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Record 1 of 36

Title: Heidegger and Arendt on Conformity and Conformism

Author(s): Agarwala, A (Agarwala, Anasuya)

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Abstract: Martin Heidegger's view of conformity comes in his description and understanding of Das Man or "the One". There is controversy within Heidegger scholarship regarding the interpretation of Das Man as an existential mode. Most scholars interpret Das Man to mean the existential mode of inauthenticity and delineate the two modes of authenticity and inauthenticity in Heideggerian existentialism. Less popularly, scholars like Hubert Dreyfus and Michael Zimmerman interpret the positive and negative aspects of Das Man and suggest the third mode of indifference in Heidegger's Being and Time. This paper follows Dreyfus' understanding of Das Man to posit indifference as a third mode of being that is structurally similar to inauthenticity but motivationally different from it. It then uses this difference to categorize two forms of moral conformity in Hannah Arendt's analysis of the difference between a morality of custom and a morality of conviction. The problematic of this paper concerns the distinction between these two forms of moral conformity and the moral status of people like Adolf Eichmann whose actions Arendt describes as the banality of evil. Usually seen as preservative of morality, Arendt shows how conformity may be a site for moral conflict.

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Author Keywords: Das Man; <italic>Indifferenz</italic>; Banality of evil; Conformity; Moral indifference

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Record 2 of 36

Title: Effects of electronic correlation on topological properties of Kagome semimetal Ni₃In₂S₂

Author(s): Das, P (Das, P.); Saha, P (Saha, P.); Singh, M (Singh, M.); Kumar, P (Kumar, P.); Patnaik, S (Patnaik, S.)

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Abstract: Kagome metals gain attention as they manifest a spectrum of quantum phenomena such as superconductivity, charge order, frustrated magnetism, and allied correlated states of condensed matter. With regard to electronic band structure, several of them exhibit non-trivial topological characteristics. Here, we present a thorough investigation on the growth and the physical properties of single crystals of Ni3In2S2 which is established to be a Dirac nodal line Kagome semimetal. Extensive characterization is attained through temperature and field-dependent resistivity, angle-dependent magnetoresistance (MR) and specific heat measurements. The central question we seek to address is the effect of electronic correlations in suppressing the manifestation of topological characteristics. In most metals, the Fermi liquid behaviour is restricted to a narrow range of temperatures. Here, we show that Ni3In2S2 follows the Fermi-liquid behaviour up to 86 K. This phenomenon is further supported by a high Kadowaki-Woods ratio obtained through specific heat analysis. Different interpretations of the magneto-transport study reveal that MR exhibits linear behaviour, suggesting the presence of Dirac fermions at lower temperatures. The angle-dependent magneto-transport study obeys the Voigt-Thomson formula. This, on the contrary, implies the classical origin of MR. Thus, the effect of strong electron correlation in Ni3In2S2 manifests itself in the anisotropic magneto-transport. Furthermore, the magnetization measurement shows the presence of de-Haas van Alphen oscillations. Calculations of the Berry phase provide insights into the topological features in the Kagome semimetal Ni3In2S2.

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Title: Mesenchymal stem cells (MSCs) from the mouse bone marrow show differential expression of interferon regulatory factors IRF-1 and IRF-2

Author(s): Chaudhary, JK (Chaudhary, Jitendra Kumar); Ahamad, N (Ahamad, Naseem); Rath, PC (Rath, Pramod C.)

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Abstract: BackgroundInterferon regulatory factors (IRF-1 and IRF-2) are transcription factors widely implicated in various cellular processes, including regulation of inflammatory responses to pathogens, cell proliferation, oncogenesis, differentiation, autophagy, and apoptosis.MethodsWe have studied the expression of IRF-1, IRF-2 mRNAs by RT-PCR, cellular localization of the proteins by immunofluorescence, and expression of mRNAs of genes regulated by IRF-1, IRF-2 by RT-PCR in mouse bone marrow cells (BMCs) and mesenchymal stem cells (MSCs).ResultsHigher level of IRF-1 mRNA was observed in BMCs and MSCs compared to that of IRF-2. Similarly, differential expression of IRF-1 and IRF-2 proteins was observed in BMCs and MSCs. IRF-1 was predominantly localized in the cytoplasm, whereas IRF-2 was localized in the nuclei of BMCs. MSCs showed nucleo-cytoplasmic distribution of IRF-1 and nuclear localization of IRF-2. Constitutive expression of IRF-1 and IRF-2 target genes: monocyte chemoattractant protein-1 (MCP-1), vascular cell adhesion molecule-1 (VCAM-1), cyclooxygenase-2 (COX-2), matrix metalloproteinase-9 (MMP-9), and caspase-1 was observed in both BMCs and MSCs. MSCs showed constitutive expression of the pluripotency-associated factors, Oct3/4 and Sox-2. Lipopolysaccharide (LPS)-treatment of MSCs induced prominent cellular localization of IRF-1 and IRF-2.ConclusionsOur results suggest that IRF-1 and IRF-2 exhibit differential expression of their mRNAs and subcellular localization of the proteins in BMCs and MSCs. These cells also show differential levels of constitutive expression of IRF-1 and IRF-2 target genes. This may regulate immune-responsive properties of BMCs and MSCs through IRF-1, IRF-2-dependent gene expression and protein-protein interaction. Regulating IRF-1 and IRF-2 may be helpful for immunomodulatory functions of MSCs for cell therapy and regenerative medicine.

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Title: Gene regulatory networks in abiotic stress responses via single-cell sequencing and spatial technologies: Advances and opportunities

Author(s): Jain, M (Jain, Mukesh)

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Abstract: Understanding intricate gene regulatory networks (GRNs) orchestrating responses to abiotic stresses is crucial for enhancing climate resilience in crop plants. Recent advancements in single-cell and spatial technologies have revolutionized our ability to dissect the GRNs at unprecedented resolution. Here, we explore the progress, challenges, and opportunities these state-of-the-art technologies offer in delineating the cellular intricacies of plant responses to abiotic stress. Using scRNA-seq, the transcriptome landscape of individual plant cells along with their lineages and regulatory interactions can be unraveled. Moreover, coupling scRNA-seq with spatial transcriptomics provides spatially resolved gene expression and insights into cell-to-cell interactions. In addition, the chromatin accessibility assays can discover the regulatory regions governing abiotic stress responses. An integrated multi-omics approach can facilitate discovery of cell-type-specific GRNs to reveal the key components that coordinate adaptive responses to different stresses. These potential regulatory factors can be harnessed for genetic engineering to enhance stress resilience in crop plants.

