Evolutionary Epigenetics at Retinoic-acid-Mediated Methylation Switching in Rice

Abstract

The genome and phenotype of the green algae Chlamydomonas sp. UTEX 3807 reveal adaptive traits for desert accommodation. The genome of the alga has undergone several rounds of genome duplication, leading to a complex genome structure. The alga has developed mechanisms to adapt to desert conditions, such as desiccation tolerance, photosynthesis, and water conservation strategies. The analysis of the genome reveals the presence of genes involved in stress responses and adaptive mechanisms. The study provides insights into the evolutionary adaptations of desert-dwelling organisms, highlighting the genomic changes that have enabled these organisms to thrive in extreme environments. The findings contribute to our understanding of the evolutionary processes that shape the genome and phenotypic traits of desert-adapted organisms.
LINE Insertion Polymorphisms are Abundant but at Low Frequencies across Populations of Anolis carolinensis

Robert D. Allendorf, Mary Underwood and Jennifer Rovelstad

The phylogeographic patterns of new and ancient LINE insertions are examined in 15 Anolis populations from the Carolinas. Insertion frequencies fluctuated through time, with most insertions occurring in the past 100,000 years. The frequency of insertion was higher in the north than in the south, and the frequency of insertion was higher in the east than in the west. Insertions were also more frequent in the north than in the south, and the frequency of insertion was higher in the east than in the west. Insertions were also more frequent in the north than in the south, and the frequency of insertion was higher in the east than in the west.

Keywords: Anolis, phylogeography, LINE insertions, population genetics.

Introduction

Even though LINE insertions are abundant in many species, their role in shaping population structure is not well understood. Previous studies have shown that LINE insertions can affect population structure through various mechanisms, including isolation by distance, genetic drift, and gene flow. However, it remains unclear how these factors interact to shape population structure. In this study, we examined the frequency and distribution of LINE insertions across 15 Anolis populations from the Carolinas to gain a better understanding of how these factors interact to shape population structure.

Methods

We used a combination of genotyping and sequencing techniques to identify LINE insertions in 15 Anolis populations from the Carolinas. We genotyped 150 individuals from each population for 15 microsatellite loci. We also sequenced a 10 kb region of the genome from 50 individuals from each population. We then used these data to identify LINE insertions and to estimate their frequency and distribution across populations.

Results

We identified 15 new LINE insertions in the 15 Anolis populations. The frequency of insertion varied widely across populations, with some populations having very high frequencies of insertion and others having very low frequencies of insertion. We also found that the frequency of insertion was higher in the north than in the south, and the frequency of insertion was higher in the east than in the west. These patterns were consistent with previous studies that showed that the frequency of insertion is influenced by latitude and longitude.

Discussion

Our results suggest that the frequency of insertion is shaped by a combination of factors, including isolation by distance, genetic drift, and gene flow. However, the relative importance of these factors is likely to vary across populations, depending on the specific patterns of migration and selection that are operating in each population. Further studies are needed to better understand the interplay between these factors and how they shape population structure.

Conclusion

Our study provides new insights into the role of LINE insertions in shaping population structure. We found that the frequency of insertion is influenced by latitude and longitude, and that the frequency of insertion is shaped by a combination of factors, including isolation by distance, genetic drift, and gene flow. These results highlight the importance of considering the interplay between these factors when studying the role of LINE insertions in shaping population structure.

Acknowledgments

This research was supported by a grant from the National Science Foundation (BSF-0822730). We would like to thank the Carolina Museum and the University of North Carolina for providing access to the Anolis populations.

References

Peptide nanosheets exhibit a new secondary-structure motif

Graphene-like single-layer peptide nanosheets have attracted much interest in the design of functional materials in recent years. However, the understanding of the secondary structures of these peptides is still limited. Here, we report the structural and chemical properties of a peptide nanosheet that exhibits a new secondary-structure motif.

**Abstract**

Graphene-like single-layer peptide nanosheets are of great interest in the design of functional materials. In this work, we used density functional theory (DFT) to study the structural and chemical properties of a single-layer peptide nanosheet. Our calculations revealed that the peptide nanosheet exhibits a new secondary-structure motif, which is different from the typical graphene-like structure. This new motif is characterized by a unique hydrogen bonding network that stabilizes the nanosheet, leading to enhanced mechanical and thermal stability.

**Introduction**

The study of peptide nanosheets is crucial for the development of new materials with unique properties. In this work, we focus on a single-layer peptide nanosheet, which is composed of a specific peptide sequence. Our computational approach allows us to explore the structural and chemical properties of this nanosheet in detail.

**Methodology**

We employed density functional theory (DFT) to simulate the structural and chemical properties of the peptide nanosheet. The DFT calculations were performed using the Vienna Ab initio Simulation Package (VASP) code. The exchange-correlation functional used was the Perdew-Burke-Ernzerhof (PBE) functional.

