



Defense and escape mechanisms of *Borrelia* against the human immune system and against antibiotics and chemotherapeutics

Please double - click
on all underlined
and all the blue links

Why *Borrelia* remains infectious despite intensive antibiotic treatment

<http://www.xerlebnishaft.de/trotzantibiosepat.pdf>
<http://www.erlebnishaft.de/trotzantibiosetier.pdf>
<http://lymerick.net/Borrelia-history-test-FINAL.pptx>

An animated
Power Point
presentation

Bernt-Dieter Huisman

March 2014



Defense and escape mechanisms of Borrelia

tick spit

A. conventional borrelia

B. pleomorphic forms of Borrelia *

C. biofilms *

D. horizontal gene transfer

E. symbiogenesis



Defense and escape mechanisms of Borrelia

Tick spit is the
Achilles' heel
in vektor-borne diseases.

Salp15 from the tick spit for example
inhibits the
Complement-system.

http://www.erlebnishaft.de/tick_spit.pdf

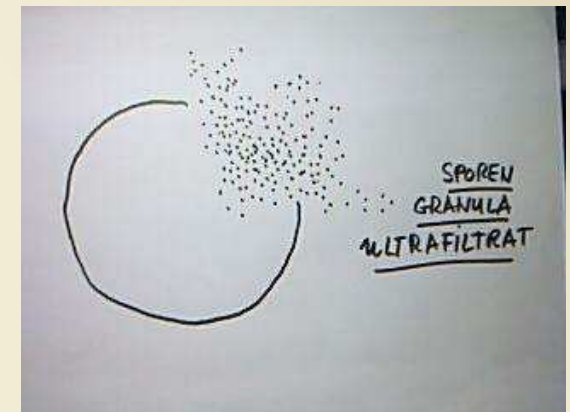
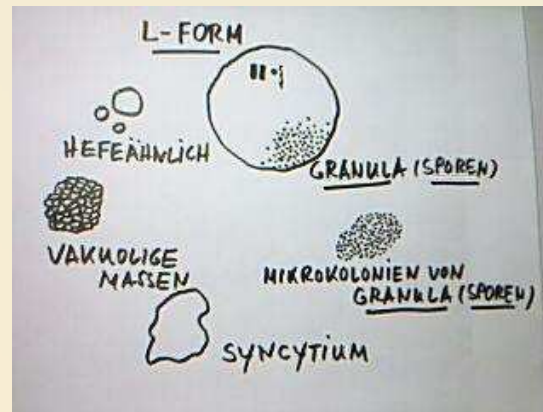
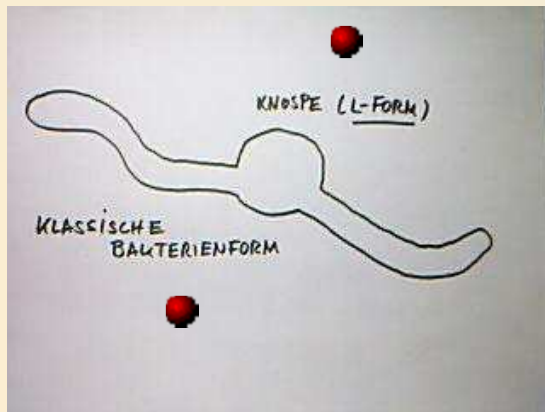


A. Classic Borrelia - forms, B. Pleomorphic Borrelia forms

Zell wall defective bacteria – Variants (CWD´s)
L - Forms and bacteria – granulates forms

Stealth – Infektions

Chronic Borreliosis *



Conventional form with bud *

Zell wall defektive variants *

Bakterial – ultrafiltrates *

Images after L.H. Mattman, Cell Wall Deficient Forms, Stealth Pathogens CRC Press 2001 *

Text processing by Dr.med.Bernt - Dieter Huismans Am Haldenberg 24 74564 Crailsheim, 2007

A. Defense and escape mechanisms of Classic Borrelia forms

**Borrelia are as classic Borrelia,
pleomorphic Borrelia, L-form or as
granular ultrafiltrate**

increasingly in this order

fat-soluble, i.e. lipophilic,

**Borrelia therefore esp. as “liposomes”
can easily penetrate cell membranes.**



A. Defense and escape mechanisms of Classic Borrelia forms

Borrelia prefer

viscous structures,

a hyper-osmolar medium,

a low-oxygen environment, they are

facultative anaerobes, they

prefer a slightly acidified

environment, ph-values of 6,8 - 7,8

as well as temperatures of 25° to 30° C



A. Defense and escape mechanisms of Classic Borrelia forms

Borrelia can smell.

**The infectivity of Borrelia
disappears with the loss of
this ability.**

Sense of smell, Chemotaxis

<http://iai.asm.org/content/early/2012/04/11/IAI.00145-12>



A. Defense and escape mechanisms of Classic Borrelia forms

**Borrelia can quickly move away
e.g. within two minutes
one centimeter.**

<http://www.youtube.com/watch?v=vpKtC1H5fhc>

<http://www.youtube.com/watch?v=F9B60gsCg4w>

<http://www.youtube.com/watch?v=O0y7X5acK8M>

<http://www.youtube.com/watch?v=N8C-5QkNyhl&list=PLB60F4DDB87FE2DD6>



A. Defense and escape mechanisms of Classic Borrelia forms

Borrelia operate an

Efflux mechanism for pollutants,

this is well known for example for
Tetracyclines.

Borrelia produce Betalaktamases * *,
against Penicillins, Cephalosporins.

<http://www.erlebnishaft.de/stressvar2.pdf>

http://www.xerlebnishaft.de/borsrel_inflam_lymphom_neopl.pdf

http://www.erlebnishaft.de/chronic_fatigue.pdf

http://www.erlebnishaft.de/psychiatric_patients.pdf

Antibiotic resistance <http://www.erlebnishaft.de/staphylococcus aureus.pdf>



A. Defense and escape mechanisms of Classic Borrelia forms

Vlse (Variable major protein (VMP) sequence expressed) helps Borrelia in masking by continuous change of Borrelia surfaces.

With OspC the Borrelia can be masked and move undetected in the connective tissue of their hosts.

<http://www.xerlebnishaft.de/complement.pdf>

<http://www.xerlebnishaft.de/serollyme.pdf>

<http://www.borreliose-verschwiegene-epidemie.de/app/download/8931827599/Kraiczy.pdf?t=1389008403>



A. Defense and escape mechanisms of Classic Borrelia forms

Preferred Borrelia staying points are
blood vessels with the sequence of
micro-and macro-angiopathy,
tendons and ligaments *
and high-fat, lipid-rich organs, such as
the nervous system *.

<http://www.erlebnishaft.de/angiopathie.pdf> <http://www.erlebnishaft.de/arthritisiden.pdf>

<http://www.erlebnishaft.de/alzheimerspirochaetosis.pdf>

http://www.erlebnishaft.de/psychiatric_patients.pdf

<http://www.erlebnishaft.de/multipleskleroseborreliose.pdf>



A. Defense and escape mechanisms of Classic Borrelia forms

Borrelia

sequester host-antibodies.

Borrelia reduces the number of active
natural killer cells from the group

CD57.

http://www.erlebnishaft.de/danger_model.pdf

http://www.erlebnishaft.de/selbst_muster_nano.pdf

http://www.xerlebnishaft.de/bakt_pathogenitaetsfaktoren.pdf



Zellwall Therapeutics for Classic Borrelia forms

With an intact blood-brain barrier cell wall agents (beta-lactams)
can not go into the liquor! *

Of the drugs against Borrelia is preferred among the penicillins:
Amoxicillin.

Among the cephalosporins are effective only the 3rd generation of cephalosporins:

Ceftriaxon, Cefuroxim, Cefotaxim.

Borrelia produce betalaktamases



Ribosomes Therapeutics for Classic Borrelia forms

Macrolides (eg, azithromycin) and tetracyclines (eg, minocycline) are complementary in effect. In case of "chronic Lyme disease" you should always use them combined with each other!

Prokaryonts (bacteria and archaeae)

Minocycline is to 40% in the cerebrospinal fluid, doxycycline to 16% only.

Ribosome	Subunit
70 S	50 S 30 S

act specifically in the division phase of the bacteria

Makrolide

Lincosamide

Tetracycline

Glycylcycline

Clindamycin

instead of
Acithromycin in
cardiac patients,
and/or protozoa
such as Babesia

Remember the „Efflux Mechanism“: Check the serum levels

Eukaryonts (animals, plants, fungi, protozoa)

Ribosome	Subunit
80 S	60 S 40 S

Makrolide http://www.kabilahsystems.de/azithromycin_and_lyme.pdf

Tetracycline <http://www.kabilahsystems.de/minocyclin.pdf>

Clindamycin <http://www.kabilahsystems.de/clindamycin.pdf>



B. Defense and escape mechanisms of pleomorphic Borrelia

Pleomorphie or Pleiomorphie is the diversity of microorganisms or cells of multicellular organisms, including tumor cells.