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Title: Understanding the relationship between preferential interactions of peptides in water-acetonitrile mixtures with protein-solvent contact surface area

Author(s): Phougat, M (Phougat, Monika); Sahni, NS (Sahni, Narinder Singh); Choudhury, D (Choudhury, Devapriya)

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Abstract: The influence of polar, water-miscible organic solvents (POS) on protein structure, stability, and functional activity is a subject of significant interest and complexity. This study examines the effects of acetonitrile (ACN), a semipolar, aprotic solvent, on the solvation properties of blocked Ace-Gly-X-Gly-Nme tripeptides (where Ace and Nme stands for acetyl and N-methyl amide groups respectively and X is any amino acid) through extensive molecular dynamics simulations. Individual simulations were conducted for each peptide, encompassing five different ACN concentrations within the range of chi ACN = 0.1-0.9. The preferential solvation parameter (Gamma) calculated using the Kirkwood-Buff integral method was used for the assessment of peptide interactions with water/ACN. Additionally, weighted Voronoi tessellation was applied to obtain a three-way data set containing four time-averaged contact surface area types between peptide atoms and water/ACN atoms. A mathematical technique known as N-way Partial Least Squares (NPLS) was utilized to anticipate the preferential interactions between peptides and water/ACN from the contact surface areas. Furthermore, the temperature dependency of peptide-solvent interactions was investigated using a subset of 10 amino acids representing a range of hydrophobicities. MD simulations were conducted at five temperatures, spanning from 283 to 343 K, with subsequent analysis of data focusing on both preferential solvation and peptide-solvent contact surface areas. The results demonstrate the efficacy of utilizing contact surface areas between the peptide and solvent constituents for successfully predicting preferential interactions in water/ACN mixtures across various ACN concentrations and temperatures.

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Author(s): Bisht, J (Bisht, Jyoti); Jalal, S (Jalal, Somenath); Kumar, B (Kumar, Brijesh)

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Abstract: The effect of Hubbard and Kondo interactions on the edge states in the half-filled Su-Schrieffer-Heeger chain of electrons is investigated by studying the behavior of charge quasiparticles using Kumar representation and the density matrix renormalization group method. For any finite dimerization of hopping, by increasing the Hubbard interaction, the edge states are found to transmigrate from the physical charge gap to a high energy gap through an intermediate phase without the edge states. The extent of this phase with no edge states shrinks smoothly upon increasing the dimerization. The transmigration of edge states from the charge gap to the high energy gap is also found to occur with Kondo interaction, but through an intermediate phase which itself changes from having no edge states for weak dimerization to having the edge states in the physical as well as the high energy gaps coexisting from moderate to strong dimerization.

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Abstract: This work systematically studies conformal Vivaldi antenna (VA) arrays in a spherical volume. A VA with gain varying from 5 to 9 dBi and S-11 <= -10dB from 4.3 to 9.8 GHz is considered. A 1x 7 VAs are placed on a correctional area of the cylinder to scan from theta=0(degrees) to 45 degrees at Phi =90 degrees . The results show that the sidelobe level (SLL) has a higher amplitude, almost equivalent to the main lobe. To reduce the SLL, the phase center to phase center distance of antenna elements is reduced by bringing the radius correctional area of the cylinder leading to the development of a modified VA (MVA) without disturbing the S-11 parameters of the VA. To verify, the MVA as a radiating element a 1 x 7 circular MVA array is developed with the same scanning capability, the results show a high reduction of SLL. Finally, a 49-element MVA array arranged in a spherical volume is developed to obtain 3-D-beam scanning. The antenna elements are designed to be conformal to the periphery of a sphere to achieve a 360 degrees beam scanning in the azimuthal plane and +/- 45 degrees in the elevation angle. The 3-D array has a realized gain of 18.57 dBi at theta=0 degrees and an approximately 10 dB difference in the magnitude of the major lobe and side lob levels at all the scan angles. The validation is carried out using ANSYS HFSS full wave solver and achieved a good agreement with the theoretical considerations.

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Abstract: Visible-light photocatalysis offers a sustainable approach to environmental remediation and renewable energy generation. However, traditional photocatalysts often require ultraviolet light, which limits their efficiency in utilizing sunlight. In this study we address this challenge by exploring the potential of [KNbO3](1-x)-[Ba(Ni0.1Zn0.3Nb0.6)O3-delta]x perovskites for visible-light photocatalysis. Incorporation of Ba(Ni0.1Zn0.3Nb0.6)O3-delta into KNbO3 results in a structural phase transition from orthorhombic (at x = 0) to pseudo cubic (at x = 0.3) and reduces the bandgap from 3.14 eV to 1.1-2.0 eV, enhancing visible-light absorption. Theoretical models are investigated using the density functional theory (DFT) to provide the underlying physics, revealing that the incorporation of Zn2+/Ni2+ at the B-site introduces 3d states in the conduction band, and oxygen vacancies create impurity states near the valence band edge, which lower the bandgap. Additionally, octahedral distortion splits the degenerate Nb 4dz2\documentclass[12pt]{minimal} \usepackage{amsmath} \usepackage{wasysym} \usepackage{amsfonts} \usepackage{amssymb} \usepackage{amsbsy} \usepackage{mathrsfs} \usepackage{upgreek} \setlength{\oddsidemargin}{-69pt} \begin{document}$$4d_{{z<^>{2} }}$$\end{document} and 4dx2-y2\documentclass[12pt]{minimal} \usepackage{amsmath} \usepackage{wasysym} \usepackage{amsfonts} \usepackage{amssymb} \usepackage{amsbsy} \usepackage{mathrsfs} \usepackage{upgreek} \setlength{\oddsidemargin}{-69pt} \begin{document}$$4d_{{x<^>{2} - y<^>{2} }}$$\end{document} orbitals, shifting them closer to the Fermi level and further contributing to the reduction of the bandgap. This combined experimental and theoretical approach provides valuable insights for designing visible-light-active ferroelectric perovskite oxides for enhanced photocatalytic applications.

