutechwiki.unige.ch/en/4C/ID

4C/ID Four Components Instructional Design

van Merriënboer (1997) and others

- Learning Tasks
  - The tasks are sequentially ordered according to task difficulty and are to be performed by learners in simulated or real task environments.
- Supportive Information
  - supports the learning and performance of non-recurrent aspects of learning tasks; includes cognitive strategies and cognitive feedback, is always available to the learners
  - Task complexity increases as the learner progresses, but with each level of complexity comes additional supportive information from the instructional environment
- Procedural Information (Just-in-time-Information)
- Part-Task Practice

4C/ID Four Components Instructional Design

van Merriënboer (1997) and others

- Learning Tasks
- Supportive Information
- Procedural Information (Just-in-time-Information)
  - prerequisite to the learning and performance of recurrent aspects of learning tasks or practice items, consists of information displays, demonstrations and instances and corrective feedback
- Part-Task Practice
  - provides additional practice for selected recurrent constituent skill in order to reach required level of automaticity
  - Not possible for the large number of novices!

Cognitive Load Theory

J.Sweller 1988, P.Chandler & J.Sweller 1991

- Focuses on how constraints on the human working memory help determine what kinds of instruction are effective.
- It describes learning structures in terms of an information processing system involving the long-term memory, which effectively stores all of our knowledge and skills on a more-or-less permanent basis and the working memory, which performs the intellectual tasks associated with consciousness.
- Information may only be stored in the long-term memory after first being attended to, and processed by the working memory.

Cognitive Load Theory

- Short-term Memory → Working memory
  - Human working memory is limited; we can only keep in mind a few things at a time. This poses a fundamental constraint on human performance and learning capacity.
  - Two mechanisms to circumvent the limits of working memory are
    - schema acquisition, which allows us to chunk information into meaningful units, and
    - automation of procedural knowledge." (Wilson & Cole, 1996)
- Long-term Memory
- Intrinsic Load
- Germane Load
- Extraneous Load

Wilson, B. & Cole, P. (1996). Cognitive teaching models. In D. Jonassen (Ed.) Handbook of Research in Instructional Technology. New York: Scholastic Press.

Cognitive Load Theory

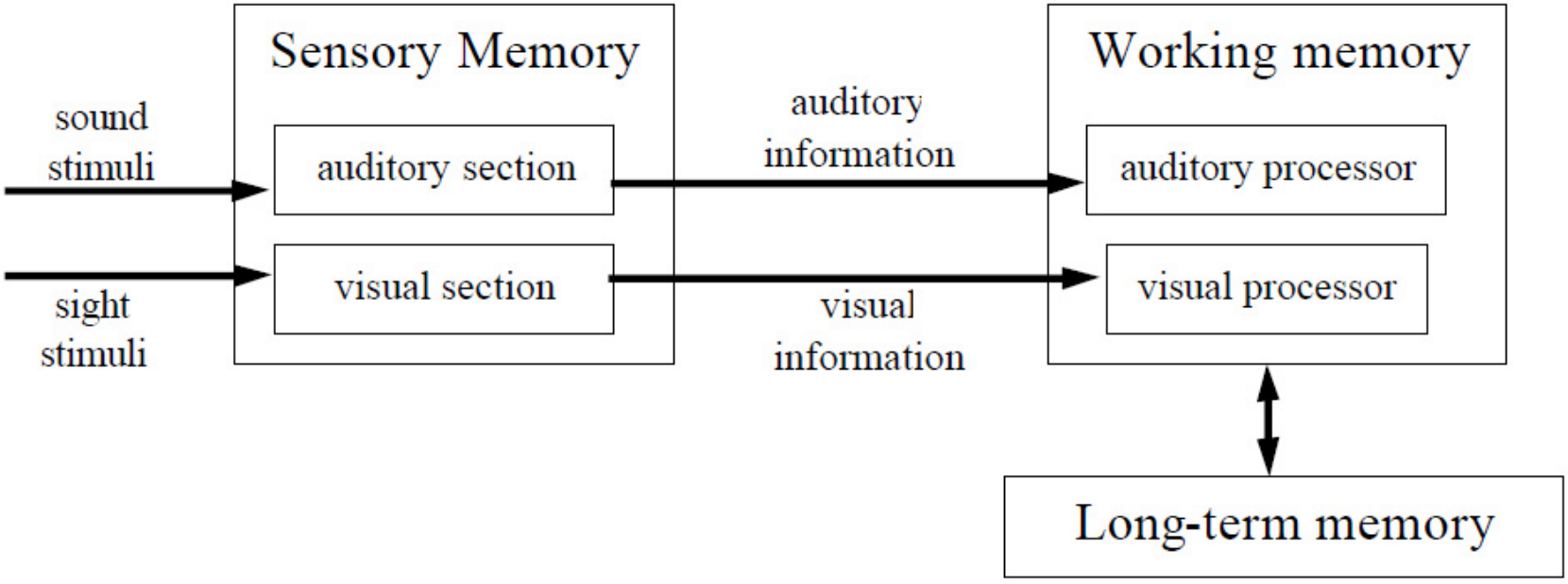
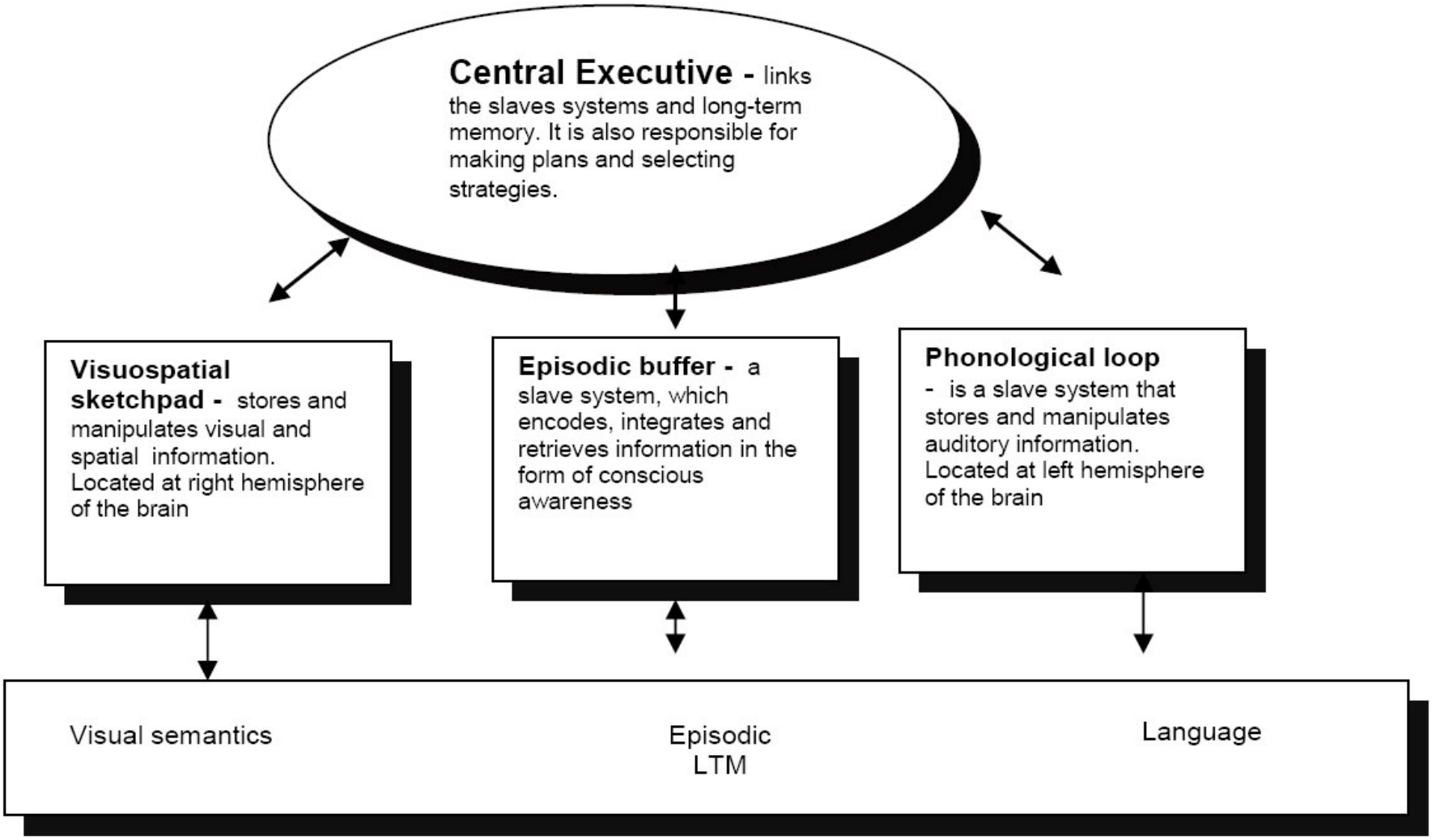


Figure 1 A Simple Model of Memory

•http://www.ppig.org/papers/15th-shaffer.pdf

CLT Working Memory



The working memory model (Baddeley's, 2000)

Cognitive Load Theory

- Intrinsic load
  - refers to the complexity of the learning material. It is dependent on the intrinsic nature (difficulty level) of the learning material and also on the learner's amount of prior knowledge.
- Germane load
  - refers to demands placed on the working memory that are imposed by mental activities that contribute directly to learning.
  - Also called relevant load!
- Extraneous load
  - refers to mental activities during learning that do not contribute directly to learning.
  - Also called irrelevant load!