**Results**

Our calculations revealed that the peptide nanosheet exhibits a new secondary-structure motif, which is characterized by a unique hydrogen bonding network. This network stabilizes the nanosheet, leading to enhanced mechanical and thermal stability.

**Conclusion**

In conclusion, we have reported the structural and chemical properties of a single-layer peptide nanosheet that exhibits a new secondary-structure motif. This new motif is characterized by a unique hydrogen bonding network that stabilizes the nanosheet, leading to enhanced mechanical and thermal stability.
A computational insight into the interaction of methylated histones with aromatic amino acid cages

Exenea Vite

Abstract: Methylated histones, modifications in eukaryotic proteins, are recognized by specific reader complexes that mediate gene expression. Understanding how histone modifications affect chromatin and gene expression can aid in the development of new therapeutic strategies. In this study, we investigated the interaction of methylated histones with aromatic amino acid cages. Using molecular dynamics simulations, we found that the presence of methyl groups on histones significantly altered the interaction energies compared to non-methylated states. These results suggest that methylated histones may have distinct interactions with aromatic amino acid cages, which could have implications for gene expression and disease states.

1 INTRODUCTION

Histone modifications, such as methylation, are key regulators of gene expression in eukaryotes. Methylated histones are recognized by specific protein complexes, which alter chromatin structure and transcriptional activity. Understanding the interactions between methylated histones and aromatic amino acid cages is essential for developing new therapeutic strategies. In this study, we employed molecular dynamics simulations to investigate the interaction of methylated histones with aromatic amino acid cages.

2 RESULTS

Our simulations revealed that methylated histones exhibit different interaction energies compared to non-methylated states. The presence of methyl groups on histones significantly altered the interaction energies, suggesting distinct interactions between methylated histones and aromatic amino acid cages. These findings imply that methylated histones may have distinct interactions with aromatic amino acid cages, which could have implications for gene expression and disease states.
2015-2016

**A Biocompatible Polymer For Curing Organics Based Cements**

**Authors:**

- [Name 1]
- [Name 2]
- [Name 3]

**Keywords:**

- Biocompatible
- Polymer
- Curing
- Organics
- Cements

**Abstract:**

The development of a biocompatible polymer for curing organics based cements is crucial for various applications. This paper presents a novel biocompatible polymer that demonstrates excellent curing properties and mechanical strength. The polymer's biocompatibility is assessed through in vitro and in vivo experiments, confirming its suitability for biomedical applications. The curing behavior of the polymer is optimized through exhaustive trials, resulting in a formulation that shows promise for use in organics based cements.

**Introduction:**

The need for biocompatible polymers in cement-based materials has increased with the advancement of medical and dental technologies. The curability of organics based cements is a major consideration in their application. This paper aims to contribute to the field by introducing a new biocompatible polymer that enhances the curing and mechanical properties of organics based cements.

**1. Introduction**

The development of a biocompatible polymer for curing organics based cements is crucial for various applications. This paper presents a novel biocompatible polymer that demonstrates excellent curing properties and mechanical strength. The polymer's biocompatibility is assessed through in vitro and in vivo experiments, confirming its suitability for biomedical applications. The curing behavior of the polymer is optimized through exhaustive trials, resulting in a formulation that shows promise for use in organics based cements.

**2. Materials and Methods**

The biocompatible polymer was synthesized using a combination of poly(ethylene glycol) and diisocyanates. The curing process was evaluated using different curing conditions to determine the optimal parameters.

**3. Results and Discussion**

The results showed that the biocompatible polymer had superior curing properties compared to existing organics based cements. The mechanical strength of the cured cement was also significantly enhanced.

**4. Conclusion**

A biocompatible polymer for curing organics based cements was successfully developed and characterized. Its potential for use in biomedical applications is demonstrated, highlighting the need for further research in this area.

**References:**

- [Name 1, 2014]. Biocompatible Poly(ethylene glycol) Curing Agent for Organics Based Cements. Materials, 7(10), 6240-6250.

**2013-2014**
Extraction and prediction of ineradicable macroinvertebrates: an approach based on multivariate logistic spectral analysis

C. A. H. J. A. J. Haak (Assistant Professor, University of Wageningen, The Netherlands)

2017

2015-2016
Historical variations of Indian summer monsoon intraseasonal oscillations and their relationship to synoptic activity in a warming climate

Part II: Multiscale atmosphere-ocean linkages

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The NRE 2 is a Coarse-Resolution GCM with a Robust Multiscale Parameterization

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Abstract

The NRE 2 is a coarsely resolved global general circulation model (GCM) with a robust parameterization scheme for sub-grid scale processes. The model includes a multiscale parameterization scheme that captures the multiscale interactions in the atmosphere. The parameterization scheme is designed to be computationally efficient and to provide accurate simulations of the climate system.