The pleomorphie is from the ground up different from the theory of Pleomorphism

<http://www.wwwarchiv.de/wwwarchiv/anfang/texte/umweltkl00.html>

<http://dict.leo.org/englisch-deutsch/Pleomorphie.html>

: „Sorry, we found no matches for your search term(s) Pleomorphie”



B. Defense and escape mechanisms of pleomorphic Borrelia

Pleomorphic forms

are diverse varieties of bacteria, eg of Borrelia or fungi with altered cell wall, grown in mycoplasma-like colonies.

<http://www.erlebnishaft.de/stressvar1.pdf>

<http://www.erlebnishaft.de/stressvar2.pdf>

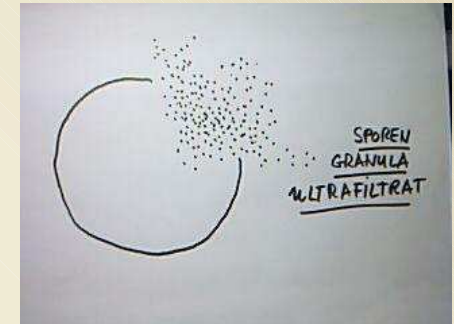
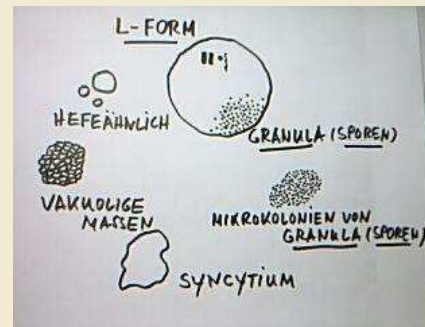
Mycoplasma-like colonies are hydrogels of bacteria, fungi and other microbes, so-called biofilms



B. Defense and escape mechanisms of pleomorphic Borrelia

Namings

- L – Formen , L1–Forms , L–Phase Variants , ([E. Klieneberger – Nobel , 1935](#))
- Sphaeroplasten , Symplasten , Protite , Somatite , Sporen , („Grey Goo“), Granula
- Protoplasten , Plasmodien
- Transitionals, Rauhformen
- Blebs (dormante Formen)
- Ultrafiltrierbare Bakterienformen
- Pleomorphe Bakterien
- Bakterien - Induktions – Formen
- Gymnoplasten , Bakterien - Reversions – Formen
- Elementarkörperchen (EK) , Paschenske Körperchen (1932) , Persister
- Zysten – Formen * , Round bodies, Ca-Protozoen (A. Weber , 1968)
- Tarnkappen – Krankheitserreger , Stealth Pathogens (L.H. Mattman)
- Zellwanddefekte Bakterien , CWDs , L - Formen ([L.H. Mattman , 2001](#))



L = little , large , lipoidal , lithe , Lister

(E.B. Almquist , E. Friedberger , F. Löhnis , E. Klieneberger-Nobel , L. Dienes)

B. Defense and escape mechanisms of

little (virus size) pleomorphic *Borrelia*

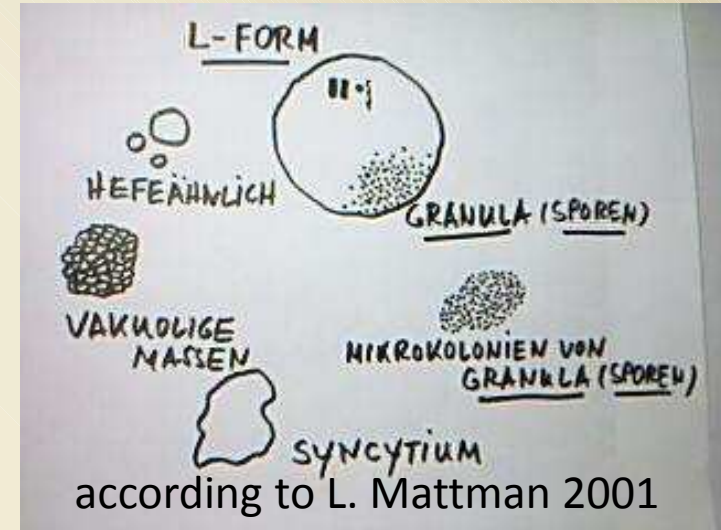
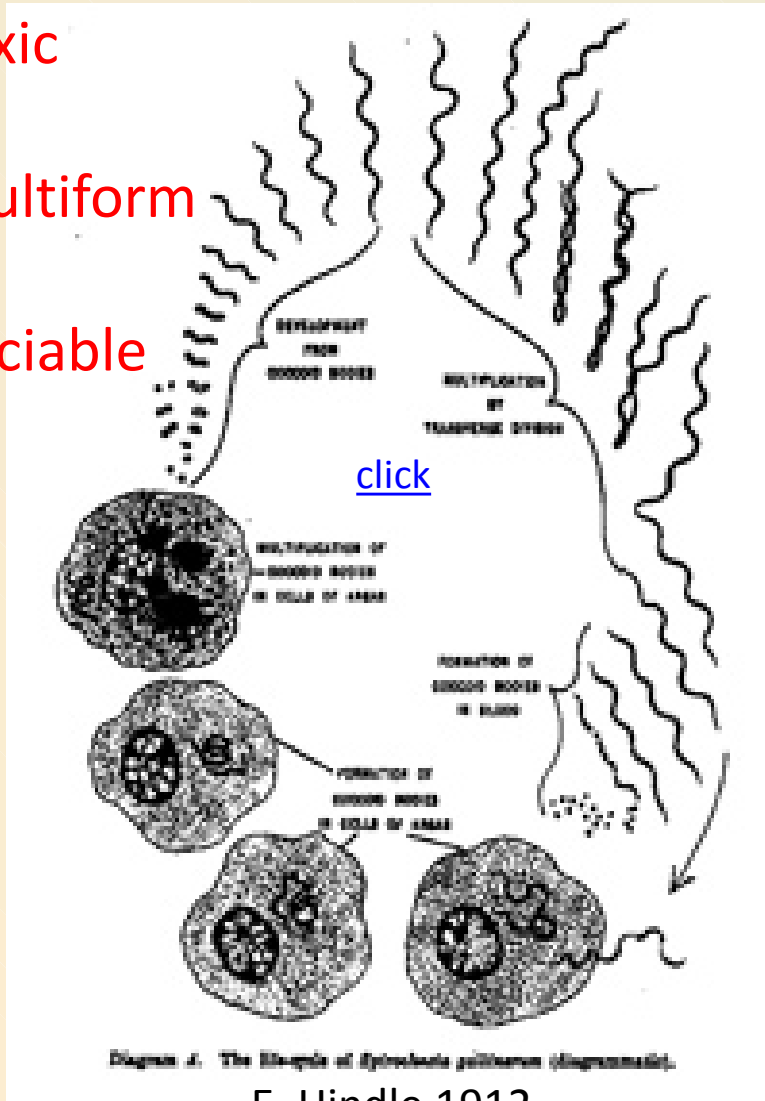
<http://www.xerlebnishaft.de/lebensstrukturenvergleich.pdf>