Resume

- For greenhorns, the most effective learning will result from the concise informal narration of relevant graphics.
- In situations that rely on visual elements only the most effective learning will result from the concise informal textual explanation of relevant graphics in which the text and graphic are integrated on the screen.

Resume

- Apply the research and psychology behind the core principles of the CLT: the extraneous, intrinsic, and germane types of the cognitive load
- Eliminate common sources of the extraneous cognitive load through the best use of graphics, text and audio materials
- Manage the intrinsic cognitive load by weeding and “chunking”

Questions to ask

- The most important question should be…

Why?

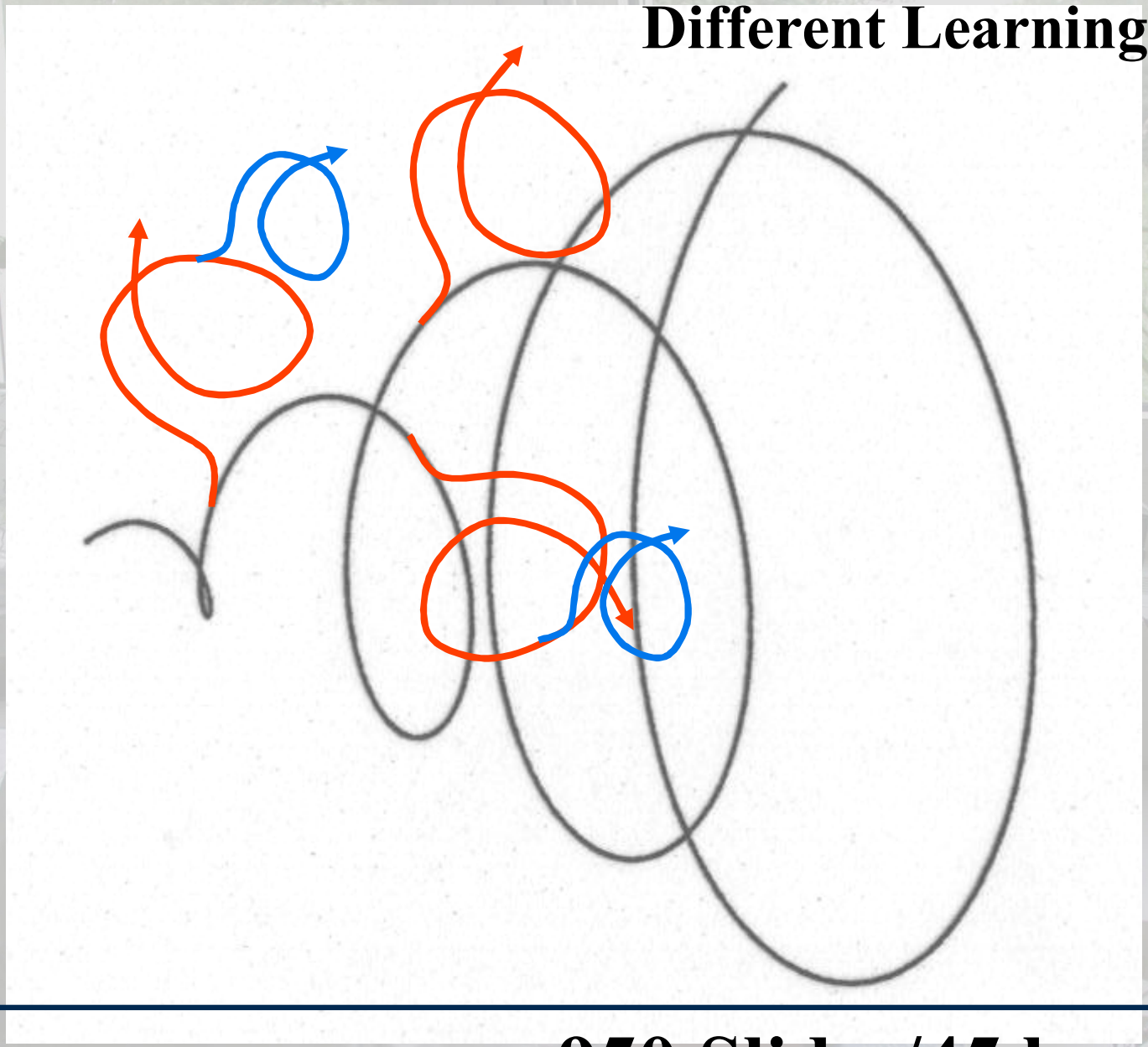
Questions to ask

- **Surface features** (Skin [proteines, proteines+cellulose+cork])
- **Ingestion and egestion of substances** (nutrient / Excrement /deciduous leafs, anatomical airway [oxygen / carbondioxide], mineral supplements , stomata [carbondioxide / oxygen])
- **Possibilities for the transfer of substances** (vessels [bloodvessels,trachea / trachea, sieve cells])
- **Storage for nutrients** (fat cells / oil cells, liver/glycogen / parenchyma/ amylum)
- **Sexuell reproduction** (spermatozoon / oocyte embryo nestling, Spermakern/Eizelle Embryo Same
- **Construction manual** (DNA nucleus and organelles [mitochondria, mitochondria / chloroplast])

Questions to ask

- Main suggestion
  - Conceive you are a mushroom/tree/ape/...
  - What will happen to you during
    - Day/night
    - stormy weather
    - Sommertime/wintertime
    - ....
  - Which biological needs appear?

