



Cup fungi (Pezizaceae family) Taken by Seline Dilmec-AMSB during a research trip in the Amazon, in the Pacaya-Samiria region

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Dear Readers,

Happy New Year 2020!

Access Biology, the official newsletter of the Department of Life Sciences-CUTN, aims to bring to light the latest updates in biology research, both from the department as well as developments in diverse areas of the discipline from across the globe.

The current issue details on the launching of the Fauna and several other scientific and academic events that occurred in the last 6 months at DLS. The issue also hosts student achievements under student corner! Future issues will also carry articles from the DLS student community that we are soliciting now!

I believe the introductory issue will keep the campus community abreast of the latest advances and updates in the field, and I hope you will enjoy delving into the science of life.

- Editors

Hatching of the Fauna

At a gala event that marked the beginning of the decennial celebrations of the Central University of Tamil Nadu (CUTN), Thiruvarur, the Honorable Chancellor, Prof. G. Padmanabhan and Prof. A.P. Dash, Honorable Vice Chancellor of CUTN, launched the official biodiversity handbook of the university, 'Fauna: A Compendium of the Biodiversity of CUTN Volume I' on 28th December 2019 developed jointly by the Department of Life Sciences, Department of Media and Communication and the Internal Quality Assurance Cell of the university. The Fauna showcases images and descriptions of hundreds of avian, amphibian, echinoderms, molluscs, reptiles, insects, and a few mammalian species that are distributed within the beautiful campus, which holds both academic as well as the residential quarters of the university.

Talking at the launch ceremony, the Chancellor highlighted the importance of preserving the glamour of the campus by providing safer niches for the animal species especially birds, because of the recent announcement at the Convention on Biological Diversity (CBD) that several species of aves are at the brink of extinction and a few have already disappeared. During the inaugural speech, Prof. A. P. Dash stated that the stakeholders of the university must focus on education programs that would sensitize teachers, students and the public to concertedly protect and conserve the campus biodiversity, the boon of mother nature, and that learning outcomes should always include academic understanding, acquisition of values, increased capacity, skills development, and the adoption of attitude and behavior conducive to conservation and sustenance of biodiversity as well as protection. He congratulated the entire team from the School of Life Sciences for compiling the biodiversity encyclopedia of the campus, and also said that the floral species of the campus would be showcased as well, which he believed would happen in the near future.



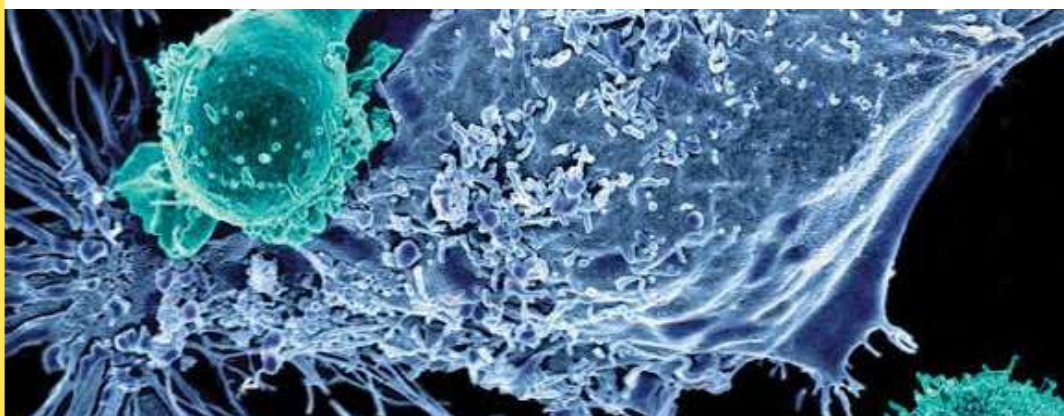
RESEARCH HIGHLIGHTS

DLS Plant Physiology Researchers Report on UV-B Priming-Induced Activation of Stress-Responsive Proteins in Paddy