http://www.xerlebnishaft.de/expand_koch_post.pdf

toxic

multiform

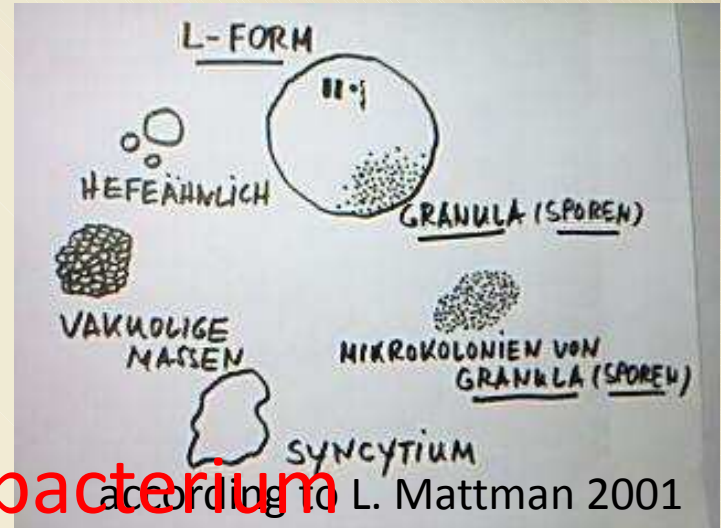
sociable



B. Defense and escape mechanisms of pleomorphic Borrelia

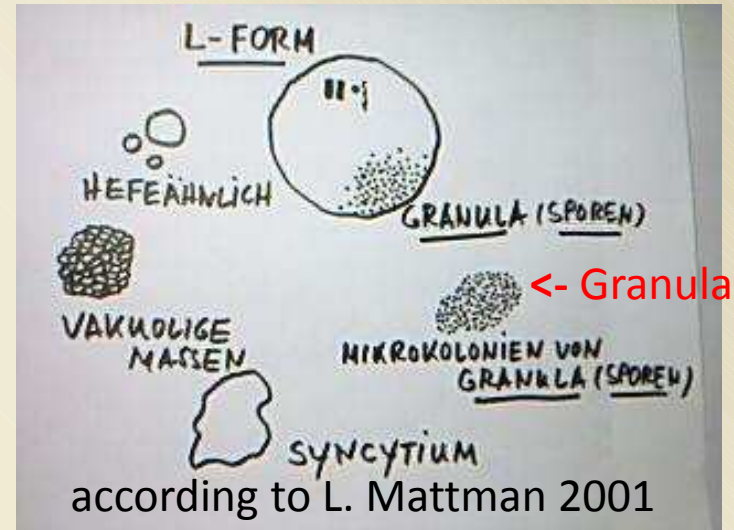
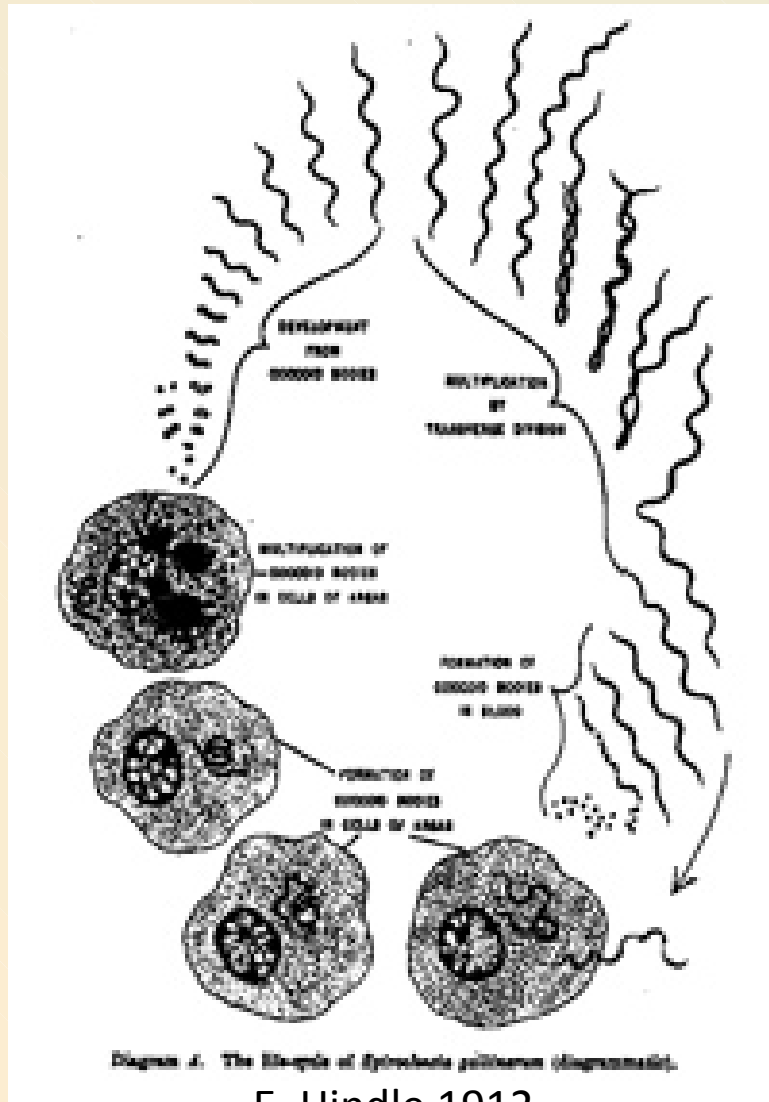


Always the same bacterium



according to [A. McDonald, 2008](#)

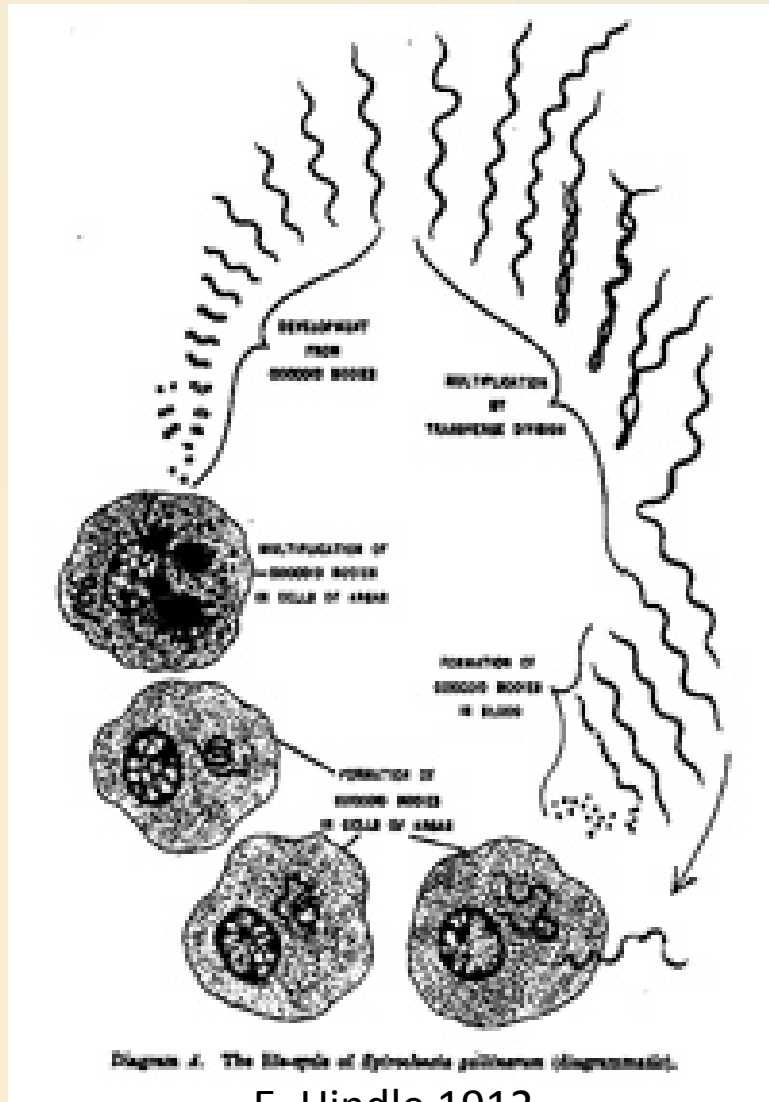
B. Defense and escape mechanisms of pleomorphic Borrelia