Different Learning Paths



Learning Path I

Vgl. auch Folien weiter unten

Slide 54

Slide 59

Blattmetamorphosen

Schwimmblätter

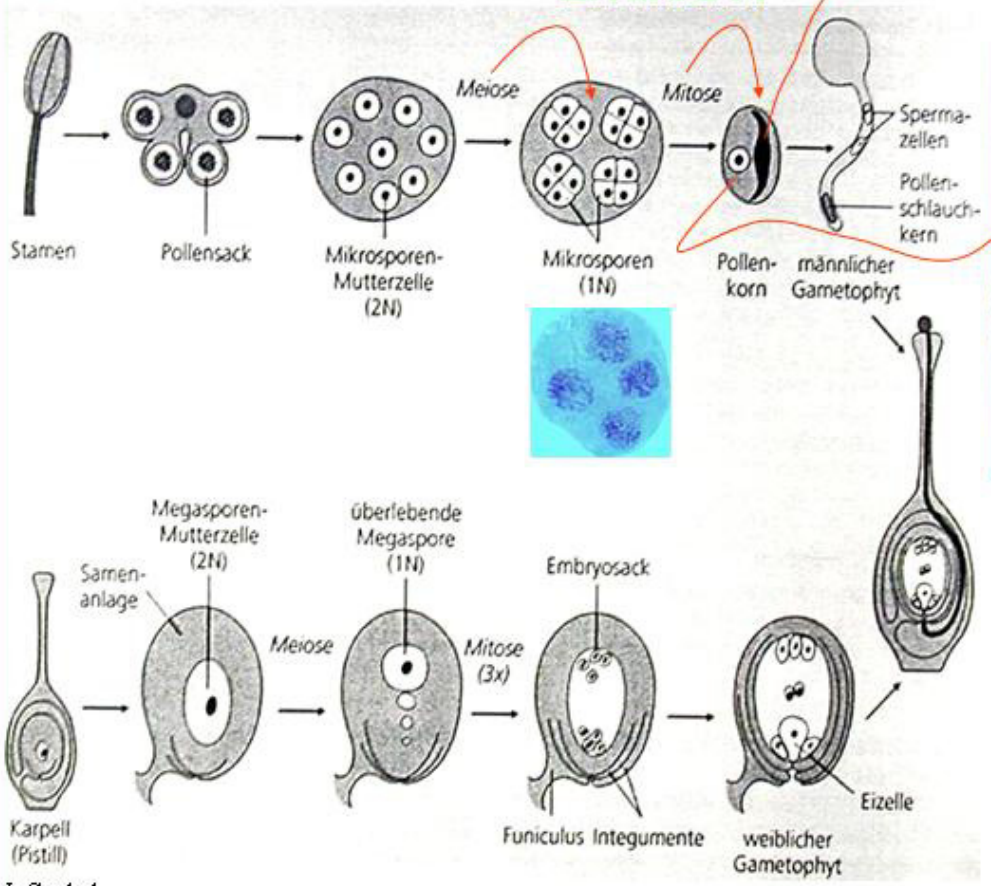
Slide 103

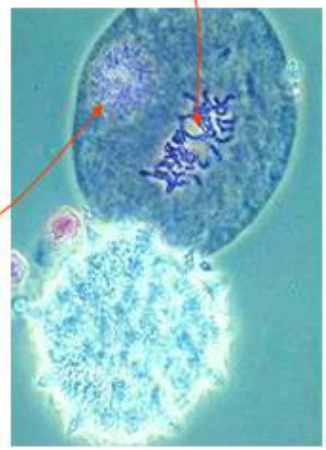
Embryophyten - Landpflanzen

Slide 120

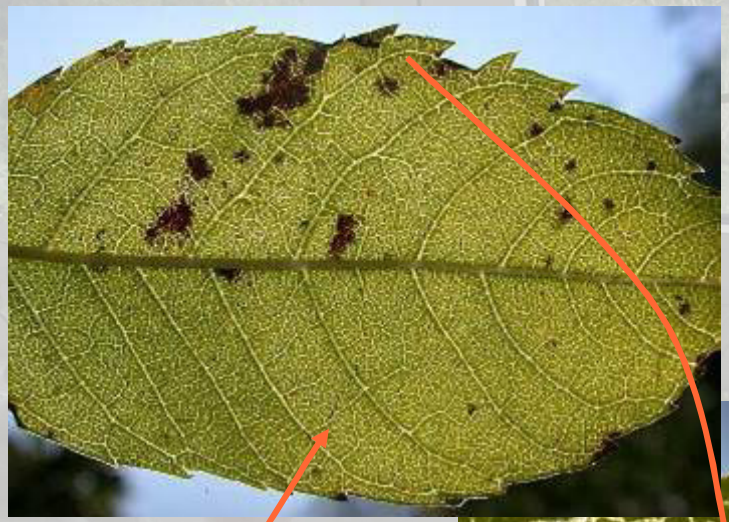
Slide 156

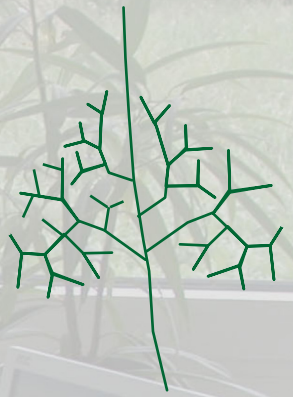
Blüten





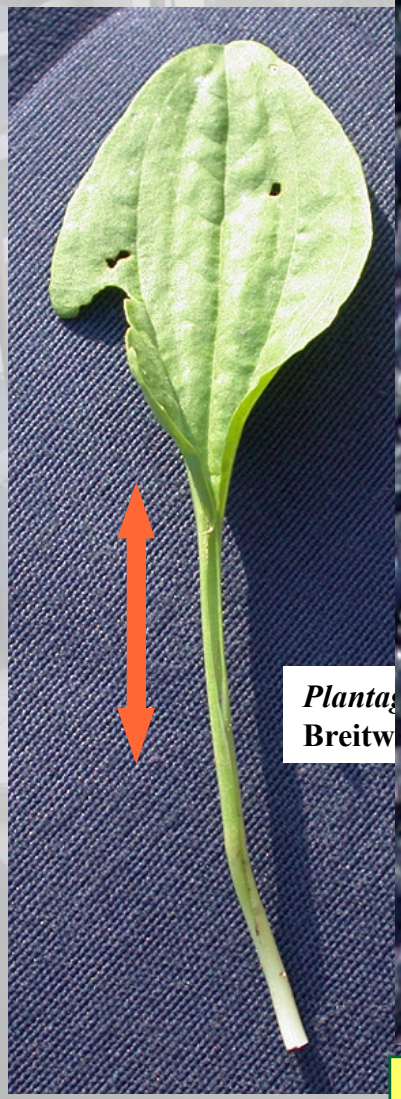
Nervatur





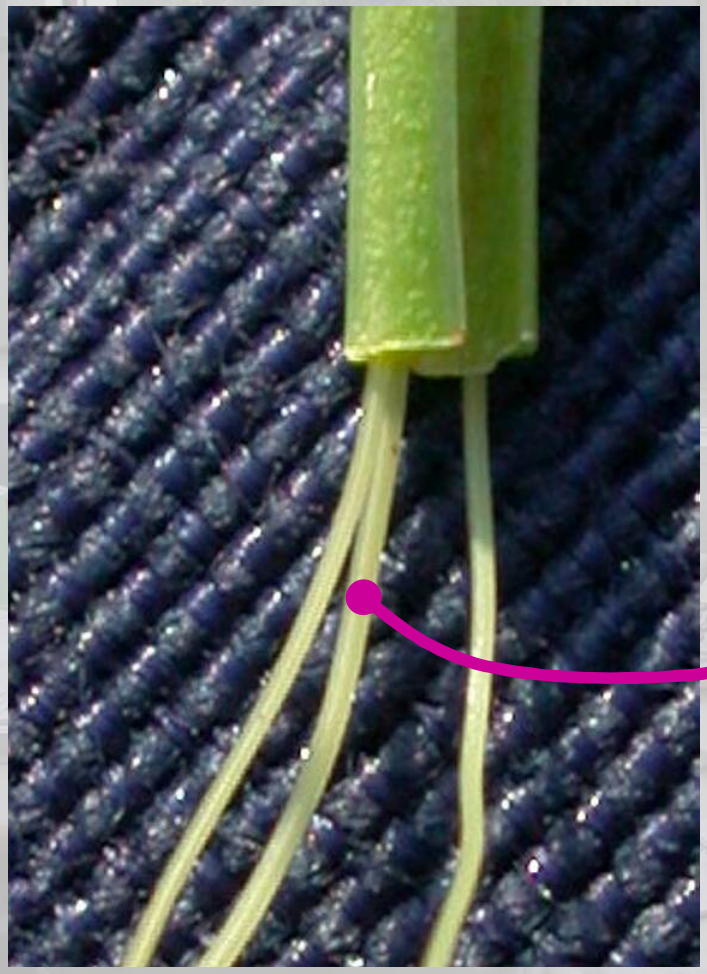
