

## Biofilme und Elektromagnetismus, Quorum sensing, Fröhlich waves, Interkingdom communication, Biofilme und Ultraschall, Anti Biofilm Medikamente

### Biofilms and electromagnetism, quorum sensing, Frohlich waves, interkingdom communication, biofilms and ultrasound, anti-biofilm drugs

**Biofilme** <http://www.erlebnishaft.de/kommentbiofilmmed.pdf> <http://www.erlebnishaft.de/biofilmmed.pdf> sind deutlich **antibiotika-resistent**, ganz im Gegensatz zu ihren **frei lebenden planktonischen Varianten**.

**Quorum sensing** ist die Individualsprache der einzelnen artverwandten Bakterien und das Gruppen-Esperanto der Biofilme. <http://www.erlebnishaft.de/kommentbiofilmmed.pdf>. Ursprünglich ist Quorum sensing die Fähigkeit von Bakterien ihre Befalls-Dichte im Wirtsorganismus über **chemische Boten-Stoffe** (Laktame) zu messen.

„**Quorum sensing - Inhibitoren** modifizieren die Wirkung der Chemotherapie weil sie Acyl-homoserin Lacton-Synthase und andere Botenstoffen blockieren, z.B. ändern sie die zyklisch-di-GMP was über Efflux und Diffusion zu Veränderungen in der Zellkommunikation führt, z.B. bei Biofilmen, bei deren Schwarmverhalten, deren Qualität der Effluxpumpen Systeme, PMF, und der Zell-Adhäsion und Kohäsion, etc. " Quelle: Molnar J (2014) Universität Szeged

**Biofilme** verhalten sich wie organisierte Lebewesen. Sie leben in Rhythmen und Zyklen und in Abhängigkeit von ihrem Milieu. Biofilme sind mechanisch, elektrisch, physikalisch und chemisch therapierbar.

**Biofilms** <http://www.erlebnishaft.de/biofilmmed.pdf> are relatively **resistant to antibiotics**, in contrast to their **free-living planktonic variants**.

**Quorum sensing** is the language of each individual congeners and the group Esperanto of biofilms. <http://www.erlebnishaft.de/kommentbiofilmmed.pdf>. Originally quorum sensing is the ability of bacteria to measure their infestation density in the host organism by **chemical messenger substances** (lactams).

„**Quorum sensing inhibitors** are able to modify the effect of chemotherapy through blocking acyl-homoserin lactone synthase, other mediators, or second messenger e.g. cyclic-di-GMP resulting in changes in active efflux or diffusion, changes in cell to cell signal transport, secretion of biofilm, swarming, efflux pump systems, PMF, cell adhesion, cohesion etc.“ Source: Molnar J (2014) [University of Szeged](http://www.universityofszeged.edu)

**Biofilms** behave as organized beings. They live in rhythms and cycles and they are dependent on their environment. Biofilms are mechanically, electrically, physically and chemically treated.

➔ **Bakterien stabilisieren, entwaffnen** [http://www.kabilahsystems.de/bakt-stabilis\\_entwaff.pdf](http://www.kabilahsystems.de/bakt-stabilis_entwaff.pdf)

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Im Bose-Einstein Kondensat sind Bosonen vollständig **delokalisiert**. Bosonen vermitteln die Kräfte in der Materie. Die Wahrscheinlichkeit jedes Bosons, es an einem bestimmten Punkt anzutreffen, ist innerhalb des Kondensates überall gleich. Das Bose-Einstein Kondensat ist ein Quantenobjekt. Sein Zustand kann deshalb durch **eine einzige Wellenfunktion** beschrieben werden ([Resonanz-Theorie](#), [Helmholtz Resonanz-Theorie](#)).

**Bei Abständen von unter 80 Nanometer geht die reale Welt ganz allmählich in die quanten-elektrodynamische über.**

In the Bose-Einstein condensate bosons are completely **delocalized**. Bosons mediate the forces in matter. The probability of any boson to meet it at a given point is the same everywhere within the condensate. The Bose-Einstein condensate is a quantum object. His condition can therefore be described by **a single wave function**.

**At distances of less than 80 nanometers in the real world is changing gradually into the quantum - elektrodynamische world.**

➔ **Selbstorganisation, selforganization** [http://www.erlebnishaft.de/selbst\\_muster\\_nano.pdf](http://www.erlebnishaft.de/selbst_muster_nano.pdf)



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## Inter-kingdom communication

### Quorum sensing

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“**The interactions between bacterial pathogens and their eukaryotic hosts are vital in determining the outcome of infections. Bacterial pathogens employ molecular sensors to detect and facilitate adaptation to changes in their niche. The sensing of these extracellular signals enables the pathogen to navigate within mammalian hosts. Intercellular bacterial communication is facilitated by the production and sensing of autoinducer (AI) molecules via quorum sensing. More recently, AI-3 and the host neuroendocrine (NE) hormones adrenaline and noradrenaline were reported to display cross-talk for the activation of the same signalling pathways. Remarkably, there is increasing evidence to suggest that enteric bacteria sense and respond to the host NE stress hormones adrenaline and noradrenaline to modulate virulence. These responses can be inhibited by  $\alpha$  and  $\beta$ -adrenergic receptor antagonists implying a bacterial receptor-based sensing and signalling cascade. ... Here we provide additional hypotheses to reconcile these observations implicating the existence of alternative adrenergic receptors including BasS, QseE and CpxA and their associated signalling cascades with major roles in interkingdom communication.**”

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➔ **Infraschall, infrasound** <http://www.erlebnishaft.de/infrasound.pdf>



## Anti-biofilm – Medikamente, Anti-biofilm drugs

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**„Als besonders vielversprechend erwies sich die antibiotisch wirksame Substanz ADEP (Acyldepsipeptid)... ADEP4 aktiviert das eiweißspaltende Enzym ClpP der Bakterien. Diese Protease dient normalerweise nur dazu, fehlerhafte Proteine zu entsorgen. Die Anlagerung von ADEP4 hat zur Folge, dass das Enzym unkontrolliert und wahllos zahlreiche Proteine zerstört, so dass die Mikroben absterben. Dieser Effekt trat auch bei nicht wachsenden Zellen von *Staphylococcus aureus* ein. Zwar ist – wie bei allen Antibiotika – damit zu rechnen, dass sich mit der Zeit Mutanten entwickeln, die gegen ADEP4 resistent geworden sind. Experimente zeigten aber, dass sich diese dann leicht durch bekannte Antibiotika wie Rifampicin oder Ciprofloxacin beseitigen ließen. Mit einer Kombination aus ADEP4 und**

**Rifampicin konnten die Forscher Staphylokokken in Laborkulturen auch dann vollständig eliminieren, wenn sie Biofilme gebildet hatten.“**

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