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Abstract: Sediment serves as a heavy metal store in the riverine system and provides information about the river's health. To understand the distribution of heavy metal content in the Ganga River basin (GRB), a total of 25-bed sediment and suspended particulate matter (SPM) samples were collected from 25 locations in December 2019. Bed sediment samples were analyzed for different physio-chemical parameters, along with heavy metals. Due to insufficient quantity of SPM, the samples were not analyzed for any physio-chemical parameter. The metal concentrations in bed sediments were found to be as follows: Co (6-20 mg/kg), Cr (34-108 mg/kg), Ni (6-46 mg/kg), Cu (14-210 mg/kg), and Zn (30-264 mg/kg) and in SPM, the concentrations were Co (BDL-50 mg/kg), Cr (10-168 mg/kg), Ni (BDL-88 mg/kg), Cu (26-80 mg/kg), and Zn (44-1186 mg/kg). In bed sediment, a strong correlation of 0.86 and 0.93 was found between Ni and Cr, and Cu and Zn respectively and no significant correlation exists between organic carbon and metals except Co. In SPM, a low to moderate correlation was found between all the metals except Zn. The risk indices show adverse effects at Pragayraj, Fulhar, and Banshberia. Two major clusters were formed in Hierarchal Cluster Analysis (HCA) among the sample points in SPM and bed sediment. This study concludes that the Ganga River at Prayagraj, Banshberia, and Fulhar River is predominately polluted with Cu and Zn, possibly posing an ecological risk. These results can help policymakers in implementing measures to control metal pollution in the Ganga River and its tributaries.

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Title: Structural, dielectric, impedance, and ferroelectric studies of LiNbO₃-doped K_{0.5}Na_{0.5}NbO₃ ceramics

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Abstract: Currently, sophisticated advanced electronics require ferroelectric materials with high dielectric response. Lead-free (1 -x)K0.5Na0.5NbO3-xLiNbO3(KNN-xLiN) ceramics with x = 0.01, 0.03, and 0.05 were produced using a solid-state method, resulting in a greater dielectric constant, a lower impedance, and an increased conductivity. Compared to conventional ferroelectrics, KNN-0.01LiN ceramics have a greater activation energy (E- r e l) of 1.33 eV and a large sigma(a c)value of 10(- 3)- 10 S- 2 /m in the frequency range of 20 Hz-1 MHz. The peak that corresponds to the orthogonal-tetragonal (T (O - T)) phase shifts toward the lower temperature side and the peak that corresponds to TT - C shifts toward the higher temperature side as dopant percentage increases in the KNN-xLiN ceramics. The observed data may provide light on a key member of the team involved in the creation of upgraded ferroelectrics with improved performance. This result sheds light on the process underlying the improved characteristics of K0.5Na0.5NbO3-based ceramics and may lead to the development of high performance ferroelectrics that will benefit a variety of functional materials.

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Abstract: The neuromodulator 5-hydroxytryptamine, known as serotonin, plays a key regulatory role in the central nervous system and peripheral organs; however, several research revelations have indicated a direct link between the oxidation of serotonin and a plethora of detrimental consequences. Hence, the question of how several neuronal and non-neuronal complications originate via serotonin oxidation remains an important area of investigation. Here, we show the autoxidation-driven structural conversion of serotonin into hemolytic and cytotoxic amyloid-like nanoassemblies under physiological conditions. We also observed the catalysis of serotonin oxidation in the presence of A beta 1-42 amyloid fibrils and Cu(II) ions. The serotonin nanostructures generated from its spontaneous and amyloid-mediated oxidation exhibited typical structural and functional characteristics of amyloid entities, and their effective internalization in neuroblastoma cells caused cell-damaging effects via cytosolic aggregation, ROS generation and necrosis/apoptosis-mediated cell death. Since imbalance in the serotonin level is known to predispose diverse pathological conditions including serotonin syndrome, atherosclerosis, diabetes, and Alzheimer's diseases, our results on the formation of cytotoxic nanoassemblies via serotonin oxidation may provide important evidence for understanding the molecular mechanism of serotonin associated complications.

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Abstract: Bacterial systems have recently emerged as the most potential candidates for the synthesis of metal nanoparticles. This revolutionary approach has given a new dimension to green technology where biocompatible, stable, and cost-effective metal nanoparticles can be synthesized using simple methods. Bacterial cell offers various advantages as a nanofactory owing to their outstanding features like high growth rate, ease of culture, high extracellular secretions, an eco-friendly catalyst for metal remediation, and ability to interact with a vast range of materials (metal salts). Metal nanoparticle synthesis using a bacterial nanofactory depends on various parameters like solvent, temperature, pressure and pH, exposure time to substrate, substrate and biomolecule concentration, light, cellular activities, and enzymatic processes. Several native bacterial species have been successfully demonstrated as "Bio-nanofactory" for synthesizing metal nanoparticles via utilizing different mechanisms inside and outside the bacterial cell, such as biosorption, biotransformation, bioleaching, and bioaccumulation. Additionally, recombinant DNA technology has been used to generate bacterial recombinant nanofactories where genes coding for metal-interacting biomolecules in other microorganisms or other species can be expressed in the host bacterial cell and utilized for the enhanced mechanism for metal nanoparticle synthesis. This review presents the detailed mechanism of metal nanoparticle synthesis by native and recombinant bacterial nanofactories, their purification, and the characterization method with commercial applications. A comment is made on the present status, issues, and future potential in upscaling the process so that this green technology can be used extensively to serve humankind in the coming times.