netzig

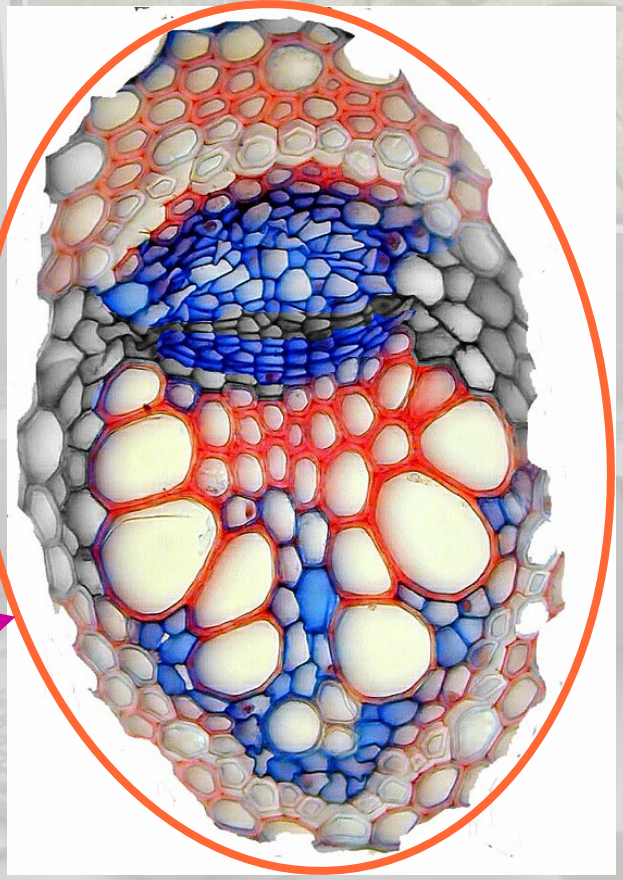
Nervatur/Gefäßbündel=Leitbündel



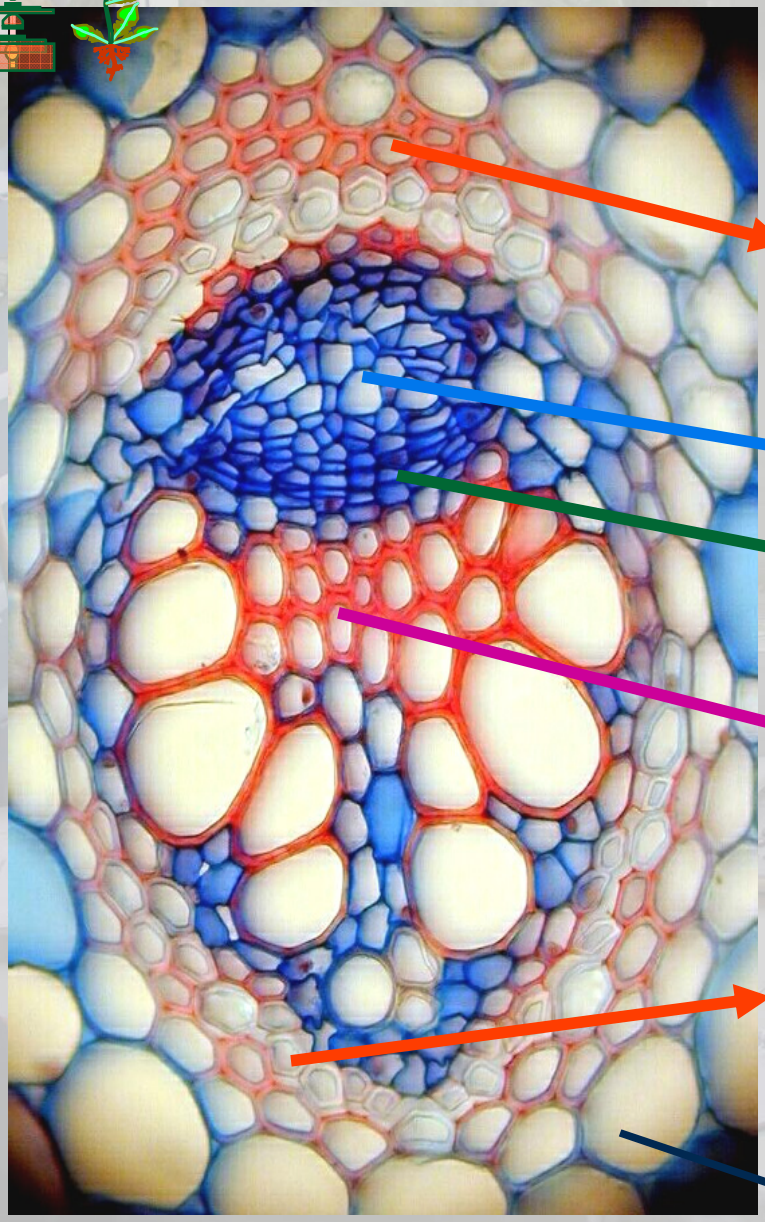
bogenläufig

Nervatur/Gefäßbündel=Leitbündel





Kollateral offenes Gefäßbündel



Faserkappe

Phloem ▯ Assimilatleitung

Leptom

Kambium

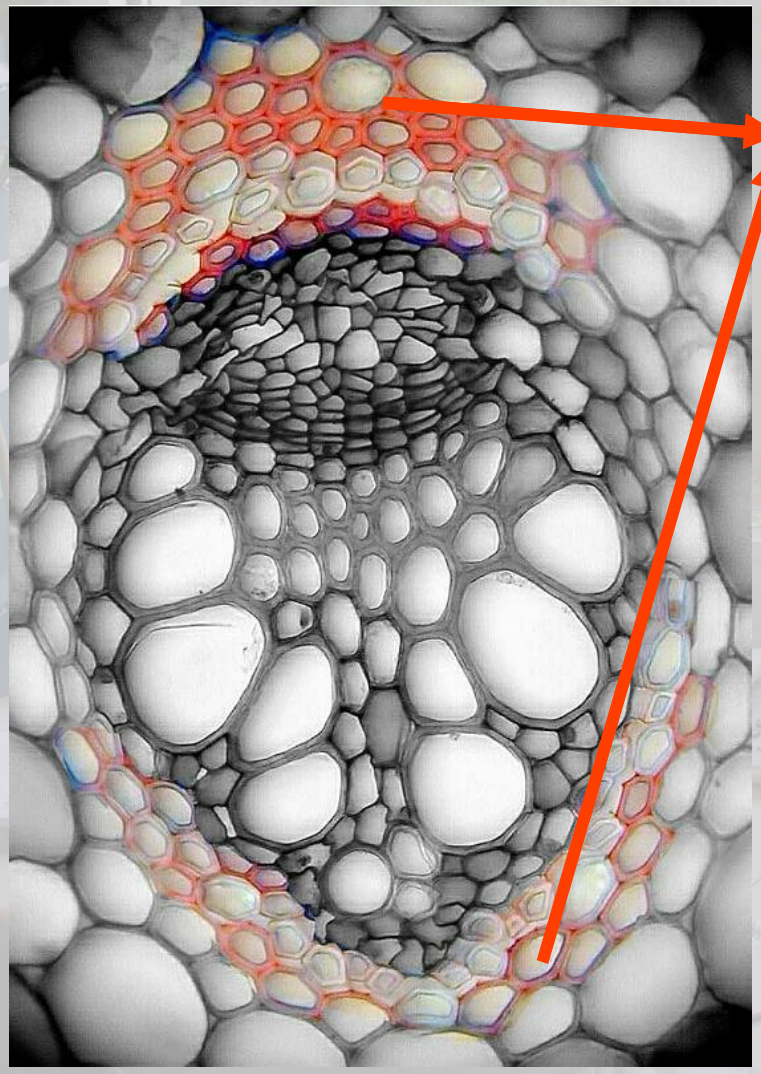
Hadrom

Xylem ▯ Wasserleitung

Faserkappe

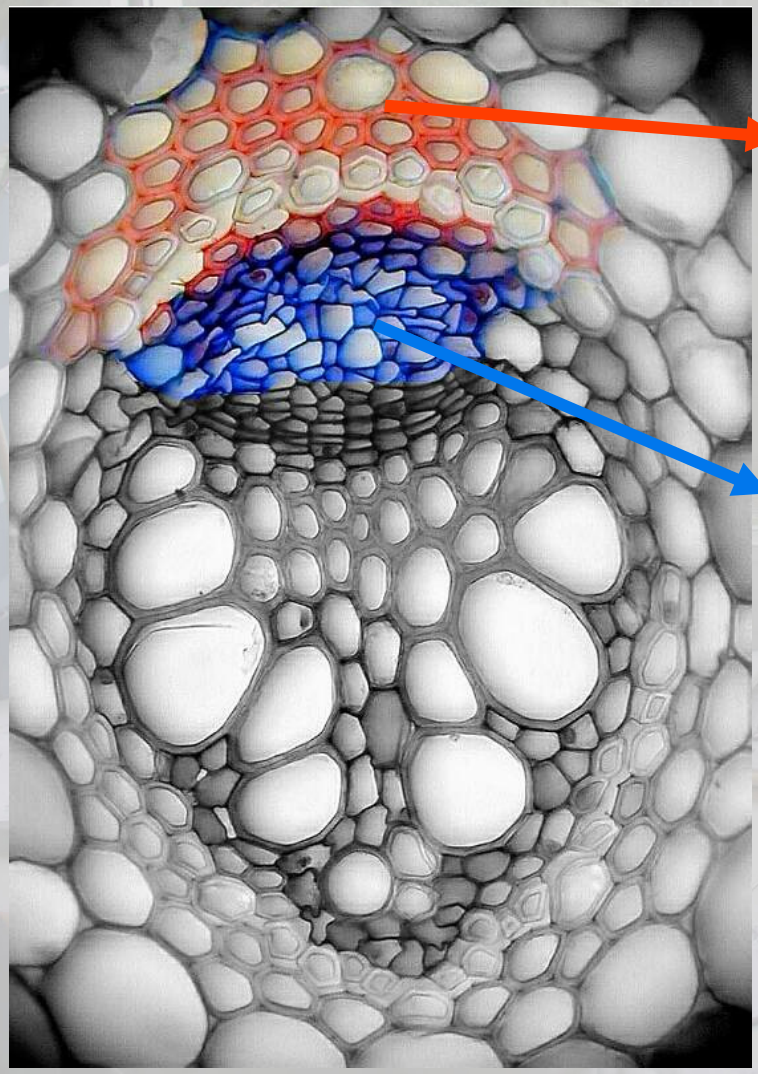
Parenchym

Kollateral offenes Gefäßbündel