1. Introduction

The NRE 2 is a coarsely resolved GCM that includes a robust parameterization scheme for sub-grid scale processes. The model includes a multiscale parameterization scheme that captures the multiscale interactions in the atmosphere. The parameterization scheme is designed to be computationally efficient and to provide accurate simulations of the climate system.

Role of stratosphere heating on the organization of convection over the monsoon trough

R.S. Aggarwal, R. Sutanto, K. J. Hedges

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Abstract

The role of stratosphere heating on the organization of convection over the monsoon trough is studied in a high-resolution dynamical model. The model results show that stratospheric heating plays a crucial role in organizing the convection over the monsoon trough. The heating increases the stability of the atmosphere, which leads to a more organized structure of convection.

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The role of stratospheric heating on the organization of convection over the monsoon trough is studied in a high-resolution dynamical model. The model results show that stratospheric heating plays a crucial role in organizing the convection over the monsoon trough. The heating increases the stability of the atmosphere, which leads to a more organized structure of convection.

On the Relationship Between Mean Seasonal Precipitation and Large-Scale Dynamic Climate Models

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Abstract

The relationship between mean seasonal precipitation and large-scale dynamic climate models is studied using a high-resolution dynamical model. The results show that there is a strong correlation between the precipitation and the model output. This suggests that large-scale dynamic climate models can be used to predict mean seasonal precipitation.

1. Introduction

The relationship between mean seasonal precipitation and large-scale dynamic climate models is studied using a high-resolution dynamical model. The results show that there is a strong correlation between the precipitation and the model output. This suggests that large-scale dynamic climate models can be used to predict mean seasonal precipitation.
Jet Noise Reduction by Downstream Fluidic injection: Effect of Injection Pressure Ratio and Number of Injection Ports

Pak-Hung Tsoi and Xiao Hao
New York University, New York, New York, USA

This study investigates the use of downstream fluidic injection to reduce jet noise. A computational fluid dynamics (CFD) simulation is performed to model the jet noise reduction effect of downstream fluidic injection. The CFD simulation results show that the downstream fluidic injection is effective in reducing jet noise. The injection pressure ratio and the number of injection ports are found to be important parameters in determining the effectiveness of jet noise reduction. The results of the CFD simulation are validated by experimental data from a jet noise reduction experiment. The experimental results show good agreement with the CFD simulation results, indicating the effectiveness of downstream fluidic injection in reducing jet noise.

Keywords: Jet noise, Downstream fluidic injection, CFD simulation, Experimental validation.

Acknowledgments

This work was supported by the National Science Foundation under grant number 1255972.

References


Directionally-Targeted Jet Noise Suppression: Benefits of Asymmetric Downstream Fluidic Injection

Pak-Hung Tsoi and Xiao Hao
New York University, New York, New York, USA

This study investigates the use of downstream fluidic injection to reduce jet noise. A computational fluid dynamics (CFD) simulation is performed to model the jet noise reduction effect of downstream fluidic injection. The CFD simulation results show that the downstream fluidic injection is effective in reducing jet noise. The injection pressure ratio and the number of injection ports are found to be important parameters in determining the effectiveness of jet noise reduction. The results of the CFD simulation are validated by experimental data from a jet noise reduction experiment. The experimental results show good agreement with the CFD simulation results, indicating the effectiveness of downstream fluidic injection in reducing jet noise.

Keywords: Jet noise, Downstream fluidic injection, CFD simulation, Experimental validation.

Acknowledgments

This work was supported by the National Science Foundation under grant number 1255972.

References


Nomenclature

- $c$: jet speed
- $p$: pressure
- $T$: temperature
- $E$: energy
- $D$: distance
- $x$: coordinate
- $y$: coordinate
- $z$: coordinate
- $u$: velocity
- $v$: velocity
- $w$: velocity
- $\rho$: density
- $\gamma$: specific heat ratio
- $\mu$: viscosity
- $\kappa$: thermal conductivity
- $\alpha$: turbulence intensity
- $\beta$: turbulence dissipation rate
- $\epsilon$: turbulence energy
- $\nu$: viscosity

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Jet Noise Research from Pankaj H Rajput

Noise Reduction for an Unheated Mach 0.9 Fluidic Injection

Pankaj H. Rajput, Xinyi Ka, and Day He.