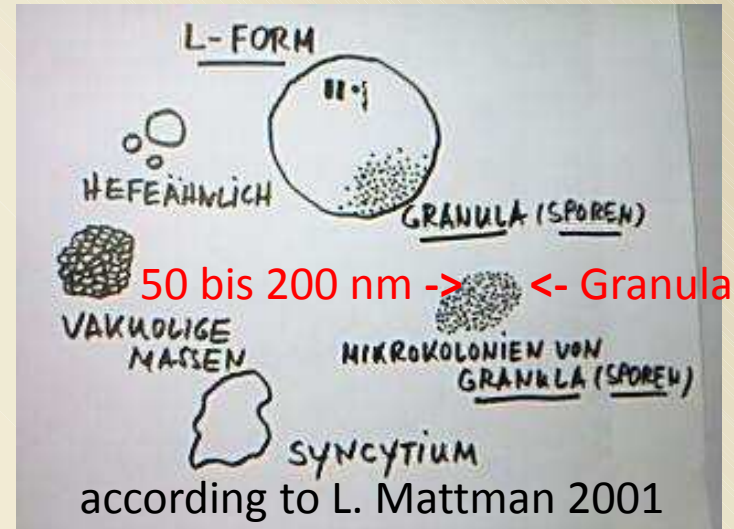
<- Granula



B. Defense and escape mechanisms of pleomorphic Borrelia



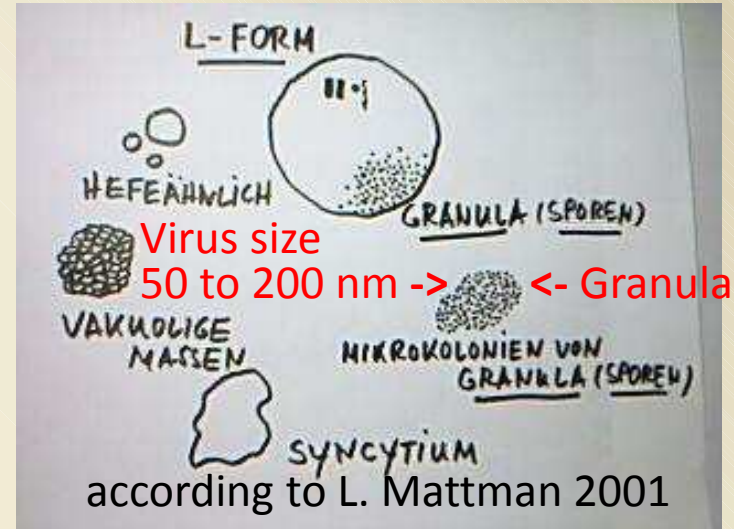
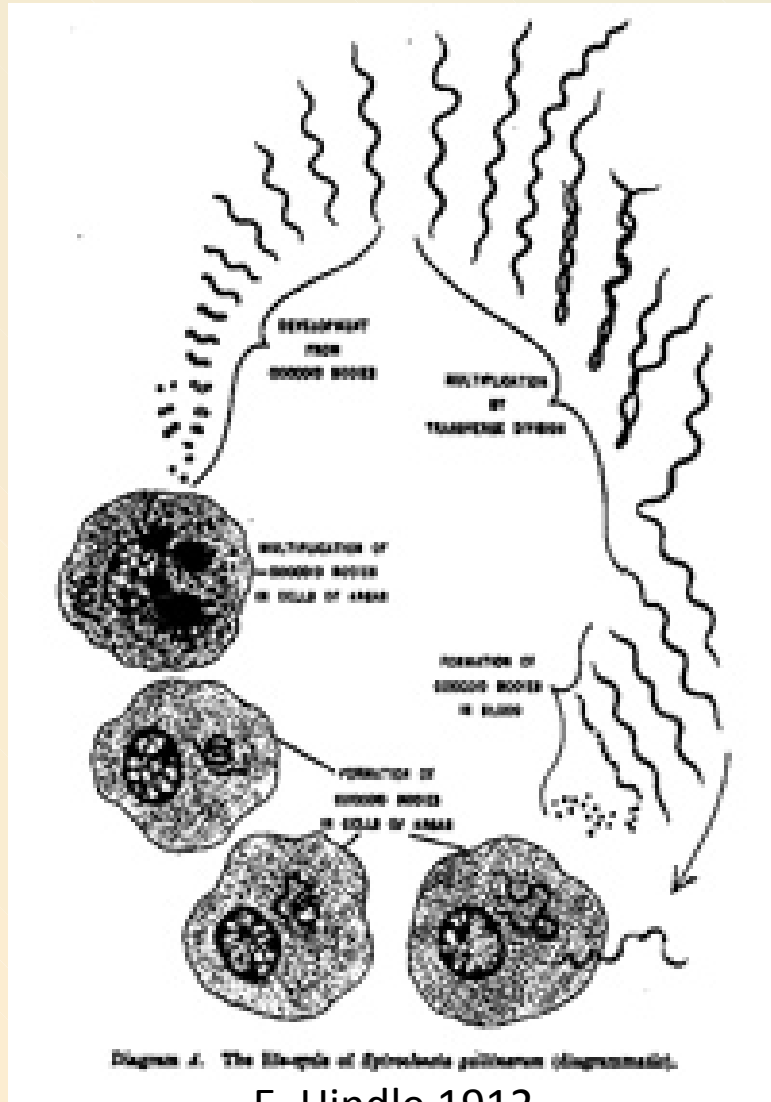
E. Hindle 1912



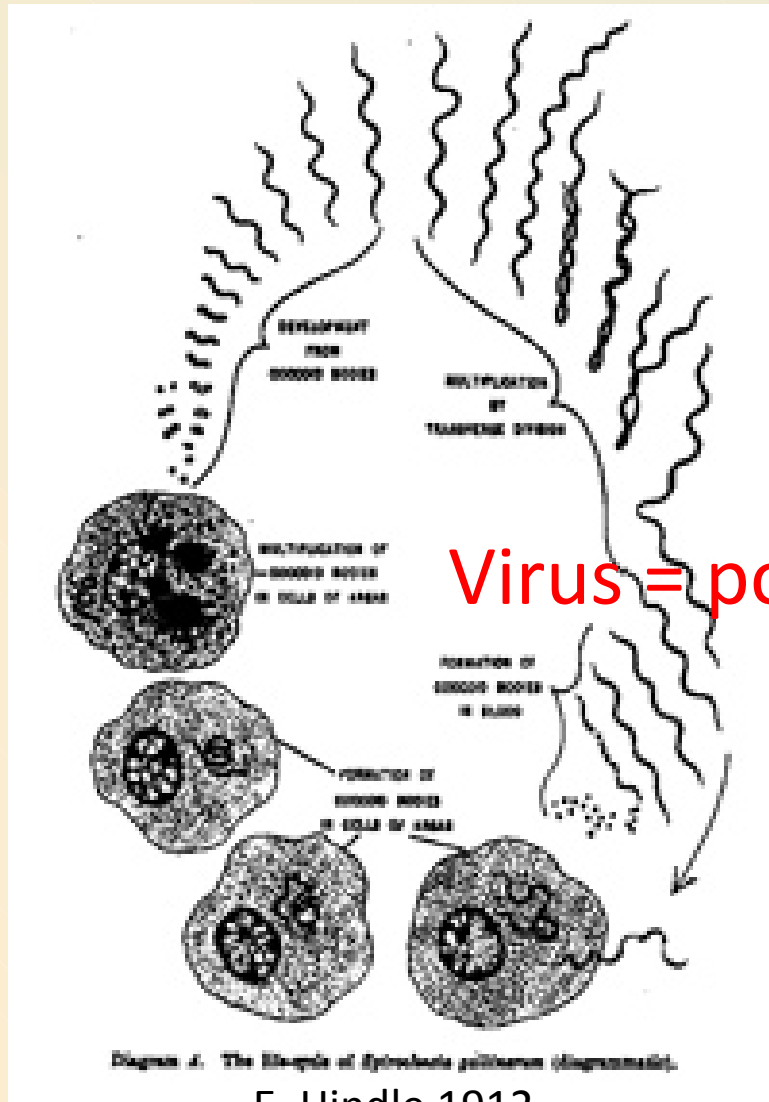
according to A. McDonald, 2008



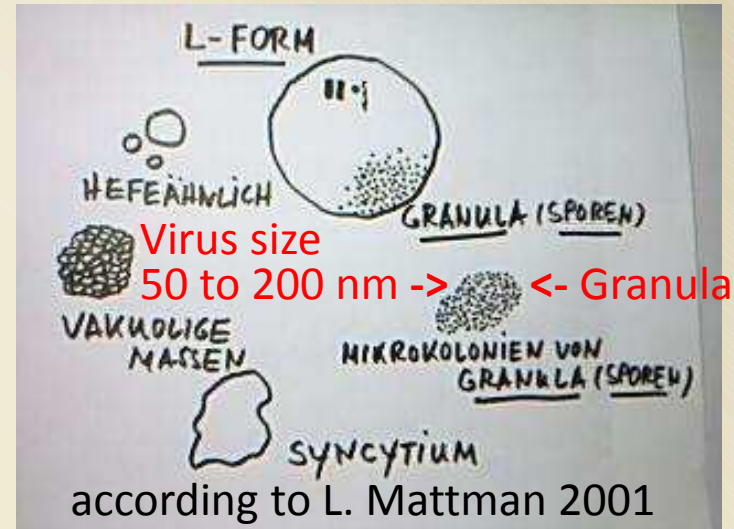
B. Defense and escape mechanisms of pleomorphic Borrelia



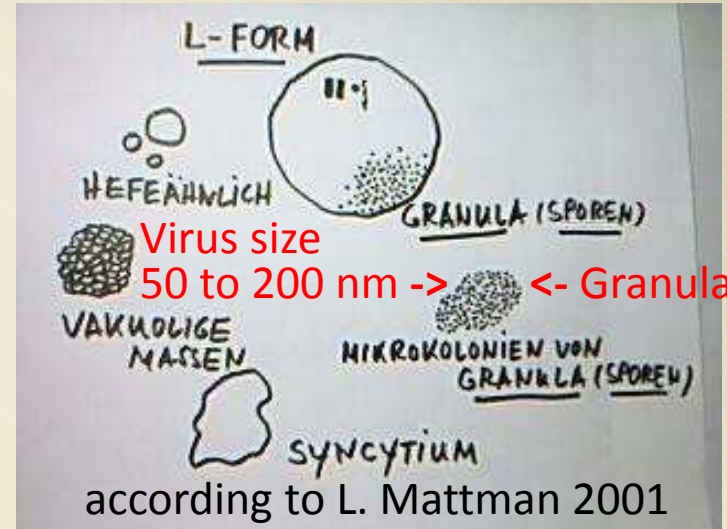
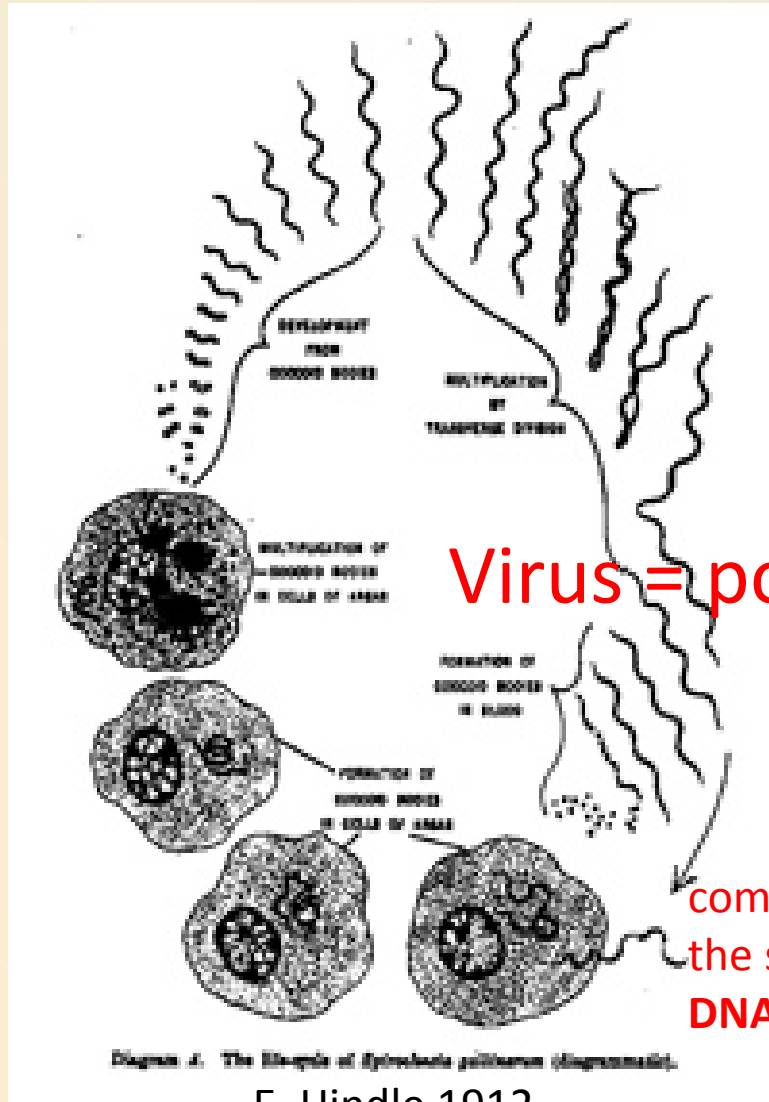
B. Defense and escape mechanisms of pleomorphic Borrelia