Faserkappe/Gefäßbündelscheide

Kollateral offenes Gefäßbündel

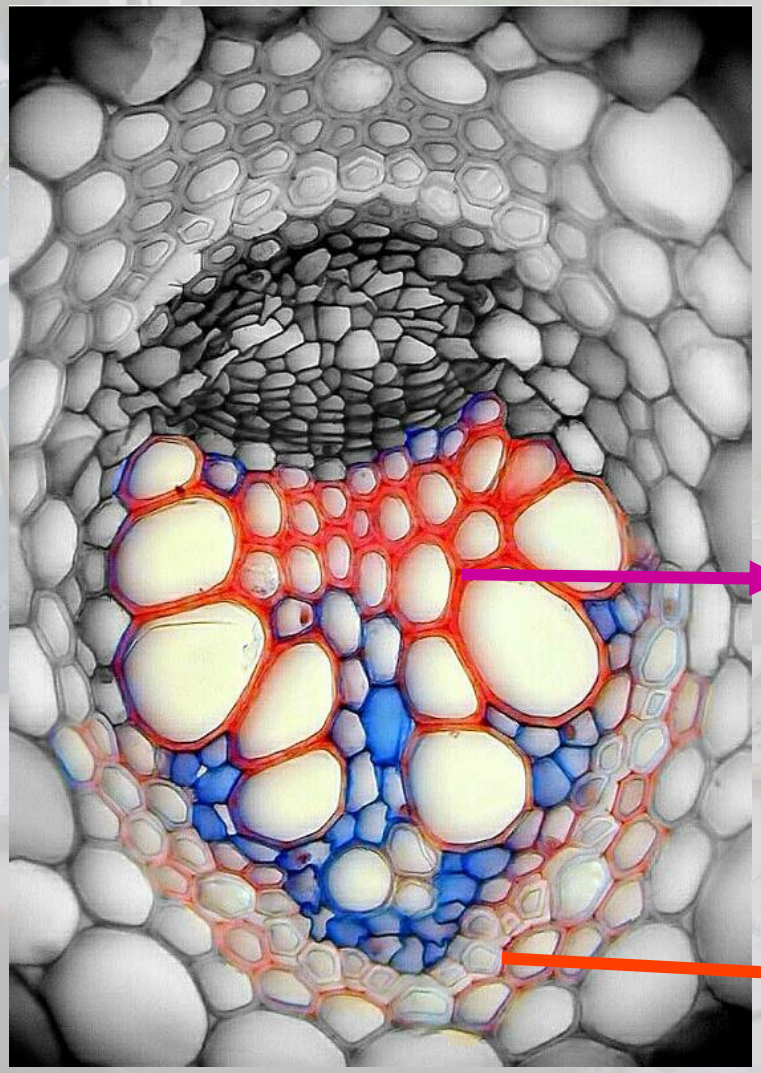


Faserkappe/Gefäßbündelscheide

Phloem ▯ Assimilatleitung

Leptom

Kollateral offenes Gefäßbündel

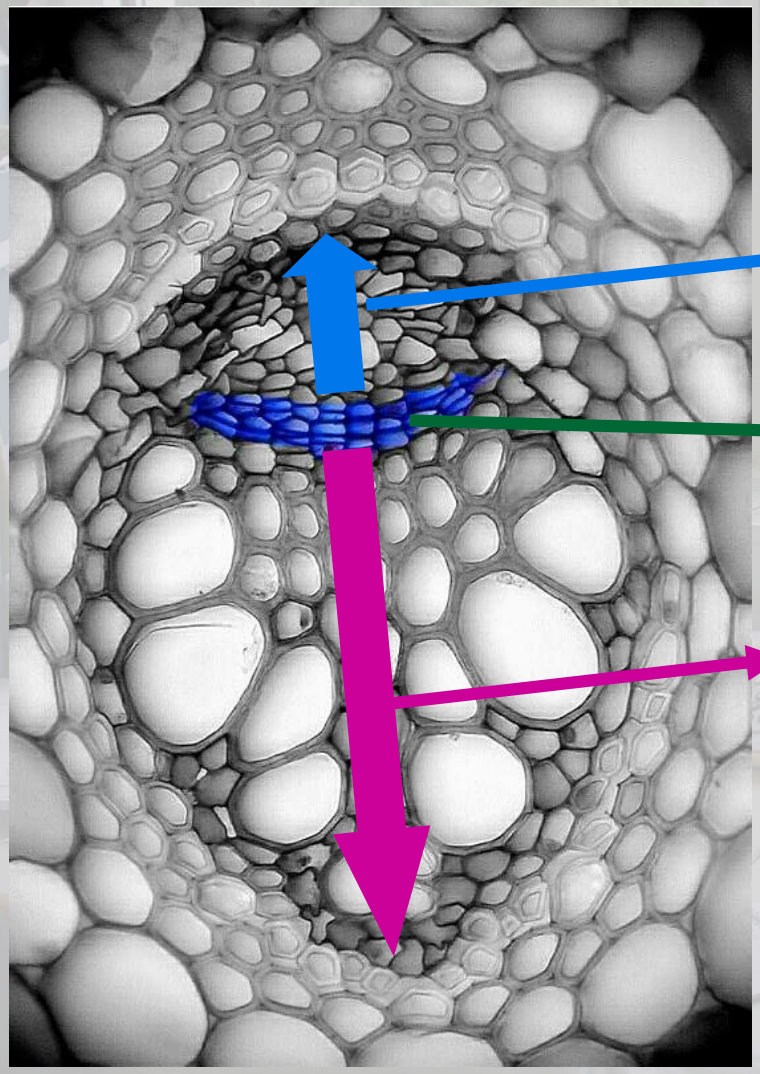


Hadrom

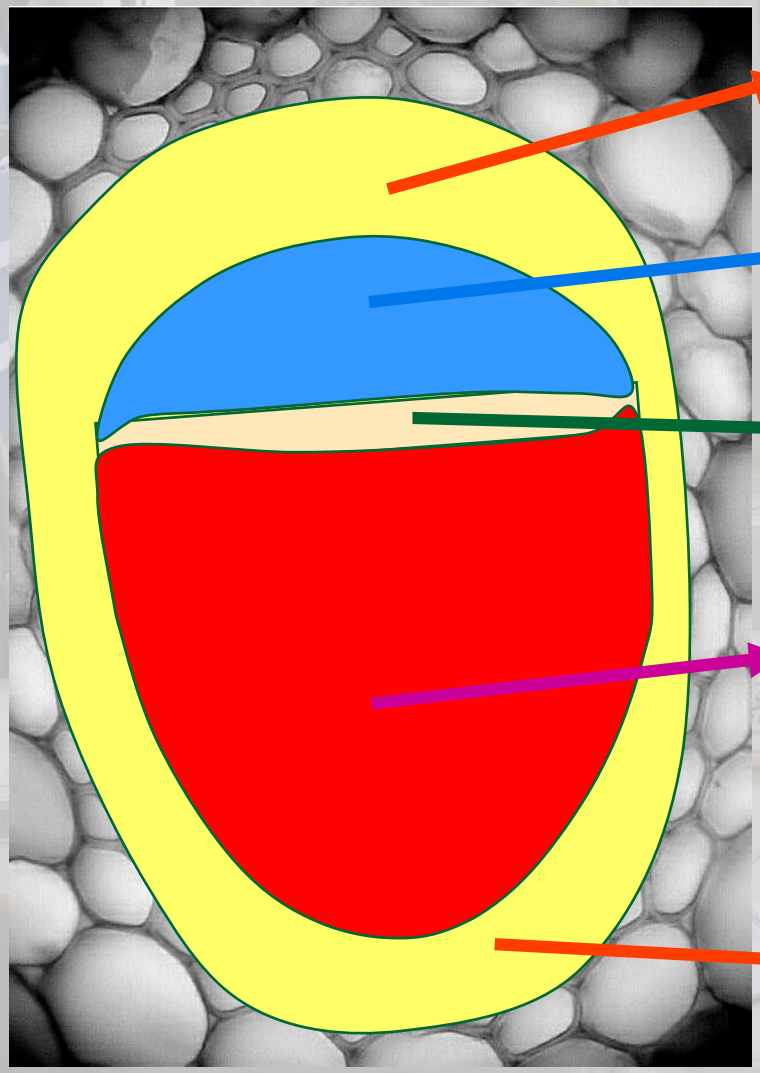
Xylem – Wasserleitung

Faserkappe/Gefäßbündelscheide

Kollateral offenes Gefäßbündel



Kollateral offenes Gefäßbündel



Faserkappe/Gefäßbündelscheide