In one of the seminal findings in plant stress physiology, Dr. Dinakar Challabathula together with his collaborators on a study titled "Effect of UV-B priming on the abiotic stress tolerance of stress-sensitive rice seedlings: Priming imprints and cross-tolerance" has shown that UV-B priming of *Oryza sativa* var. Kanchana seedlings results in augmented antioxidant potentials and gene expression of stress-response proteins under various abiotic stresses, focusing primarily on abiotic stress tolerance in sensitive and tolerant varieties of rice. The research article published in the *Plant Physiology and Biochemistry* journal reports on the enhancement of abiotic stress tolerance in both sensitive and tolerant varieties of rice after UV-B priming. The enhancement of abiotic stress tolerance in rice plants after UV-B priming is reported to be achieved through effective enhancement of photosynthetic efficiency, antioxidant machinery activity, and antioxidative enzyme production of sensitive rice seedlings against stresses like NaCl, UV-B and PEG. In yet another research article, the team has demonstrated that UV-B priming of the tolerant rice seeds and seedlings resulted in increased production of non-enzymatic antioxidants, activity/mRNA-level expressions of enzymatic antioxidants and stress-responsive proteins when exposed to NaCl, UV-B and PEG stress than by non-primed seedlings. Intriguingly, this is the first ever report on UV-B priming-induced activation of stress-responsive proteins (HSP and LEA) in rice.

For details: <https://www.sciencedirect.com/science/article/pii/S1349007918301609?via%3Dihub>



EXPERT SPOTLIGHT

Immunology Feast Enlightens Aspirants at DLS



The faculty and student members of DLS enjoyed a rich feast of basic immunology at a Crash Course in Basic Immunology "Immunology - Concepts for Beginners" offered by a leading expert in the subject, Prof. Balachandran Ravindran, Former Director, Institute of Life Sciences, Bhubaneswar, between 16th and 20th September 2019 at the Department of Life Sciences. The sessions were packed with aspirants who threw highly insightful and thoughtful inquiries in the subject to the resource person who shared his rich treasure of experience with the charismatic audience. Prof. Ravindran also provided clues to several hitherto ambiguous mechanisms in the immunobiology of autoimmune disorders and evolutionary concepts in developmental immunology.



alumni corner

Mr. Adarsh K. Mohapatra, an alumni (2012-17) of DLS-CUTN has been selected as a Marie-Curie Fellow to pursue a PhD at the Maastricht University, Maastricht, The Netherlands on a project titled "Alternative splicing in the regulation of thrombo-inflammation" under the TICARDIO Programme, 2020. The faculty members, students and staff congratulated Mr. Adarsh and wished him all success in his future academic endeavors.

alumni corner

The Honorable Vice Chancellor, the Faculty, Staff and Students of the Department of Life Sciences congratulated student alumni members of DLS, Ms. Aishi S. Satapathy and Ms. Gayathri Vishwanathan for having selected for pursuing their PhD research via the Italian International Scholarship in Italy. Both the members will undergo their PhD training at the University of Verona in Italy from 2019 onwards.

In yet another interview, Mr. Mohammed Ashiq, another DLS alumni emerged successful to undergo a doctoral program again at the University of Verona, where he is expected to explore the molecular mechanisms underlying certain immunological disorders.