Virus = poison = toxin



B. Defense and escape mechanisms of pleomorphic Borrelia

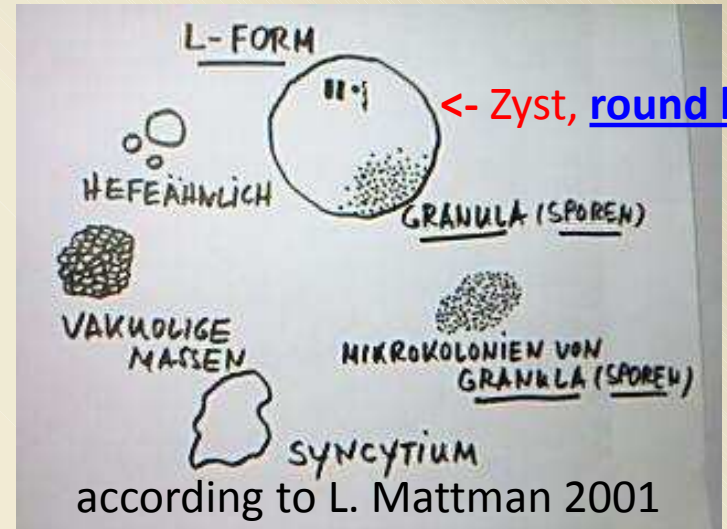
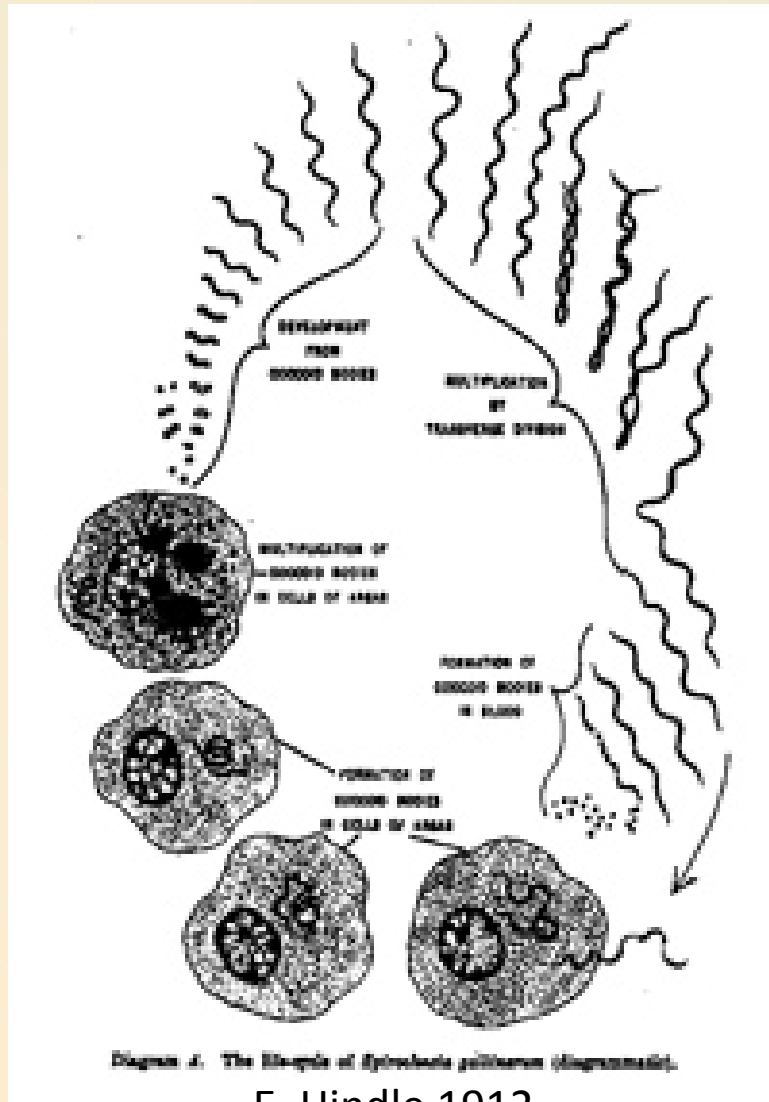


Virus = poison = toxin *

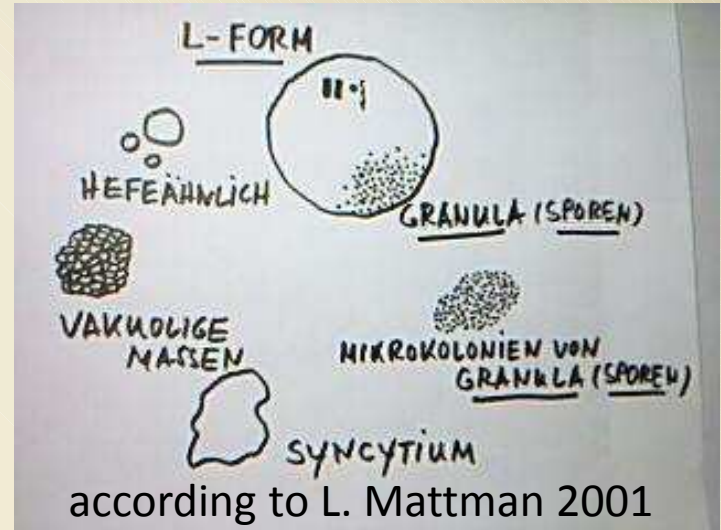
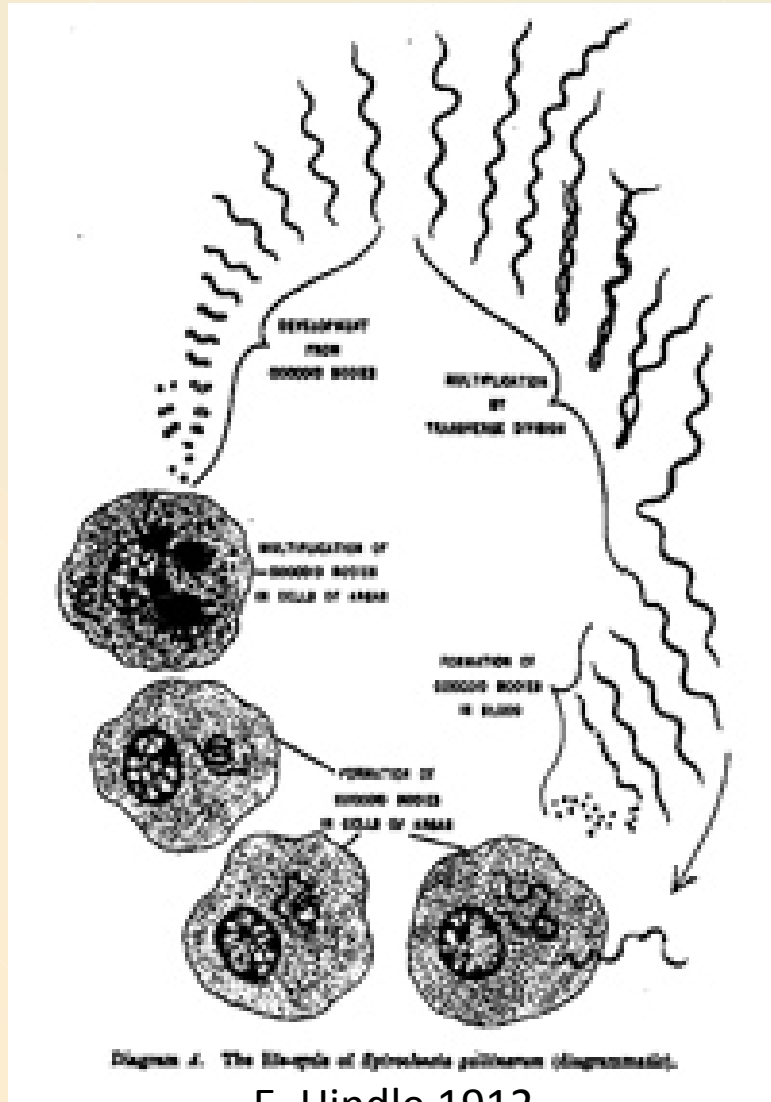