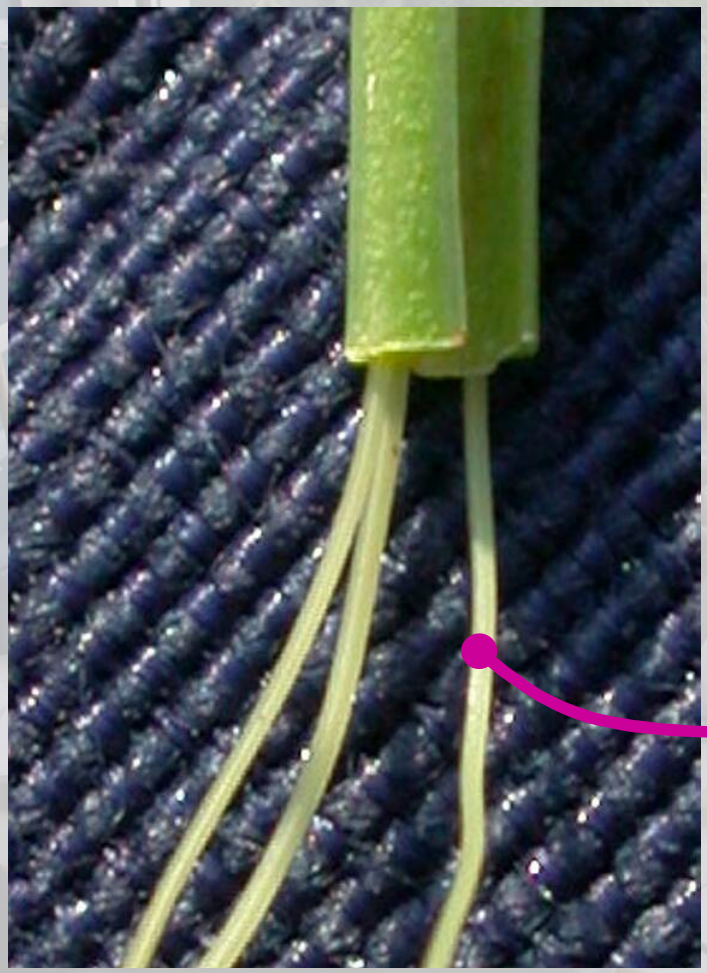
Leptom

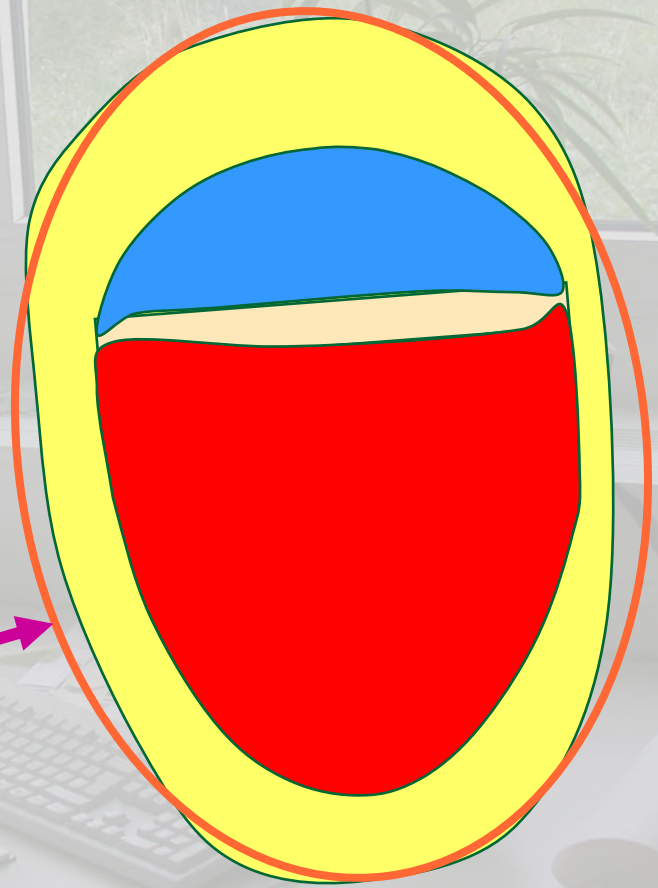
Kambium

Hadrom

Faserkappe/Gefäßbündelscheide

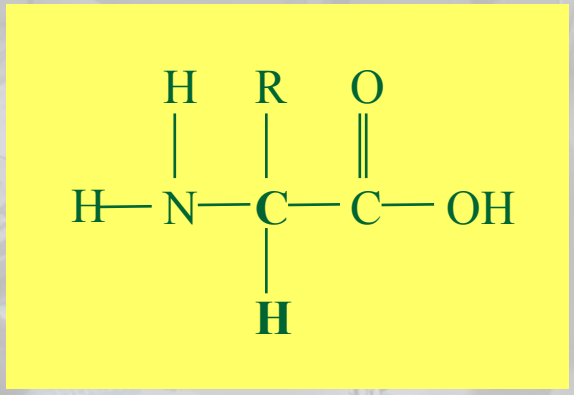
Kollateral offenes Gefäßbündel



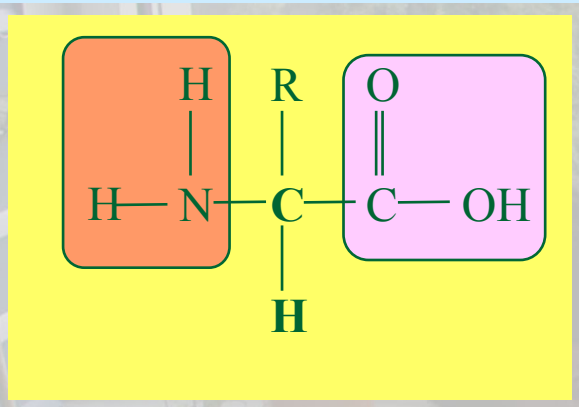


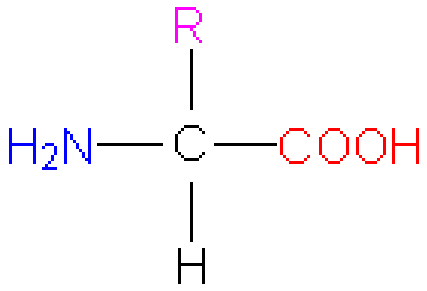
Proteine

- Proteine bestehen aus einem oder mehreren Polypeptid(en)
- Polypeptide sind verkettete Aminosäuren
- ca. 20 Aminosäuren bilden das Grundgerüst aller Proteine