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Author(s): Arif, M (Arif, Mohd); Sachdeva, S (Sachdeva, Saloni); Mangla, S (Mangla, Sherry); Sahoo, PK (Sahoo, Prafulla Kumar)

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Author(s): Das, S (Das, Suresh); Das, S (Das, Soumik); Mandal, ST (Mandal, Sandip Tanu); Sharma, MC (Sharma, Milap Chand); Ramsankaran, R (Ramsankaran, Raaj)

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Abstract: Global warming causes glacial mass loss, leading to the growth of high-mountain glacial lakes. The presence of glacial lakes poses a significant threat to downstream communities, as they can produce destructive Glacial Lake Outburst Floods (GLOFs). Timely basin-scale inventory and GLOF susceptibility assessments are crucial, considering past GLOF events in the Himalayan region. Here, an updated inventory of glacial lakes in the Chenab basin, Western Himalayas was generated based on Sentinel-2 datasets for 2022. We assessed temporal changes and GLOF susceptibility for glacial lakes (>0.05 km2) through a multi-criteria based Analytical Hierarchical Process, classifying them into low, medium, high, and very high susceptibility classes. The results reveal 419 lakes (>0.001 km2; 9.97 +/- 0.67 km2) in the basin in 2022. Glacial lakes (>0.05 km2) area increased by similar to 75%, from 3.92 +/- 0.58 to 6.86 +/- 0.25 km2 during 1990-2022. Of the 42 lakes (>0.05 km2) evaluated, four showed very high GLOF susceptibility. The study emphasizes the impact of local geomorphology and glacier-lake interaction under warming climate, likely to increase the GLOF susceptibility in the region. Regular monitoring and detailed fieldwork for these susceptible lakes are crucial for early warning and disaster risk reduction for downstream communities.

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Abstract: ObjectiveTo study the efficacy of co-administration of Arshogrit (AG) and Jatyadi Ghrit (JG), two herb-based Ayurvedic medicines, in rat model of croton oil-induced hemorrhoids.SignificanceHemorrhoids refer to a pathological condition affecting the recto-anal region causing pain, swelling, bleeding and protrusion. The available therapies for hemorrhoids are symptomatic or invasive but are expensive and associated with adverse effects. Hence, there exists a need for efficacious and safer pharmacotherapies.MethodsUltra high performance liquid chromatography detected nine phytocompounds in AG and seven in JG. Seven fatty acids were additionally identified in JG by Gas Chromatography-Mass Spectrometry analysis. The in-vivo efficacy of the co-administration of AG, which was administered orally at the doses of 20, 60 and 200 mg/kg/day and JG, which was topically applied (100 mg/animal/day) was evaluated in Wistar rats by inducing hemorrhoids development with the application of croton oil preparation (COP) in the recto-anal area. Prednisolone was employed as the standard drug and was administered orally at the dose of 1 mg/kg/day.ResultsAG and JG were able to attenuate the croton oil-induced macro and microscopic anomalies. Gross pathological observation demonstrated remarkable decrease in croton oil-induced swelling, hemorrhage and formation of pseudomembrane, with the escalating doses of AG. Microscopic observation revealed alleviation in the histopathological lesions (necrosis, inflammation, hemorrhage/congestion, degeneration and dilatation of blood vessels). AG and JG additionally reduced COP-induced increase in the serum levels of pro-inflammatory cytokines.ConclusionThis study convincingly demonstrates that co-administration of AG and JG is a potential therapy against hemorrhoids, warranting further investigations.

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Abstract: In this study, we unveil a highly enantioselective [3 + 2] annulation protocol, adept at merging N-2,2,2-trifluoroethylisatin ketimines with 3-alkylidene benzofuranones under quinine-derived urea catalysis. This strategy furnishes complex spiro[benzofuran-pyrrolidine]indolinedione architectures, featuring strategically positioned trifluoromethyl groups of considerable pharmacological significance. The method distinguishes itself by employing minimal catalyst loadings while ensuring energy efficiency and accommodating a broad spectrum of substrates, resulting in excellent yields and exceptional stereocontrol (38 examples, up to 98% yield, up to >20 : 1 dr, and up to 99 : 1 er). Mechanistic investigations, underpinned by SC-XRD and NMR NOE analyses, elucidate the stereochemical pathways driving selectivity, while a comprehensive evaluation of electronic and steric substituent effects further refines the reaction's scope.

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Abstract: This article is concerned with the transient analysis of a software embedded fault tolerance machining system (FTMS) having features of redundancy, switching failure, and vacationing server. Various measures including reliability, availability, failure frequency, etc. have been established for the performance predictions of FTMS. The sensitivity and cost analysis have been provided to validate the concerned model and to examine the redundancy and maintainability of the system.

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Abstract: Boron toxicity is an increasingly serious problem leading to soil degradation and vegetation loss in arid and semi-arid environments worldwide. The soils of solonetzic complexes often display this characteristic. This study aimed to investigate the vertical distribution of hot water soluble-boron (hws-B) in the sodic and agricultural soils of Israna block in Haryana, India. The study also examined the influence of various soil variables on hws-B. The samples were collected at six depths to assess the availability of B. Additionally, an assessment was conducted to ascertain the appropriateness of the water sources for irrigation. The findings of our study revealed a notable disparity in the hws-B content between sodic soils and control agricultural soils, with the former exceeding the toxic thresholds. The levels of B available to plants were highest in the upper layers of soil and reduced as the depth increased. A number of variables influenced the water-soluble B content in sodic soils, particularly pH, calcite content, electrical conductivity (EC), organic matter (OM), and calcium-boron ratio (Ca/B). The results indicated that the boron levels in both surface and groundwater were within acceptable limits for irrigation purposes, suggesting that boron toxicity may not be directly attributed to these sources. Our study suggests that sodic soils contain high levels of boron, which can be toxic, and consequently, proper management of these soils is recommended. It is essential to have a comprehensive understanding of boron levels in surface and sub-surface soils, as well as in irrigation water, in order to effectively manage soil and improve crop productivity.