composition
the stealth forms:
DNA+RNA+Lipids+Protein

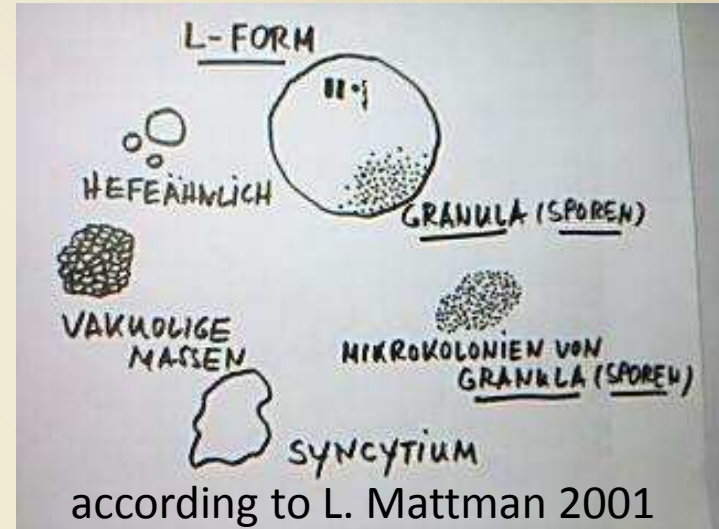
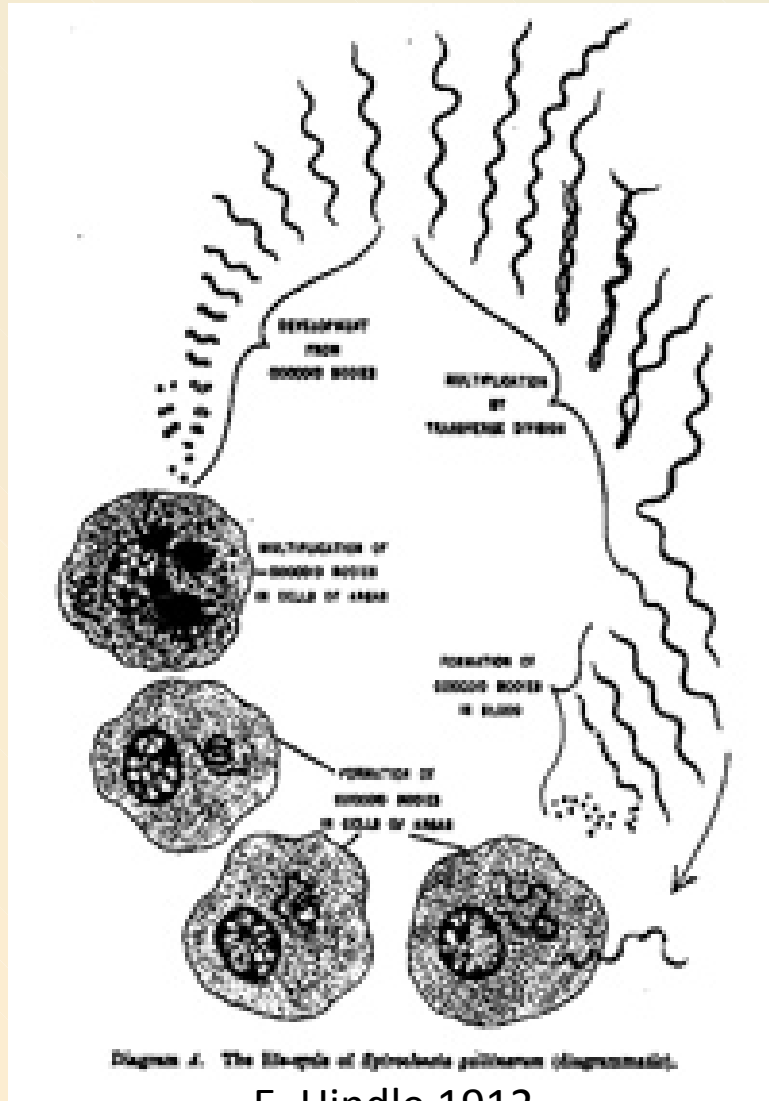
B. Defense and escape mechanisms of pleomorphic Borrelia



B. Defense and escape mechanisms of pleomorphic Borrelia



B. Defense and escape mechanisms of pleomorphic Borrelia



B. Defense and escape mechanisms of pleomorphic Borrelia

L-shapes and granules * are

Bakteria-forms of life

from 50 to 250 nm size (virus size)

with very sluggish metabolism.

They are hardly capable of reproduction and they can in spurts

germinate again

to classical forms of bacteria.



Colony formation

C. Biofilms

Host attack

<http://www.authorstream.com/Presentation/doctorrao-248605-biofilms-infections-science-technology-ppt-powerpoint/>

Gene exchange

Own profile

Own language

Own free will



Mykoplasma like colony

propagation characteristics

<http://www.youtube.com/watch?v=vpKtC1H5fhc>

<https://www.youtube.com/watch?v=qXTPiJWhtDg>

according to [A. McDonald, 2008](#)



C. Defense and escape mechanisms of Biofilms

Biofilms are the
„Cities of microbes“.

Biofilms are
a special type of aggregate living organisms.
They consist of original bacterial shapes,
pleomorphic and L-shapes,
foreign organisms, fungi, protozoa,
the adhesive peptidoglycan,
nucleic acids, lipids, and lektins.

http://www.youtube.com/watch?v=lpI4WCM_9pM



C. Defense and escape mechanisms of Biofilms

Biofilms are found extracellularly, at boundary surfaces of objects, the „Substratum“.

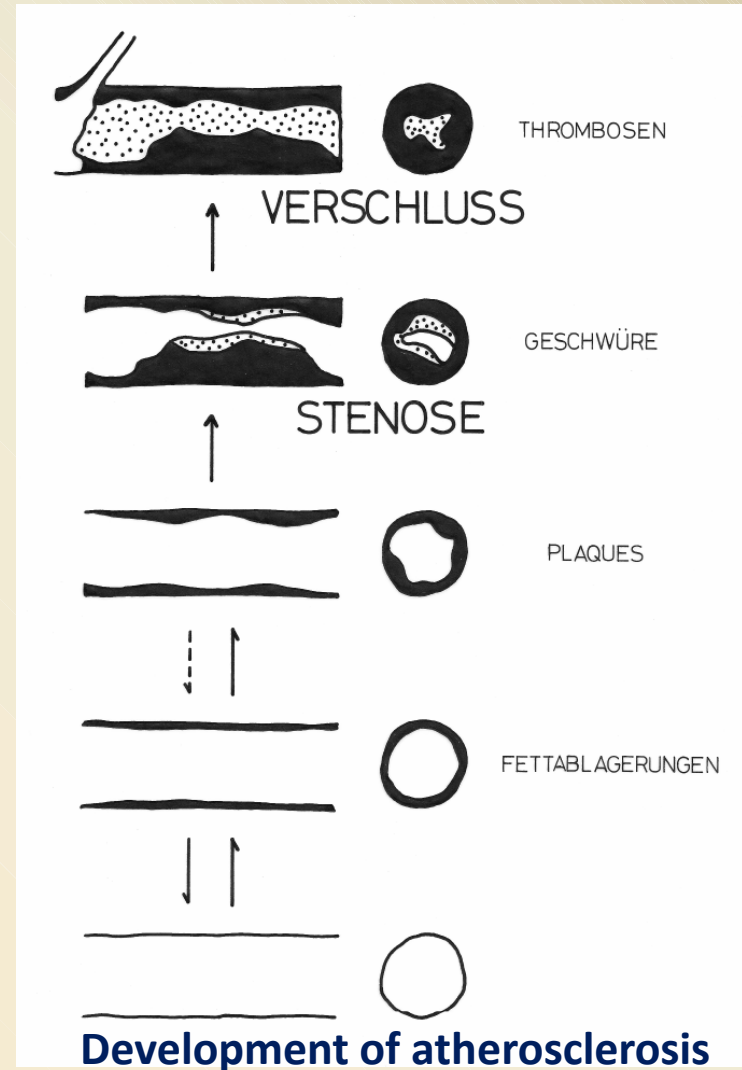
Biofilms are known as "slime layer" or perceived as "covering", as „bacterial vegetations“
or as pellicle or as sielhaut



C. Defense and escape mechanisms of Biofilms

Biofilms in cell tissues

- **3. Existence phase**
- Balance between growth and degradation of the biofilm
- **2. Accumulation phase**
([Quorum sensing](#))
- Colonization (Organisation phase)
- **1. Induction phase**
([Biopolymer](#))
- Adhesion (loss of surface negativity in the host, glycoproteins)