Aminosäure

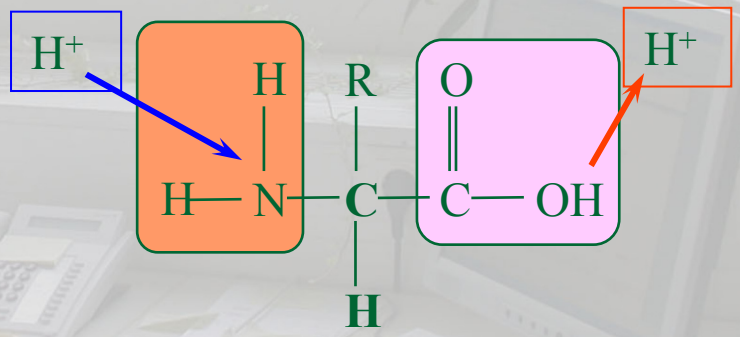




Aminosäure

Aminogruppe

Carboxylgruppe

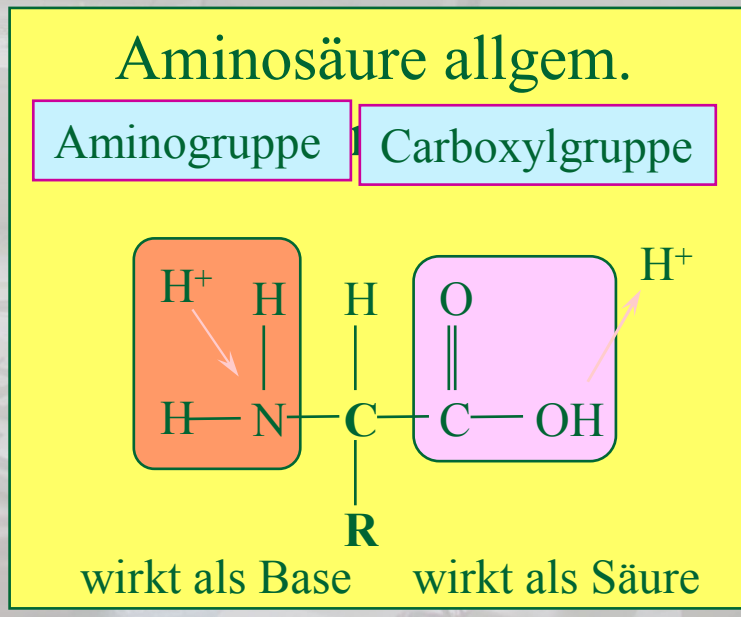


wirkt als Base

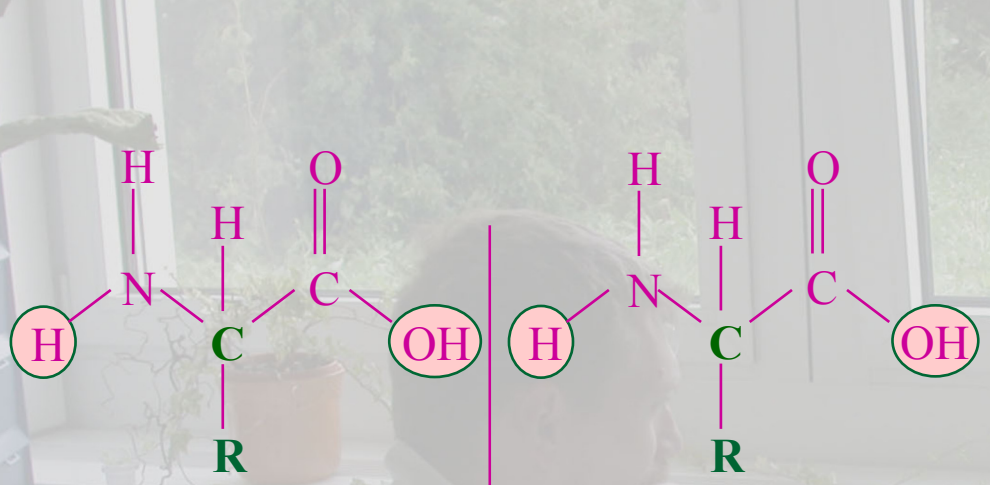
wirkt als Säure

Proteine

- Proteine bestehen aus einem oder mehreren Polypeptid(en)
- Polypeptide sind verkettete Aminosäuren
- ca. 20 Aminosäuren bilden das Grundgerüst aller Proteine