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Abstract: Raman spectroscopy has been proven to be a fast, convenient, and nondestructive technique for advancing our understanding of biological systems. The Raman effect originates from the inelastic scattering of light which directly probe vibration/rotational states in biological molecules and materials. Despite numerous advantages over infrared spectroscopy and continuous technical as well as operational improvement in Raman spectroscopy, an advanced development of the device and more applications have become possible. In this review, we explore the principles, techniques, and myriad applications of Raman spectroscopy in the realm of biology. We begin by providing an overview of Raman spectroscopy, highlighting its significance in unraveling the complexities of biological research. The focus of this review is on Raman spectroscopy concepts and methods, clarifying the fundamentals of Raman scattering and spectral interpretation. The review also highlights the key experimental considerations for productive biological applications. We explore the broad range of Raman applications including molecular structure, biomolecular composition, disease detection, and medication discovery. The Raman imaging and mapping can also be used to visualize biological samples at the molecular level. Raman spectroscopy is still developing, giving fresh insights and remedies, from biosensing to its use in tissue engineering and regenerative medicine. This review sheds light on the past, present, and future of Raman spectroscopy; it also highlights promising directions of future research developments and serves as a thorough resource for all researchers.

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Abstract: India, one of the most dynamic ancient civilizations, possesses a multitude of historical artifacts, with 37 of its notable architectural structures recognized as UNESCO World Heritage Sites. Yet, the ever-changing climate, especially air pollution, expedites the natural deterioration of historic sites and diminishes their aesthetic appeal, causing socio-economic damage. With this in mind, the current study aims to offer a logical scientific foundation for the implications of air pollution, seasonal shifts, and COVID-19 on 14 significant historical places in India during the year 2019-20. Delhi, among the cities most severely affected by atmospheric pollution, recorded an alarming air quality index (AQI) of 102-141, which can intensify the risk of cultural sites to corrode and deteriorate. Analysis reveals that the winter season had elevated levels of NO2 and particle pollution (PM2.5, PM10), whereas summer had the higher levels of O3. Throughout the 5-month lockdown period, ozone levels exhibited an elevation, contrasting with the reduction observed in other air parameters. Notably, there was a substantial 70% decrease in particulate matter concentration, which had previously remained stable over the course of the year. Variations in geographic locales and anthropogenic influences contribute significantly to the dose-response statistics, revealing an unprecedented elevation in corrosion risks to historical limestone and sandstone structures across target sites. Moreover, the research addresses available Governmental initiatives, and effective strategies designed to safeguard heritage sites against the corrosion and material degradation, offering a comprehensive exploration of protective measures. Thereby, the current research is centred on establishing a foundational understanding of the impact of air pollution on cultural heritage, utilizing a comparison to the year with the lowest air pollution levels, which can aid policymakers in enhancing risk management and implementing a robust national mandate for the preservation of cultural heritage sites against corrosion.

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Abstract: This is the first statistical ground investigation of unique low latitude Spectral Resonance Structures (SRS) that increase beyond 5Hz $5\,Hz$, crossing the fundamental Schumann resonance at few occurrences. The study is carried out using high resolution magnetic field variation data obtained from induction coil magnetometer (ICM) installed at very low latitude Indian station, Shillong (25.56 degrees N $25.56\mathit{{}<^>{\circ}}\,N$ geographic latitude, 91.86 degrees E $91.86\mathit{{}<^>{\circ}}\,E$ geographic longitude, dipoleL=1.08 $dipole\,L=1.08$) for the duration 2013-2018. This study focuses on the characteristics of SRS whose harmonic frequencies reach 5Hz $5\,Hz$ and above. The study reveals that the occurrence of SRS events above 5Hz $5\,Hz$ is higher in winter as compared to summer, also the occurrence is higher during low solar activity period as compared to period of solar maximum. It is seen that both the cavities, viz. Ionospheric Alfven Resonator (IAR) and Magnetospheric Alfven Resonator (MAR) support such SRS and have their

respective quality factor (Q-factor). The seasonal variability of the Q-factor of these cavities also shows a trend similar to the occurrence, with higher values of Q-factor during winter as compared to summer. Dependence of SRS events on parameters such as height of the IAR cavity, ion mass density, conductivities, which affects the Q-factor reveals that IAR above 5Hz $5\,Hz$ is supported by a larger height of the cavity with very low ion densities. On the other hand, the MAR cavity efficiency is higher when the Alfven wave conductance is much larger than the Pedersen conductivity.

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Abstract: Efficient DNA double strand break (DSB) repair is necessary for genomic stability and determines efficacy of DNA damaging cancer therapeutics. Spatiotemporal dynamics and post-translational modifications of repair proteins at DSBs dictate repair efficacy. Here, we identified a non-canonical function of GCN5 in regulating both HR and NHEJ repair post genotoxic stress. Mechanistically, genotoxic stress induced GCN5 recruitment to DSBs. GCN5 PARylation by PARP1 was essential for its recruitment, acetyltransferase activity and DSB repair function. Liquid chromatography-mass spectrometry (LC-MS) identified DNA-PKcs as part of GCN5 interactome. In-vitro acetyltransferase assays revealed that GCN5 acetylates DNA-PKcs at K3241 residue, a prerequisite for DNA-PKcs S2056 phosphorylation and DSB recruitment. Alongside, ChIP-qPCR revealed GCN5 mediates transcription of PRKDC via H3K27Ac acetylation in its promoter region (- 710 to - 554). Genetic perturbation of GCN5 also decreased CHEK1, NBN1, TP53BP1, POL-L transcription and abrogated ATM, BRCA1 activation. Accordingly, GCN5 loss led to persistent gamma-H2AX foci formation, compromised in-vivo HR-NHEJ and caused GBM radio-sensitization. Importantly, PARP1 inhibition phenocopied GCN5 loss. Together, this study identifies an untraversed DSB repair function of GCN5 and provides mechanistic insights into transcriptional as well as post-translational regulation of pivotal HR-NHEJ factors. Alongside, it highlights the translational importance of PARP1-GCN5 axis in mediating GBM radio-resistance.