C. Defense and escape mechanisms of Biofilms

Biofilms in cell tissues

- ^Vswarm out
4. Sepsis
- Detachment in a larger context
5. Molting, embolization, e.g. heart attack, stroke
- autonomous locomotion on surfaces
6. Walking motion, for example in bronchioles
- Symbiogenesis
7. Integration

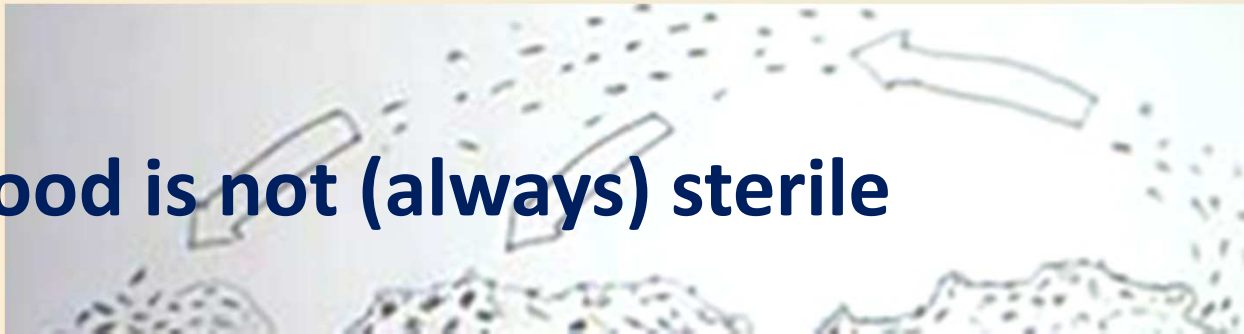
<http://www.youtube.com/watch?v=8QuB2-jBaE8>



C. Defense and escape mechanisms of Biofilms

Chronic Borreliosis is a Biofilm-disease

The blood is not (always) sterile



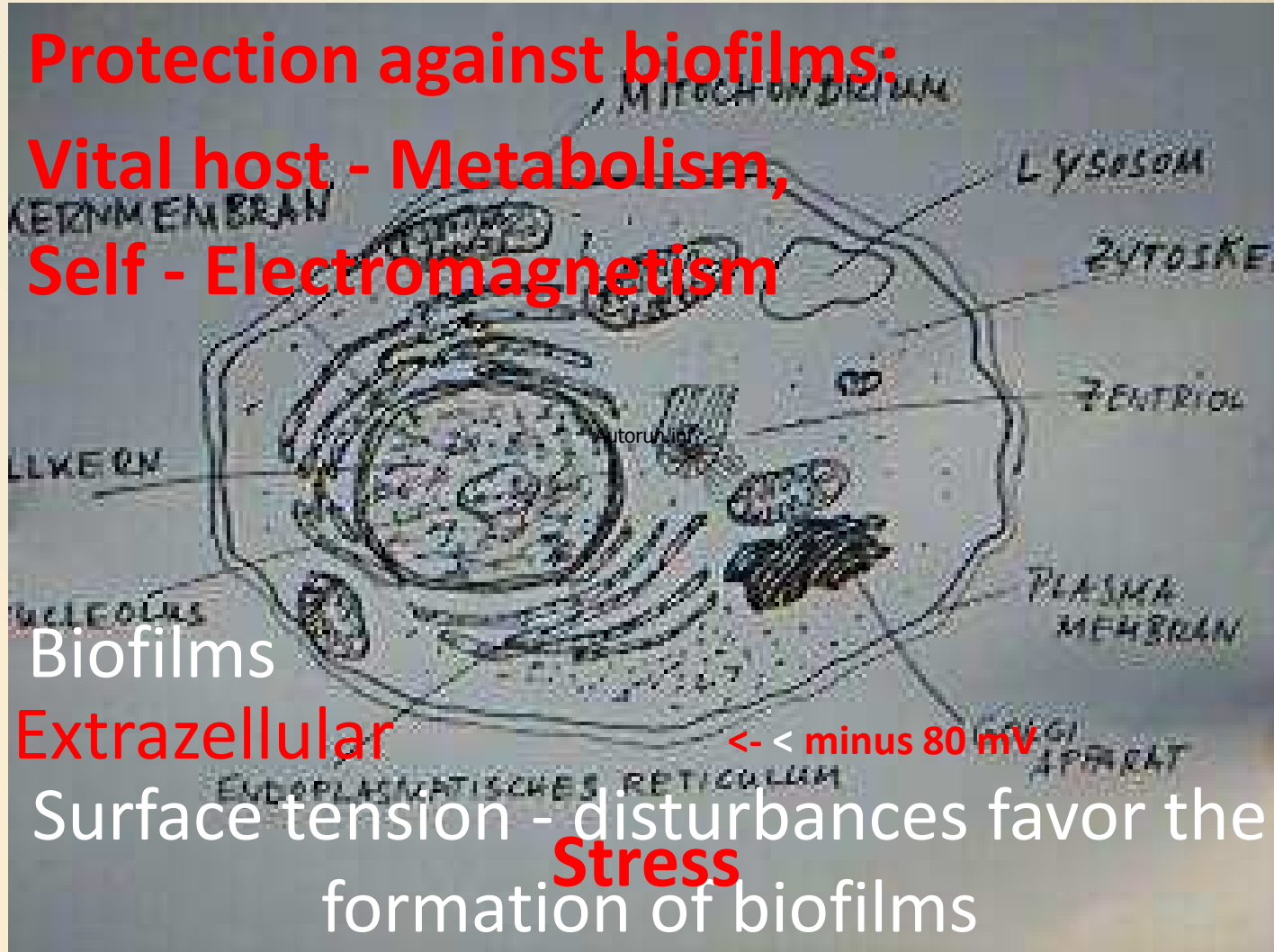
http://www.youtube.com/watch?v=M_DWNFFgHbE



C. Defense and escape mechanisms of Biofilms

Protection against biofilms:

Vital host - Metabolism,
Self - Electromagnetism



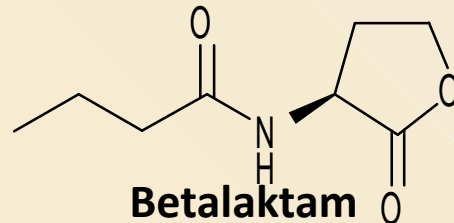
C. Defense and escape mechanisms of Biofilms

All *Borrelia* variants speak
bacterial Esperanto.

This procedure is called

Quorum sensing

<http://www.youtube.com/watch?v=TVfmUfr8VPA>



C. Defense and escape mechanisms of Biofilms

By

Quorum sensing

all *Borrelia* variants,

L-shapes and granular ultrafiltrates

can in bursts germinate

into original bacteria again,

they revert all of a sudden.



C. Defense and escape mechanisms of Biofilms

Reversion activators

High Stealth - forms density ([Quorum sensing Mechanismus](#))

Destruction of a reversion - inhibitor - factor (RIF) by **Trypsin** or **40 degrees Celsius**

Cooling at **20 – 30 degrees Celsius**, z.B. **25 degrees Celsius**

Administration of oxygen, Ventilation,
examples according to L. Mattman 2001

Lactobacillus–Variants ([Probiotics](#)), Aminosugar, ([N-acetylglucosamin](#))

[Vit.E](#), [Diaminopimelinsäure](#), Mucine, Gelatin, Agar (not autocavied)

[C10](#), Mikrobial extracts (z.B. Bakteria – Zell wall extrakts)

Frequent changes of antibiotics

UV - Light at 380 - 400 nm wavelength, Mutagens

Surfaces (Chlorella, Granulats, Animal charcoal, Cholestyramin)



Biofilms and Quorum sensing therapeutics

Makrolids: Azithromycin, Clarithromycin

Lactoferrin, Ajoene from garlic

Polyphenols, Grape fruit, Lumbrokinase,

Nattokinase, Antikoagulation, Ph,

Samento, Banderol, N-Acetylcysteine,

Phenothiazine, Acyldepsipeptid (ADEP*)

Elektromagnetism and Ultrasound

“extracellular death factor” (EDF) *

* = not commercially available

http://www.nature.com/nature/journal/v503/n7476/fig_tab/nature12834_F1.html



D. Gentransfer E. Symbiogenesis

**Borrelia exchange nuclear material
from one another and with their host,
they operate a vivid
horizontal gene transfer**

<http://www.erlebnishaft.de/virusbaktimmun.pdf>

<http://www.erlebnishaft.de/gentransfer.pdf>

<http://www.the-scientist.com//?articles.view/articleNo/39598/title/Superbugs-Ascending/>



D. Defense and escape mechanisms by horizontal gene transfer and symbiogenesis

The new formations from the horizontal gene transfer are mostly not fit for survival or capable of reproduction.

They are discarded by the Lysosomes or muted by Methylation and a number of further mechanisms.