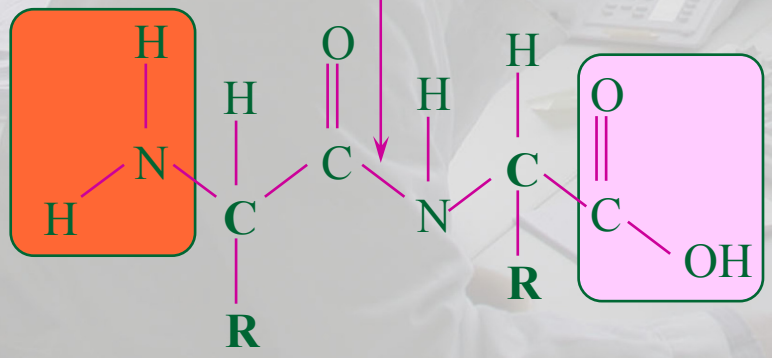


Peptide sind Ketten aus Aminosäuren



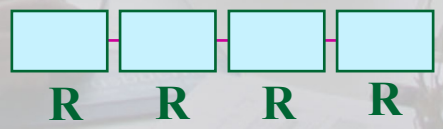
Peptidbindung

H_2O

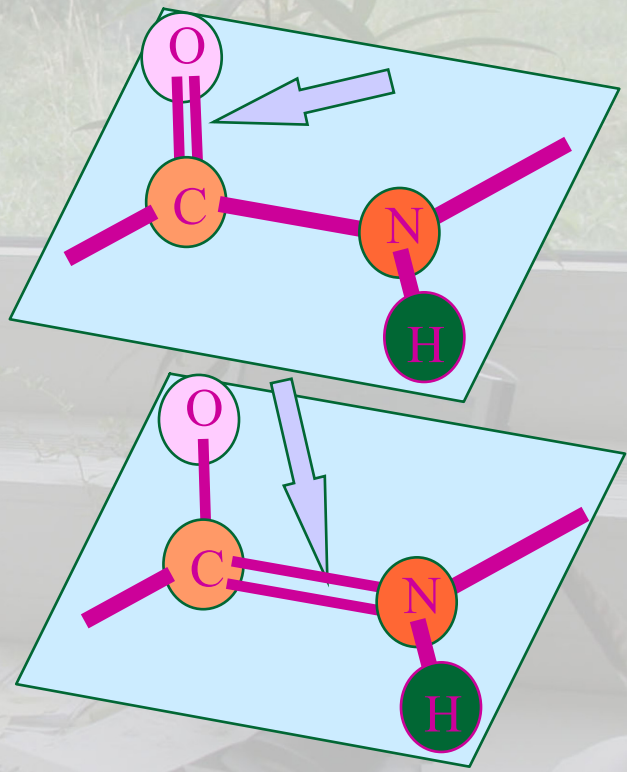


N-Terminus

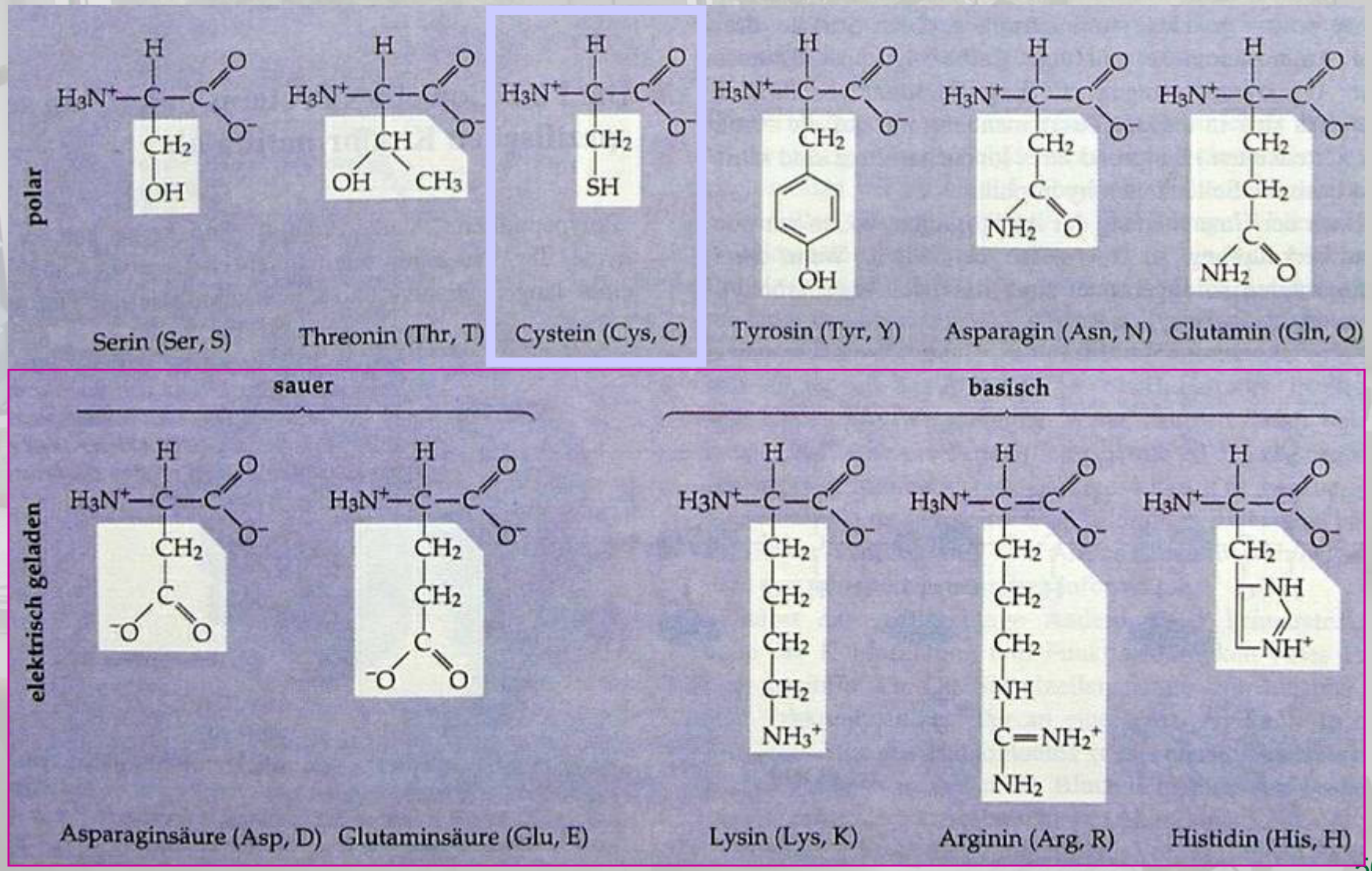
C-Terminus



mesomerstabilisiert

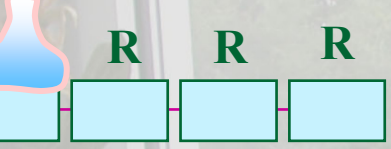


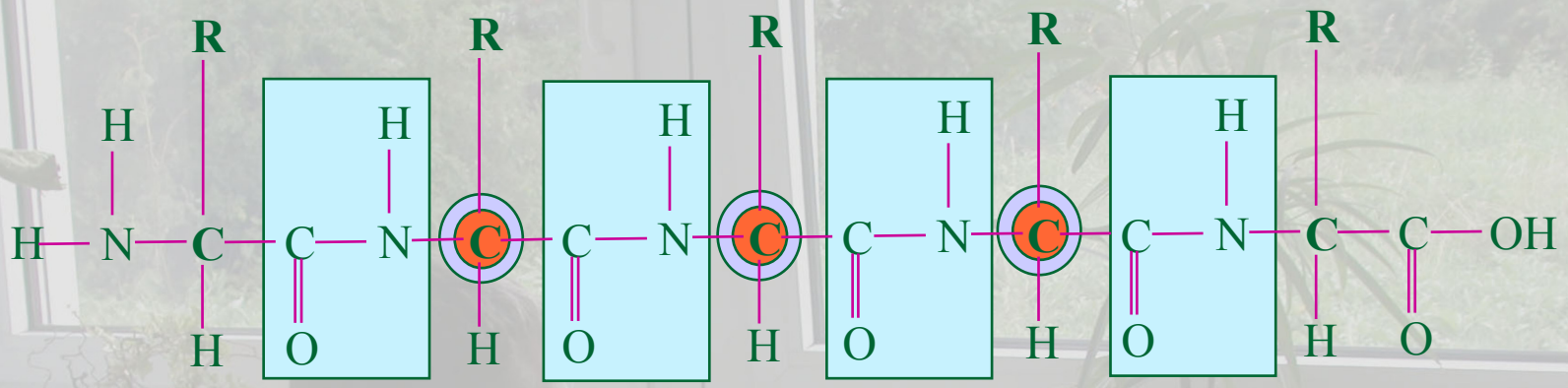
Eigenschaften der Aminosäuren

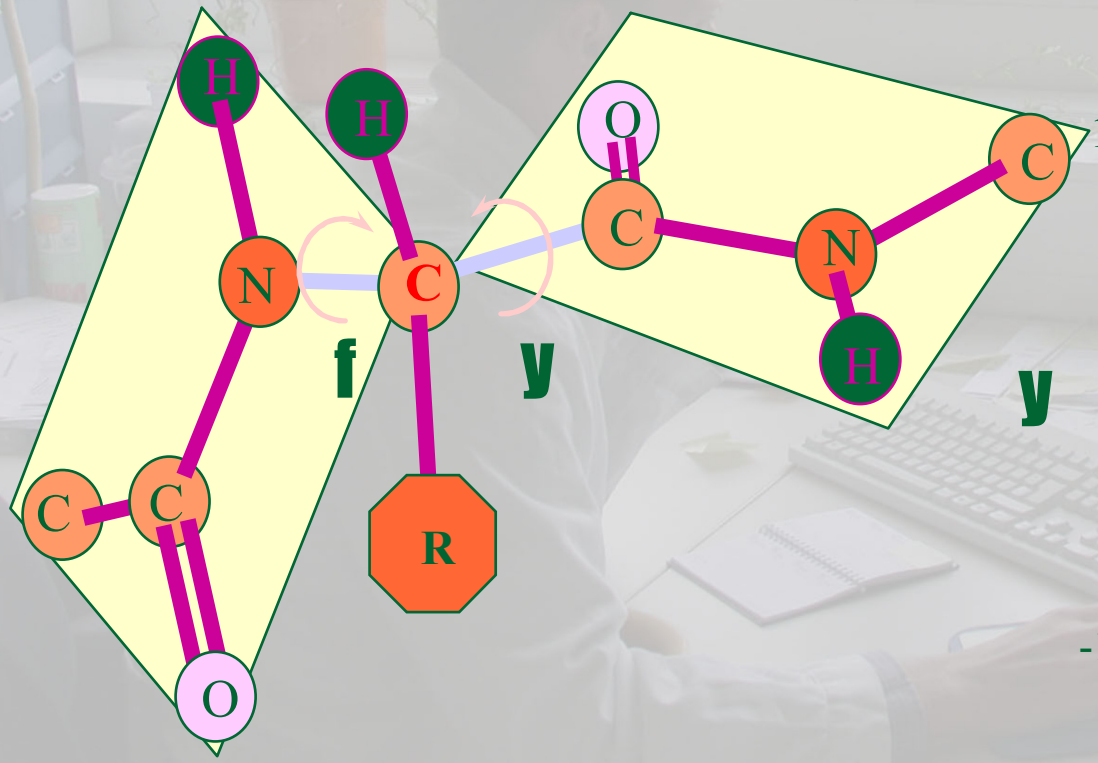


Learning Path III

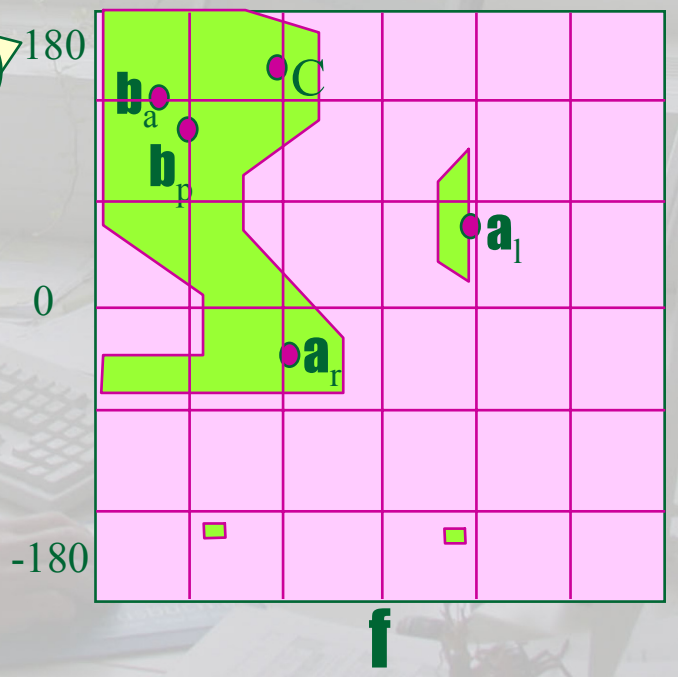
das Polypeptid-Rückgrat







f,y = Diederwinkel



Lessons learned

+ Adequate tool for large audiences
+ Online tests are highly efficient
  (depending on workload invested beforehand)
+ Guiding structure vs. Google chaos
- Digital divide! (Solution: PC for rent or large PC-rooms)
- Differences in IT equipment of students problematic
- Broadband infrastructure needed
- Didactic attractive tools need technically advanced equipment
- Unclear setting of online examinations
  (tutors, friends, etc.)
- **Virtuality vs. reality (look and feel)**

Thank you for attention