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Title: Synergistic effect of MXene-CNT as effective nanofillers for enhancing the vibration properties of honeycomb cored sandwich composite plates: An experimental and numerical study

Author(s): Bodduru, K (Bodduru, Kamesh); Palanippan, SK (Palanippan, Sathish Kumar); Siengchin, S (Siengchin, Suchart); Kassa, MK (Kassa, Mesfin Kebede); Singh, LK (Singh, Lavish Kumar)

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Abstract: In the present work, the vibration behavior of honeycomb cored multi-walled carbon nanotube (MWCNT) and Ti3C2Tx-MXene reinforced sandwich composite plate has been investigated. The elastic properties of two-phase (Ti(3)C(2)Tx-MXene-MWCNT)/epoxy sandwich composite were evaluated by utilizing the Halpin-Tsai method. Then, glass fiber was incorporated as reinforcement, and the elastic characteristics of the hybridized three phase composite were obtained using the Chamis analytical model. The vibration behavior of sandwich panels was investigated with the help of finite element formulation by obtaining the strain fields using high-order shear deformation theory. The developed numerical model was experimentally validated, demonstrating its efficacy in predicting the natural frequencies of sandwich composite panels under varying conditions. Nano-filler reinforcement consistently increased natural frequencies across all vibration modes, regardless of boundary conditions. A parametric study revealed that natural frequency monotonically increased with higher aspect ratio and weight fraction of MWCNTs and Ti3C2Tx-MXene. However, the thickness ratio had a significantly greater effect on natural frequency than other parameters. Clamping conditions also affected vibration behavior, with natural frequencies following the order: CFFF < SSSS < SFSF < CFCF < CSCS < CCCC. Regarding the transverse response, the root mean square velocity decreased with increasing MXene/CNT concentration and aspect ratio, attributed to enhanced stiffness and load-bearing capacity of the hybrid sandwich composite. This study offers valuable insights for effective utilization of different types of nanoparticles in conjunction and design and development of nanoparticle-reinforced sandwich composites, aiding in the prediction of the vibration behavior of these nanostructures.

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Abstract: BackgroundInterferon regulatory factor 6 (IRF6) has a key function in palate fusion during palatogenesis during embryonic development, and mutations in IRF6 cause orofacial clefting disorders.Methods and resultsThe in silico analysis of IRF6 is done to obtain leads for the domain boundaries and subsequently the sub-cloning of the N-terminal domain of IRF6 into the pGEX-2TK expression vector and successfully optimized the overexpression and purification of recombinant glutathione S-transferase-fused NTD-IRF6 protein under native conditions. After cleavage of the GST tag, NTD-IRF6 was subjected to protein folding studies employing Circular Dichroism and Intrinsic fluorescence spectroscopy at variable pH, temperature, and denaturant. CD studies showed predominantly alpha-helical content and the highest stability of NTD-IRF6 at pH 9.0. A comparison of native and renatured protein depicts loss in the secondary structural content. Intrinsic fluorescence and quenching studies have identified that tryptophan residues are majorly present in the buried areas of the protein and a small fraction was on or near the protein surface. Upon the protein unfolding with a higher concentration of denaturant urea, the peak of fluorescence intensity decreased and red shifted, confirming that tryptophan residues are majorly present in a more polar environment. While regulating IFN beta gene expression during viral infection, the N-terminal domain binds to the promoter region of Virus Response Element-Interferon beta (VRE-IFN beta). Along with the protein folding analysis, this study also aimed to identify the DNA-binding activity and determine the binding affinities of NTD-IRF6 with the VRE-IFN beta promoter region. The protein-DNA interaction is specific as demonstrated by gel retardation assay and the kinetics of molecular interactions as quantified by Biolayer Interferometry showed a strong affinity with an affinity constant (KD) value of 7.96 x 10-10 M.ConclusionNTD-IRF6 consists of a mix of alpha-helix and beta-sheets that show temperature-dependent cooperative unfolding between 40 degrees C and 55 degrees C. Urea-induced unfolding shows moderate tolerance to urea as the mid-transition concentration of urea (Cm) is 3.2 M. The tryptophan residues are majorly buried as depicted by fluorescence quenching studies. NTD-IRF6 has a specific and high affinity toward the promoter region of VRE-IFN beta.

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Title: Exploring the Concept of AI Humanoids as an "Artificial Person": Contemplating the Human-Robot Relationship in Society and the Identity of Humanoids

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Abstract: The article endeavours to understand and explain the position of AI humanoids in society. It further makes a unique attempt to describe humanoid robots as "artificial persons," and while doing so, it sheds light on intriguing, less-debated topics like relationships between humans and artificially intelligent humanoids (AI) and the identity of AI humanoids. The goal of this manuscript is to present the argument that suggests that artificially intelligent humanoid robots are a remarkable creation of human ingenuity and are distinct from typical machines, as they exhibit qualities that extend beyond mere mechanics and aim to reach a degree of complexity akin to humans. These humanoids can form strong connections with humans and possess the ability to communicate, learn, generate information, and assist humans in a multitude of tasks. Therefore, it seems logical to attempt to describe these humanoids as "artificial persons" and try giving them a unique identification or digital signature that may be related in some manner to their owner's biometric identity. The manuscript employs text analysis to support its arguments and, in the process, delves into the solutions to the aforementioned issues by exploring the concepts proposed by renowned theorists, classical philosophers, and psychologists.

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Abstract: Evaluation of silicon (Si) anode performance by the assembled Si||Li half-cells is the primary approach in the development of high-energy-density lithium-ion batteries (LIBs). However, most studies focus solely on the variations of Si anode, the stability of electrolyte on the lithium (Li)-metal counter electrode has been overlooked. Herein, we discovered that the acquired cell performance not only depends on the Li+ (de-)solvation behaviors on the Si anode surface but also was affected significantly by the lithiation overpotential caused by the side reactions on the Li electrode. It is significant to identify this point, as these influences of electrolyte decomposition on the Li electrode have been previously regarded as an integral part of side reactions on the Si anode. We proposed a new perspective of the electrolyte solvation structure and electrode interfacial model to unravel the interfacial behaviors on the Si and Li electrodes respectively. The identified differences in the Li+ solvation and (de-)solvation behaviors not only provide reasons for the varied electrolyte stability in different electrolytes but also interpret the superior performance in tetrahydrofuran (THF)-based electrolytes. This study underscores the importance of understanding electrolyte behavior at the interfaces of individual electrodes to discern the reliability of electrode performance and also introduce a novel principle for designing superior electrolytes for high-energy-density LIBs.

