

# Archives of Biotechnology and Biomedicine

Volume - 8, Issue - 1

Short Communication

Published Date:-2024-09-04 15:07:24

[Mesofractal Modeling of Biosystems & Organic Spintronics](#)

Mesoscopic modeling of complex systems involves thermodynamic nonequilibrium of discrete scaling. Further from quantum correlation on a chip retrieved quantum nonlinear optics with single photons enabled by strongly interacting atoms. Accompanied by mesofractals as the development of meso & micro size fractal structures is required to mimic various biological systems for various functions. Showed through fluorapatite in gelatin-based nanocomposite, fractal in DNA knots driven by balance of fission & fusion in mtDNA/mitochondrial DNA mechanism, for optical engines for light energy detection described the proportional integral derivative [PI(D)] controller set in microbial cells to HCCI/Homogeneous Charge Compression Ignition.

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Research Article

Published Date:-2024-08-13 00:00:00

[Antibacterial Resistance and Extended-Spectrum Beta-Lactamase \(ESBL\) Phenotypes in Enterobacteriaceae Isolated from Fecal Samples of Humans and Animals in Selected Local Government Areas of Nasarawa State, Nigeria](#)

It is quite alarming the increasing rate of antibacterial resistance all over the world considering the public health threat and the re-emergence of multi-drug resistant Enterobacteriaceae. The aim of this study is Antibacterial resistance and phenotypic detection of Extended Spectrum Beta-Lactamase (ESBL) producing Enterobacteriaceae isolated from human and animal fecal samples in selected local government areas of Nasarawa state, Nigeria was carried out in the study. Hundred (100) samples comprising human and animal (goats, cattle, and chicken) were collected and 55 samples were multidrug resistant. A commercial biochemical kit (Eneterosystem 18R) was used for the isolation and identification of Enterobacteriaceae. Kirby Bauer Disk Diffusion Method was used for antibacterial susceptibility testing of Enterobacteriaceae isolates. The Double Disc Synergy Test (DDST) method was also used for the phenotypic confirmation test of Extended Spectrum Beta Lactamase (ESBL). The occurrence of multidrug-resistant isolates shows that Escherichia coli (100.00%) which is the highest, Proteus mirabilis (14.54%), Klebsiella pneumoniae, and Salmonella enterica (10.90%), while the occurrence of Shigella flexneri (9.09%) was the lowest. The Enterobacteriaceae isolates were more resistant to Cefuroxime, Cefexime, Amoxicillin Clavulanate, and Imipenem/Cilastatin with percentage resistance ranges from 66.6% - 100%. The occurrence of ESBL producers shows that Escherichia coli (60.00%) and Proteus mirabilis (62.5%) were high while Shigella flexneri (20.0%) had a low occurrence of ESBL. The sale and in-discriminate use of antibiotics without a prescription is an important regulatory issue in the abuse of antibiotics for both humans and animals. The Beta-Lactam and gentamycin antibiotics were not effective against the Multi-Drug Resistant (MDR) isolates and most of the isolates were ESBL producers.

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Review Article

Published Date:-2024-06-18 11:11:55

[Microalgal Derivatives as Potential Nutraceutical and Pharmaceutical: Boon to Human Beings](#)

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Background: Marine resources have diverse biological and beneficial entities for human beings. Among them, microalgae are one of the eukaryotic photosynthetic organisms found in freshwater and marine environments with an immense source of metabolites. They consist of high nutraceutical and value-added compounds for health concerns.

Objective: Most microalgal species like- chlorella, spirulina, Isochrysis, Nannochloropsis, etc. are found to synthesize biologically active secondary metabolites which are having high pharmaceutical and nutraceutical value. Some of the purely extracted compounds are Lecithin, fucoxanthin, astaxanthin, and most important Sulphur polysaccharides- fucose, galactose, xylose, rhamnose, etc. are providing anti-microbial, anti-fungal, anti-viral, anti-cancer and anti-diabetic activities.

Methods: Many of the prior studies demonstrated the compilation of naturally derived secondary metabolites for their potential application in most fields. Because of their wide-ranging potential for use in biopharmaceutical and nutraceutical industries, microalgae have recently gained significant interest on a global scale.

Result: Microalgae are both parts of the dietary ingredients and bioactive pharmaceuticals. A number of microalgal species have been explored for their significance towards their high-value products with their exceptional pharmacological and biological properties.

Conclusion: This current review discussed the uses and benefits of microalgae for the manufacture of nutraceuticals and the medicinal use of diverse bioactive compounds.

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## Review Article

Published Date:-2024-04-18 12:29:17

### [Unlocking the Transformative Power of Synthetic Biology](#)

Artificial Intelligence (AI) combined with Synthetic Biology has the potential to change the way we approach medicine, agriculture, and manufacturing. AI automates tasks, optimizes experimental designs, and predicts biological behaviours, resulting in more efficient design and engineering of biological systems. However, there are challenges such as data limitations, interpretability issues, and ethical considerations like biosafety and biosecurity concerns that need to be addressed. AI can be used to analyze vast amounts of data and identify patterns. This has led to successful applications of AI in high-throughput screening and biomanufacturing, which can drive innovation and address critical challenges. AI-powered closed-loop systems for real-time monitoring and control of biological processes also show promise in providing real-time feedback and optimizing systems on the fly. Despite these advancements, it's important to consider ethical implications to ensure the responsible development and application of AI in synthetic biology. Proper consideration of challenges and ethical considerations can help leverage the power of AI to drive innovation and tackle pressing societal challenges. Overall, the potential of AI in synthetic biology is significant. By addressing challenges and ethical considerations, we can use them effectively to solve pressing problems.

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## Research Article

Published Date:-2024-04-08 10:17:36

### [Effect of Methyl Jasmonate on the Expression of Transcription Factors in Wild Jujube Seedlings under Salt Stress](#)

Methyl Jasmonate (MeJA) can be used as a signal molecule to regulate the expression of resistance genes in the resistance to abiotic stress, thus improving the salt tolerance of wild jujube. Among the resistance genes combined with methyl jasmonate, transcription factors play an important role in response to salt stress. However, the interaction of transcription factors in different tissues under salt stress and the regulation of transcription factors by MeJA remain unclear. In this study, the effects of MeJA on transcription factor expression in wild jujube under salt stress were investigated, and the differences in transcription factor expression among different tissues were compared. It was found that MeJA could increase the type and quantity of transcription factors responding to salt stress. The types of transcription factors responding to salt stress were roughly the same among different tissues, but the quantity and expression of the transcription factors were significantly different. The results of transcription factor co-expression analysis showed that transcription factors play synergistic roles in the face of abiotic stress, which can provide preferable genes for subsequent transgenic work.

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## Short Communication

Published Date:-2024-01-18 11:21:37

### [Computational Models in Systems and Synthetic Biology: Short Overview](#)

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Computational models used in specifying biological systems represent a complement and become an alternative to more widely used mathematical models. Amongst some of the advantages brought by these computational models, one can mention their executable semantics and mechanistic way of describing biological system phenomena. This short overview report enumerated some of the computational models utilised so far in systems and synthetic biology, the associated analysis and formal verification methods and tools, and a way of facilitating a broader use of this alternative approach.

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