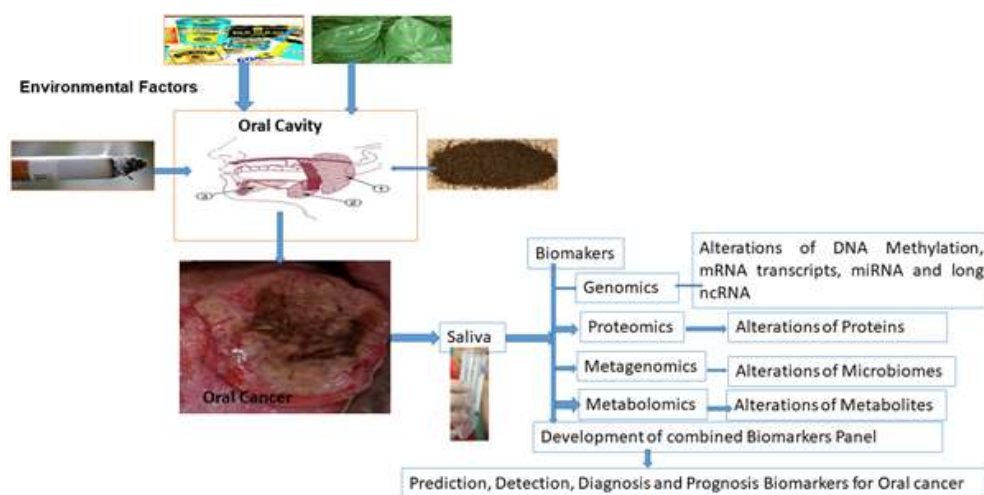
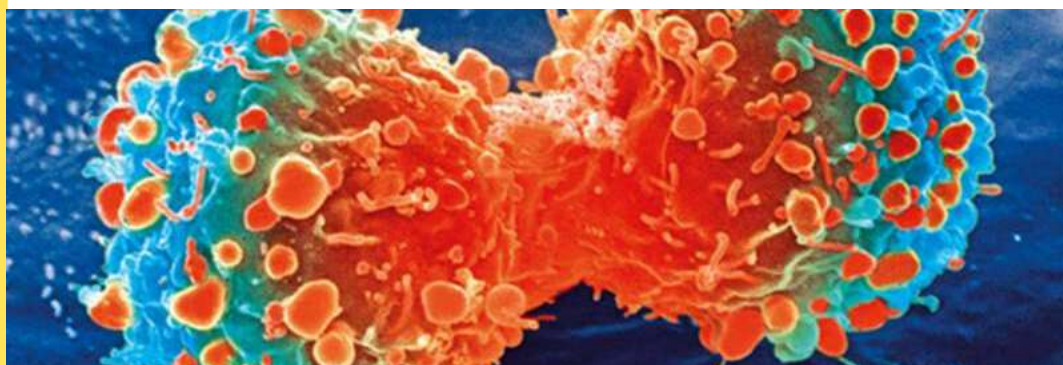
scholar corner



Ms. Madhusmita Panda, one of the doctoral students from Dr. Indranil Chattopadhyay's Cancer Biology Research Group, has received the ICMR Senior Research Fellowship Award 2019-20 for one year together with an EMBO travel grant to attend an International Congress in Europe. The department congratulates the scholar and her supervisor for bringing laurels to the department.

RESEARCH HIGHLIGHTS

CUTN Researcher Predicts the Potential Use of Saliva as a Non-Invasive Early Diagnostic Biomarker of Oral Carcinoma



In a significant development towards cancer diagnosis, CUTN researchers have identified saliva as a promising non-invasive biomarker for oral cancer. Dr. Indranil Chattopadhyay from the Cancer Biology Research Group states that "Identification of early diagnostic non-invasive biomarkers is the need of the hour to significantly improve the survival rates of oral cancer patients and also to avoid painful invasive procedures in the diagnosis of oral cancer. Saliva-based genomics, proteomics, metagenomics, and metabolomics derived biomarkers may overcome the above problems" he said on the recent findings that his group published in the Journal of Oral Biosciences. He further said, "Omics biomarkers in saliva, such as metabolites, proteins, transcribed genes, miRNAs, genomic, and epigenomic alterations, as well as the microbiota have been used for the early diagnosis of primary and recurrent oral squamous cell carcinoma, and a combination of different sensitive and specific biomarkers salivary biomarkers are being applied to screen high-risk oral cancer patients to reduce individual biological variation. Among the omics biomarkers, oral microbiome is an ideal source of biomarkers as compared to other tumor biomarker sources, due to low-inter and intra individual variations. Such biomarkers are required to be validated via a large number of populations' studies prior to FDA evaluation and approval."