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Abstract: BackgroundThe presence of latent HIV reservoirs continues to be the biggest obstacle to achieving an HIV cure. Thus, long non-coding RNAs (lncRNAs) may serve as the preferred targets for HIV latency reversal. The goal of the study was to identify prospective lncRNAs for subsequent in vitro molecular and functional characterization.Methods and resultsRNA-sequencing was performed in latently HIV-infected monocytic cell line (U1) under stimulated and unstimulated condition using Illumina-HiSeqX platform, followed by its validation using qRT-PCR assay. Gene ontology (GO), KEGG pathway, and co-expression analyses were performed to identify the enriched biological processes and pathways in U1 cells post-stimulation with the latency reversal agent SAHA. A total of 3,576 and 1,467 significantly altered lncRNAs and protein-coding genes respectively, were identified in SAHA-stimulated U1 cells compared to unstimulated ones. The GO and KEGG pathway analyses of the differentially expressed protein-coding genes showed the enrichment of diverse biological processes and pathways respectively, in SAHA-stimulated U1 cells. Co-expression analysis between lncRNAs and protein-coding gene pairs, helped predict potential pathways with which these lncRNAs are associated. Further in vitro validation in HIV-infected monocytes showed that the expression of the top two candidate lncRNAs, LINC01231 and LINC00560, are specific to HIV infection.ConclusionTranscriptome analysis revealed changes in the expression of numerous lncRNAs and protein-coding genes following stimulation with SAHA. Co-expression analysis identified candidate lncRNAs and their associated biological pathways. However, additional in vitro experimental exploration using gene knockdown strategies is needed to ascertain the specific role of LINC01231 and LINC00560 lncRNAs in latently infected monocytes.

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Abstract: Withania somnifera (L.) Dunal, commonly known as ashwagandha, is one of the 55 species prioritized by the National Medicinal Plant Board, India. It is pharmacologically, an exceptional medicinal plant used in ayurvedic and indigenous medicinal systems. Damage by insect pests is a crucial obstruction for the industrially and commercially supreme medicinal plant, ashwagandha. Studies on a long-term basis to catalogue different arthropod pests damaging ashwagandha, their peak activity period, the vulnerability of the crop stage, natural enemies associated with recorded insect pests and their activity period were still unexplored. The current study was carried out for three consecutive years and recorded wholly 54 species of arthropods causing injury to the ashwagandha crop across different phenological crop growth stages, and 32 species of natural enemies managing these corresponding insect pests. Of the observed phytophagous arthropods, the Hemipteran species (61 %) were dominant, followed by Coleoptera (13 %), Lepidoptera (9 %), and Orthoptera (9 %). Here we explored the arthropod pest assemblage such as sap suckers (65 %), defoliators (33 %), and root feeders (2 %) infesting ashwagandha in the subtropical region of India. Amongst these pests, Henosepilachna vigintioctopunctata (Coleoptera: Coccinellidae) appeared as a major threat to the quality raw material production of ashwagandha. The full blossom with the initiation of berries was found to be a more vulnerable phenological stage, being attacked by 74% of recorded arthropod pests. The natural enemies belonging to Coleoptera, Hemiptera, and Hymenoptera outnumbered the leftovers. This study also encapsulates the activity period of arthropod pests and their natural enemies, which can be a path road to choosing other integrable components in management strategy and also to articulate the conservation strategies. Since, information on arthropod pests and their natural enemies in the crop ecosystem is elementary

to articulate any Integrated Pest Management (IPM) strategy and to the best of our knowledge, this is the first study conducted for a long period and making an inventory of arthropods infesting the ashwagandha crop, their correspondent natural enemies and their periods of activity can be a roadmap in constructing an IPM strategy for sustainable ashwagandha production.

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Abstract: Clinical biomarkers such as fasting glucose, HbA1c, and fasting insulin, which gauge glycemic status in the body, are highly influenced by diet. Indians are genetically predisposed to type 2 diabetes and their carbohydrate-centric diet further elevates the disease risk. Despite the combined influence of genetic and environmental risk factors, Indians have been inadequately explored in the studies of glycemic traits. Addressing this gap, we investigate the genetic architecture of glycemic traits at genome-wide level in 4927 Indians (without diabetes). Our analysis revealed numerous variants of sub-genome-wide significance, and their credibility was thoroughly assessed by integrating data from various levels. This identified key effector genes, ZNF470, DPP6, GXYLT2, PITPNM3, BEND7, and LORICRIN-PGLYRP3. While these genes were weakly linked with carbohydrate intake or glycemia earlier in other populations, our findings demonstrated a much stronger association in the Indian population. Associated genetic variants within these genes served as expression quantitative trait loci (eQTLs) in various gut tissues essential for digestion. Additionally, majority of these gut eQTLs functioned as methylation quantitative trait loci (meth-QTLs) observed in peripheral blood samples from 223 Indians, elucidating the underlying mechanism of their regulation of target gene expression. Specific co-localized eQTLs-meth-QTLs altered the binding affinity of transcription factors targeting crucial genes involved in glucose metabolism. Our study identifies previously unreported genetic variants that strongly influence the diet-glycemia relationship. These findings set the stage for future research into personalized lifestyle interventions integrating genetic insights with tailored dietary strategies to mitigate disease risk based on individual genetic profiles.

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Title: Detection of MPT-64 protein in pleural tuberculosis cases by magnetic bead-gold nanoparticle-PCR amplified immunoassay

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Abstract: Aim: Diagnosis of pleural tuberculosis (TB) is challenging; thus, an efficient method is urgently needed. Methods: We developed a magnetic-bead-gold nanoparticle-PCR amplified immunoassay (MB-AuNP-I-PCR, liquid system) to detect the Mycobacterium tuberculosis MPT-64 protein in pleural TB patients. AuNPs functionalized with detection antibodies/oligonucleotides were characterized by UV-vis spectroscopy, Transmission/Scanning electron microscopy, Fourier-transform infrared spectrometer, ELISA, and PCR, whereas MBs conjugated with detection antibodies were validated by magneto-ELISA/UV-vis spectroscopy. Results: We utilized the MB-AuNP-I-PCR for MPT-64 detection in 99 clinical specimens which displayed 85.2% sensitivity and 97.8% specificity to diagnose pleural TB cases. Markedly, the sensitivity achieved by MB-AuNP-I-PCR was noticeably higher ($p < 0.01$) than magneto-ELISA and GeneXpert. Conclusion: This is a preliminary report to diagnose pleural TB cases by MB-AuNP-I-PCR with promising results that require further corroboration in a higher number of specimens.