D. Defense and escape mechanisms by horizontal gene transfer and symbiogenesis and possibly incorrect disposing mechanisms of the host

Levy bodies – M. Parkinson

„Amyloid plaques“ – M. Alzheimer

Elementary - bodies (EK) – Chlamydia pneumoniae and Arteriosclerosis

Spheroid neuronal Einschlusskörper* – Amyotrophic lateral sklerosis

Bacterial granular congestion – Chronic Borreliosis (Huismans 2008)

Viable persists by horizontal gene-transfer ?

„Micelles and granules“ – Carcinomas, Sarcomas (Enby E. 1984, '89)

<http://www.erlebnishaft.de/stressvar1.pdf>

<http://www.erlebnishaft.de/virusbaktimmun.pdf>



Cell organelle therapeutics

Lysosomotropics

Hydroxychloroquin, Artemisia annua,
Carbomycin, Azithromycin, Amantadin

Efflux blocking drugs

Pyrazinamide

Mitochondriotropics

Q10, L-Carnitin

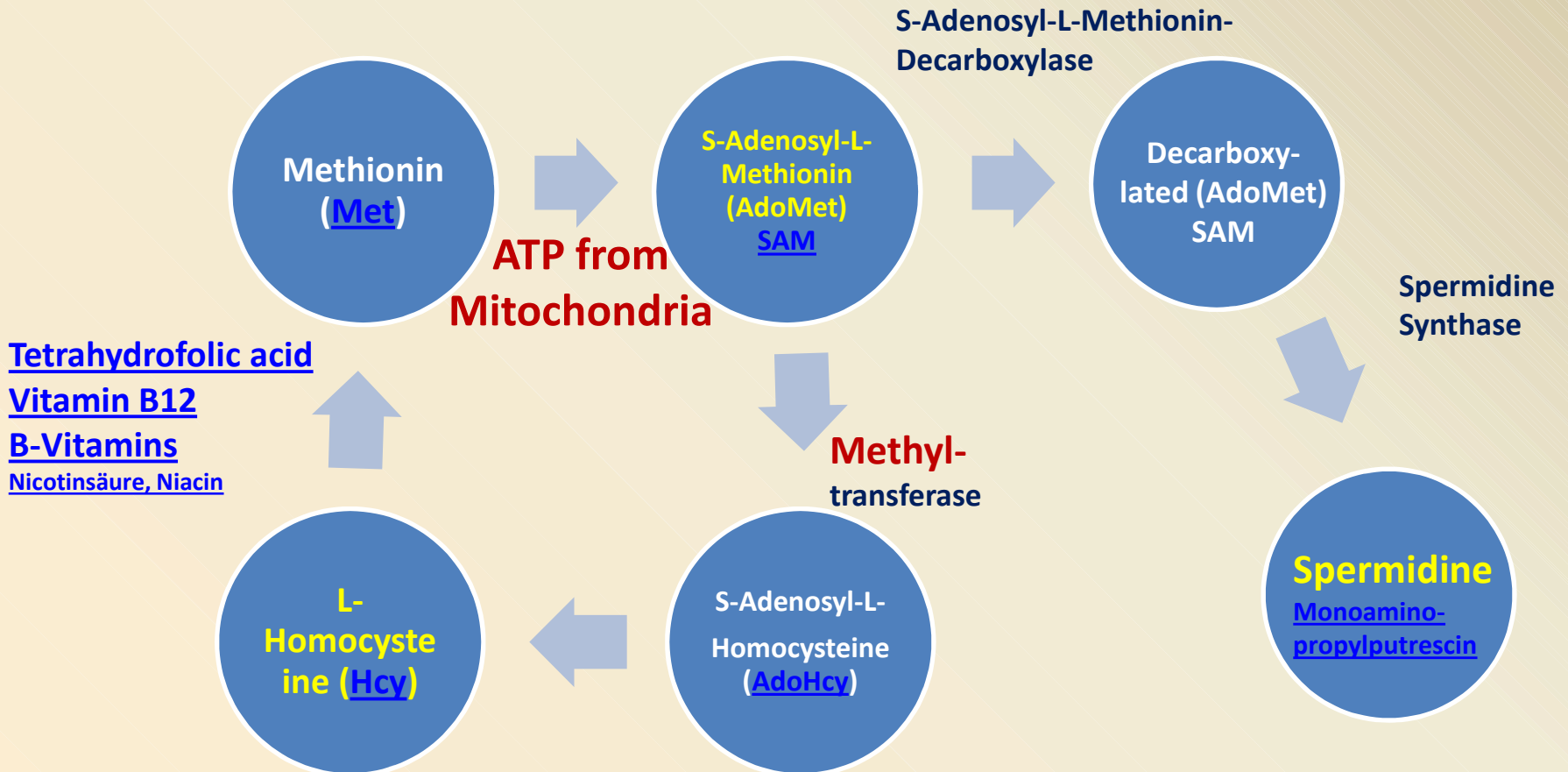
Catalase: http://www.ebi.ac.uk/interpro/potm/2004_9/Page1.htm

Bakterial manganese-catalases: <http://www.ncbi.nlm.nih.gov/pubmed/23376276>

Caspases: http://www.ebi.ac.uk/interpro/potm/2004_8/Page1.htm



Methyl cycle



[Schröder, G. et al.](#)

<http://www.erlebnishaft.de/methylierung.pdf>
<http://www.xerlebnishaft.de/vitamine.pdf>



Nucleus, nucleotide, L-forms therapeutics

Metronidazole, Tinidazole

Inosiplex (Delimmune) * _ *

Acyldepsipeptid (ADEP) * _ *

not yet
commercially
available

Methylenblue (Rember) * _ *

Phenothiazine (Chlorpromazin *) _

Methylxanthine (Pentoxifyllin) see also * _ *

* = as adjuvants only

http://www.nature.com/nature/journal/v503/n7476/fig_tab/nature12834_F1.html

<https://www.google.de/search?q=methyl+xantine&hl=de&btnG=Google+Search#hl=de&q=methylxanthine+derivatives+and+infectious+diseases>



E. Defense and escape mechanisms by symbiogenesis

Symbiogenesis * *

is the name for
the evolutionary change through
inheritance of acquired
gene equipment

Margulis L. Die andere Evolution. Spektrum Akademischer Verlag Heidelberg Berlin 1999, S. 18

<http://www.erlebnishaft.de/symbiogenese.pdf>

<http://www.kabilahsystems.de/borreliensexuellschwanger.pdf>



E. Defense and escape mechanisms by symbiogenesis

Hypotheses

Originally spirochetes were attachments to archaebacteria, who were willing to include them in themselves.

After they had given up some of their genetic material into the cells of their host as Nukleolinus, they became the Centriole-kinetosome

and the Cell-filaments, the Cytoskeleton



E. Defense and escape mechanisms by symbiogenesis

The cytoskeletal structures of nucleated organisms, the eukaryotes and the Bacteria, the prokaryotes follow the same structural principles.

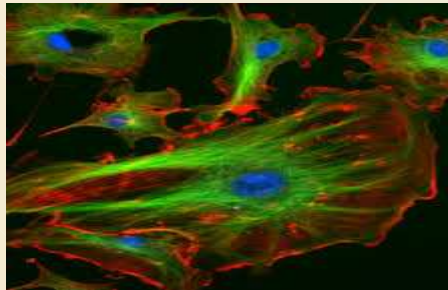
However, the respective cytoskeletal structures are mutually not fully compatible.

<http://www.xerlebnishaft.de/zytoskelett.pdf>



E. Defense and escape mechanisms by symbiogenesis

Chronic Borreliosis is a Cytoskeleton-disease.



The cytoskeleton is in this case not (always) well-sorted

https://www.google.de/search?q=Zytoskelett&sa=G&hl=de&tbn=isch&tbs=simg:CAESWQkVr0PRHo85EBpFCxCwjKclGjwKOggBEhSvBlwFhwSsBlgEigStBlfjASJBBog85wMB2gQiZekZa-zmp540Wdly59y2uSJqKJ_1W6vOp5UMIVxmq_1souYrG&dur=9394
http://en.wikipedia.org/wiki/Elongation_factor_thermo_unstable
<http://www.youtube.com/watch?v=abuAh3VqZ40>
Fucidine http://en.wikipedia.org/wiki/Fusidic_acid
Zytoskelettantibiotika <http://www.xerlebnishaft.de/krebsstammzelltherapie.pdf>



Defense and escape mechanisms of Borrelia

Summary

Variety and pleomorphism <http://www.erlebnishaft.de/stressvar1.pdf>

Biofilms, Quorum sensing <http://www.erlebnishaft.de/biofilmmed.pdf>

Intrazellular stay <http://www.erlebnishaft.de/stressvar2.pdf>

Stay in lipid-rich and less perfused tissues

Bacterial efflux mechanisms <http://www.erlebnishaft.de/stressvar2.pdf>

Formation of beta-lactamase <http://www.ncbi.nlm.nih.gov/pubmed/9158807>

Tick salivary factors http://www.erlebnishaft.de/tick_spit.pdf

Depression of complement factors <http://www.xerlebnishaft.de/complement.pdf>

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Studienarbeit

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Bernt-Dieter Huismans und Wolfgang Klemann

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bei chronischer Lyme-Borreliose mit
Borrelien DNA-Nachweis durch PCR**

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Prolonged antibiotic therapy
in PCR confirmed persistent
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