For details: <https://www.sciencedirect.com/science/article/pii/S1349007918301609?via%3Dihub>

SCIENCE CAFE: HIV VACCINE

Emory Researcher Hints Lymph Node T Cell Dynamics and Novel Strategies to HIV Cure

Dr. Vijayakumar Velu, a reputed scientist from the Emory Vaccine Center working for a HIV vaccine for the HIV Vaccine Consortium of Emory University discussed several of his key findings at a Science Cafe Research Seminar Series organised at the DLS-CUTN on 16th October 2019. The researcher who is in active collaboration with DLS since 2016 hinted the mechanisms underlying the memory T cell hide-outs in the gut during simian human immunodeficiency virus (SHIV) infection of Macaques and also explained the association of dysfunctional follicular NK cell functions and MAIT cells during chronic experimental infection of the animals. He also speculated hopes for an effectual HIV vaccine in the near future that would primarily be based on harnessing cellular immune responses.

CSIR-JRF Winners

The department congratulates Ms. Prangya Paramita Sahoo, Ms. Nur Al-Ain and Ms. Merlin Jeejo for having qualified in the CSIR-JRF National Eligibility Test 2019 and for bringing laurels to the department and the university.



students corner

Ms. Jarlin Saral, an iMSc Life Sciences final year student and a neurosciences aspirant at DLS, has been declared qualified to undergo a Project Internship Training at the prestigious Nanyang Technological University in Singapore from December 2019.

Incidentally, Ms Saral was also a participant at the NEUROMANIA 2019 Congress at the Nicolaus Copernicus University in Torun in Poland presenting a poster on neurodegenerative disease mechanisms.



● EXTINCT WATCH

World's Last Rhino of its Kind has its Last Breath!

One of the worst blows to global wild-life biodiversity was felt on 19th March 2018, when the world's last surviving male northern white rhino was declared dead owing to muscular and osseous degenerative changes combined with extensive skin wounds. The 45-year-old male rhino Sudan that lived at the Ol Pejeta Conservancy in Kenya was put to rest after his age-related complications markedly worsened. He is survived by only two females, his daughter and granddaughter the only representatives of the subspecies that are globally alive today. "His death is a cruel symbol of human disregard for nature and it saddened everyone who knew him," lamented Jan Stejskal, a government wild-life official at the Dvur Kralove Zoo in the Czech Republic, where Sudan had spent his life till 2009. He further stated that the global community should take the lead in adopting cellular technologies that can conserve critically endangered species.



How endangered are the world's rhino species?

White (two sub-species)

	Southern Population	Status
	19,666-21,085	NEAR THREATENED
	Northern Population	
	2	

Black (four sub-species, one declared extinct 2011)

	Population	Status
	5,040-5,458	CRITICALLY ENDANGERED

Greater one-horned

	Population	Status
	3,500+	VULNERABLE

Sumatran

	Population	Status
	100	CRITICALLY ENDANGERED

Javan

	Population	Status
	67	CRITICALLY ENDANGERED

Hyperion - The World's largest living tree is in California!



Hyperion, the grandparent of all tall trees, also called as the coast redwood (Botanical name: *Sequoia sempervirens*) described in 2006 is the tallest living tree in the world. It is so tall that its top can hardly be seen. The tree is resident at a secret location in the Redwood National Park, California, USA. The tree lives among other specimens that encompasses the Helios at 374.3 feet, Icarus at 371.2 feet and the Daedalus at 363.4 feet.

SCIENCE CAFE: ECO-CAMPAIGN

Protecting Snakes: Setting Standards for Eco-conservation - Reading Scientist



The Department of Life Sciences organized a Snake Awareness Program at CUTN to acknowledge and conserve the role of the bio-friendly reptile species in eco-sustenance. Global cardiovascular and venom pharmacology expert and Associate Professor at the Institute for Cardiovascular and Metabolic Research, School of Pharmacy, Dr. Sakthivel Vaiyapuri, University of Reading, United Kingdom, delivered two scientific lectures on 2nd August 2019 at DLS-CUTN on the mechanisms of action of snake venom and therapeutic measures to be adopted in the event of a snake bite, and highlighted the importance of conservation of the harmless animal species to harness and foster forest ecology.