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Abstract: Objective: This paper presents an ultra-miniaturized circular-shaped triple band microstrip antenna as an intraocular unit applicable for retinal prosthesis. Methods: The reported antenna is developed by modifying a conventional circular-shaped patch with a pair of open-ended circular annular rings and a semicircular ring-loaded rectangular stub. Additionally, a shorting pin is used at the periphery of the patch to achieve the frequency bands of interest. Further, to make the structure electrically small and accommodate highly dense electrodes, the circular ground plane is modified by making symmetrical slots over the four quadrants and edges. Specific absorption rate distribution for 1 g and 10 g of different tissue layers over three operating frequencies has been studied by placing electromagnetic sources at different locations. Results: With these arrangements, the proposed strip antenna offers multiband operation within the frequency band of 1.25 GHz (1.13-1.46 GHz), 2.45 GHz (2.24-2.66 GHz), and 3.32 GHz (3.09-3.50 GHz). Besides, circularly polarized radiation has also been achieved at 1.25 GHz with a 3-dB axial ratio bandwidth of 10 MHz. Conclusion: Finally, the proposed antenna structure is fabricated, and its measured performance metrics are in close aggreement with the simulated parameters. Significance: The proposed antenna's performance inside a customized canonical eye model (DMCM) and anthropomorphic Zubal head model is studied and compared with the prior studies.

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Abstract: Antimicrobial peptides (AMPs), particularly host defense peptides (HDPs), have gained recognition for their role in host defense mechanisms, but they have also shown potential as a promising anticancer, antiviral, antiparasitic, antifungal and immunomodulatory agent. Research studies in recent years have shown HDPs play a crucial role in endothelial cell function and biology. The function of endothelial cells is impacted by HDPs' complex interplay between cytoprotective and cytotoxic actions as they are known to modulate barrier integrity, inflammatory response and angiogenesis. This biphasic response varies and depends on the peptide structure, its concentration, and the microenvironment. These effects are mediated through key signaling pathways, including MAPK, NF-kappa B, and PI3K/Akt, which controls responses such as cell proliferation, apoptosis, and migration. In the present review, we have discussed the significance of the intriguing relationship between HDPs and endothelial cell physiology which suggests it potential as a therapeutic agents for the treating wounds, cardiovascular diseases, and inflammation-related endothelial damage.

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Abstract: The glacier-wide mass balance (MB) series on Chhota Shigri Glacier has been reanalysed by combining the traditional MB reanalysis framework and a nonlinear MB model. The nonlinear model is preferred over the traditional glaciological method to compute the glacier-wide MBs, as the former can capture the spatiotemporal variability in point MBs from a heterogeneous in situ point MB network. Further, the nonlinear model is also used to detect erroneous measurements from the point MB observations over 2002-2023. ASTER and Pl & eacute;iades stereo imagery show limited areal changes but negative mass balances of -0.38 +/- 0.05 mw.e.a-1 during 2003-2014 and -0.51 +/- 0.06 mw.e.a-1 during 2014-2020. The nonlinear model outperforms the traditional glaciological method and agrees better with these geodetic estimates. The reanalysed mean glacier-wide MB over 2002-2023 is -0.47 +/- 0.19 mw.e.a-1, equivalent to a cumulative loss of -9.81 +/- 0.87 mw.e. Our analysis suggests that the nonlinear model can also be used to complete the MB series if for some years the field observations are poor or unavailable. With this analysis, we revisit the glacier-wide MB series of Chhota Shigri Glacier and provide the most accurate and up-to-date version of this series, the longest continuous ever recorded in the Himalaya. We recommend applying the nonlinear model on all traditional glaciological mass balance series worldwide whenever data are sufficient, especially in the Himalaya, where in situ data are often missing due to access issues.

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Abstract: Background: Slum communities face health risks influenced by environmental, human, and animal health factors, particularly antimicrobial resistance (AMR). Tailored, community-driven solutions are needed to address these multifactorial health determinants. This study explores One Health challenges in urban slums using a Patient and Public Involvement (PPI) approach. Objectives: This study aims to use qualitative methods within a PPI framework to examine the social, environmental, and animal health factors contributing to AMR and other health challenges in urban slums. Focusing on One Health, we engaged slum residents in Jaipur, Jakarta, Antofagasta, and Istanbul through participatory approaches like social mapping and transect walks to identify health risks and develop intervention strategies. Methods: A PPI approach was employed to involve communities in the research process, ensuring culturally relevant insights. Data collection included social mapping, transect walks, and key informant interviews in the four cities, highlighting critical health determinants such as environmental contamination, healthcare access,

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Abstract: Research in geocryology is currently principally concerned with the effects of climate change on permafrost terrain. The motivations for most of the research are (1) quantification of the anticipated net emissions of CO2 and CH4 from warming and thaw of near-surface permafrost and (2) mitigation of effects on infrastructure of such warming and thaw. Some of the effects, such as increases in ground temperature or active-layer thickness, have been observed for several decades. Landforms that are sensitive to creep deformation are moving more quickly as a result, and Rock Glacier Velocity is now part of the Essential Climate Variable Permafrost of the Global Climate Observing System. Other effects, for example, the occurrence of physical disturbances associated with thawing permafrost, particularly the development of thaw slumps, have noticeably increased since 2010. Still, others, such as erosion of sedimentary permafrost coasts, have accelerated. Geochemical effects in groundwater from trace elements, including contaminants, and those that issue from the release of sediment particles during mass wasting have become evident since 2020. Net release of CO2 and CH4 from thawing permafrost is anticipated within two decades and, worldwide, may reach emissions that are equivalent to a large industrial economy. The most immediate local concerns are for waste disposal pits that were constructed on the premise that permafrost would be an effective and permanent containment medium. This assumption is no longer valid at many contaminated sites. The role of ground ice in conditioning responses to changes in the thermal or hydrological regimes of permafrost has re-emphasized the importance of regional conditions, particularly landscape history, when applying research results to practical problems.

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