Abstract: Noise reduction of an unheated Mach 0.9 fluidic injection is presented. The noise reduction is due to the use of a single injection point, which is located in the streamwise direction. The injection point is placed at the throat of the nozzle, and the results are compared with those obtained from a single injection point, which is located in the spanwise direction. The single injection point is found to be more effective in reducing the noise levels than the multiple injection points. The results are also compared with those obtained from a single injection point, which is located in the streamwise direction. The single injection point is found to be more effective in reducing the noise levels than the multiple injection points. The results are also compared with those obtained from a single injection point, which is located in the spanwise direction. The single injection point is found to be more effective in reducing the noise levels than the multiple injection points.
Characteristic signatures in the thermal emission from accreting binary black holes

Brian D. Pinto, Paul Dubrell, Andrew I. MacFadyen and Zheliaz Raitma

Abstract

We present the results of 2D hydrodynamic simulations of accretion disk instability in binary black hole systems. We consider a range of parameters such as mass ratio, binary separation, and disk inclination. Our results show that the dynamical interactions between the two black holes can lead to a variety of interesting phenomena, including disk instabilities and the ejection of an outflow. Key words: black holes, accretion, disk instabilities.

1 Introduction

Binary black holes are expected to be common in the universe, and their mergers may produce powerful gravitational waves. The accretion disk instability has been proposed as a possible mechanism for the production of such mergers. In this work, we explore the conditions under which the disk instability can occur in binary black hole systems.

2 Methods

Our model consists of a 2D hydrodynamic code that solves the equations of continuity, momentum, and energy conservation. We consider a binary black hole system with a mass ratio of 1:1 and a separation of 100 Schwarzschild radii. The disk is initialized with a density profile given by $N(r) = N_0 e^{-r/r_0}$, where $N_0 = 10^9$ cm$^{-2}$ and $r_0 = 10$ Schwarzschild radii.

3 Results

In our simulations, we observe that the disk instability can be triggered by the dynamical interactions between the two black holes. The resulting outflow can be highly relativistic, with velocities up to 0.9c. We also find that the disk instability can lead to the ejection of a significant amount of mass, which could be observed as an outburst in X-ray observations.
Dynamic mineral clouds on HD 199733b: 1. 2D-MHD with kinetic, non-equilibrium cloud formation

1. Introduction

The formation and evolution of exoplanetary atmospheres is a key aspect of understanding the habitability of exoplanets. The study of mineral clouds on exoplanets, such as the giant planets in our solar system, can provide insights into the composition and dynamics of these atmospheres. In this work, we focus on the simulation of mineral clouds on HD 199733b, a giant planet orbiting the star HD 199733. This planet is known for its high temperature and dense atmosphere, which could potentially support the formation of mineral clouds.

2. Methods

To simulate the formation and evolution of mineral clouds on HD 199733b, we use a 2D-MHD (magnetohydrodynamics) model with kinetic, non-equilibrium cloud formation. This model incorporates the effects of gravity, turbulence, and magnetic fields on the formation and dynamics of mineral clouds.

3. Results

Our simulations predict that mineral clouds can form on HD 199733b under certain conditions. The formation of these clouds is influenced by the temperature, pressure, and composition of the exoplanet's atmosphere.

4. Conclusion

The study of mineral clouds on HD 199733b can help us understand the composition and dynamics of exoplanetary atmospheres. Further research is needed to confirm the formation of mineral clouds on this planet and to explore the implications of these findings for the habitability of exoplanets.
What's in a Name? A Method for Extracting Information about Ethnicity from Names

1. Introduction

Political scientific studies consider the role of race or ethnicity in the political arena, often in the context of the impact on representation. This work has typically been driven by the belief that certain groups are more likely to support certain policies or candidates, which, if correct, could have implications for policy outcomes. As the population becomes more diverse, the importance of understanding the role of race or ethnicity in political decision-making becomes more critical. One of the main challenges in this area is collecting data on individual identities, such as race or ethnicity. Although many countries have data collection systems to record such information, these systems often lack the necessary granularity to capture the diversity of the population. This paper presents a method for extracting information about ethnicity from names, which can be used to create a more accurate picture of the racial and ethnic composition of a population.

The method is based on the idea that certain letters or combinations of letters in a name are more likely to be associated with certain ethnic groups. By analyzing a large dataset of names, the method can identify patterns of association between letters and ethnic groups. This can then be used to create a lookup table that can be applied to any name to estimate the likelihood of the name belonging to a particular ethnic group.

The method was tested on a dataset of over 5 million names, and the results were compared to data collected from a demographic survey. The method was able to correctly identify the ethnicity of over 90% of the names in the dataset, with the majority of the errors occurring in cases where the name was of mixed ancestry or when the name was not well-represented in the survey.

The results of this study suggest that the method presented here can be a useful tool for understanding the role of race or ethnicity in political decision-making. By providing a more accurate picture of the racial and ethnic composition of a population, policy makers can make more informed decisions that take into account the diverse needs of the electorate.