SCIENCE CAFE: GLOBAL HEALTH CAMPAIGN

Australian Microbiome Ambassador Offers Hope to Keep Deadly Gut Ailments at Bay

In a Science Cafe Seminar organised by the Department of Life Sciences on Gut Microbiome on 2nd August 2019 at CUTN, noted researcher Prof. Raj Eri, University of Tasmania (UTAS) at Launceston, Australia, underpinned the association of healthy gut microflora with protection attributes against deadly cancerous conditions, especially involving the colorectal part of the digestive system of humans. Addressing a galore of student aspirants, Dr. Eri stated that gut flora are second brains, and certain chemicals, notably neurotransmitters released by gut flora are largely responsible for keeping one's social behavior healthy. He also highlighted the audience to keep junk foods away to maintain a healthy gut. Prof. Eri also deliberated on the association of gut flora with the development of disorders involving several organ systems in the body.



RESEARCH HIGHLIGHTS

DLS Scientists Link Plasma Cytokines with Thrombocyte Deficit in Dengue

In a recent research published in the *Viral Immunology*, an international peer-reviewed journal that disseminates global virology research, Ms. Anbalagan A. Meena, an iMSc project student from the Infection Biology Division of the Department of Life Sciences, has explored the association of platelet deficiency in clinical dengue severity with increase of tumor necrosis factor-alpha, a chemical messenger that hallmarks the onset of cytokine storm in dengue virus-infected patients.

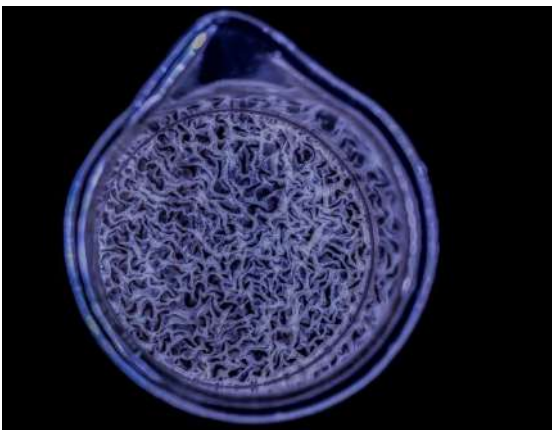
Dengue virus (DENV) infection leads to diverse and protean clinical manifestations that ranges from mild febrile to life-threatening disease, which could result from severe internal bleeding culminating often in death of the infected individual. In this study, the researchers studied the levels of several other cytokines that also corroborated with dengue severity, together with several other blood and hematological parameters. "The key finding of the study was that increase of one unit of the pro-inflammatory cytokine TNF- α was associated with a decrease of 160 units of thrombocytes, cells that are needed for blood clotting", said Dr. Kannan, one of the expert collaborators in the investigation who does platelet biology research at DLS. The Principal Scientist of the investigation, Dr. Shankar hypothesised that TNF- α could play a paramount role in the immunopathogenesis of dengue virus infection, and said that in spite of the reduced levels of thrombocytes, it will be interesting to explore if any other inflammatory cells, for instance macrophages, neutrophils and mast cells, regulate the levels of TNF- α in clinical DENV infection.

For details: https://www.liebertpub.com/doi/abs/10.1089/vim.2019.0100?rfr_dat=cr_pub%3Dpubmed&url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&journalCode=vim

FASCINATING LIFE



Pink Cotton Candy Slime Mould By Katja Schulz
These intriguing-looking structures (*Arcyria* sp.) were found in Rock Creek Park, Washington DC. More of Schulz's extensive nature photography can be found at www.flickr.com/treegrow



Bacillus subtilis pellicle, by Scott Chimileski

Scott Chimileski is a microbiologist, science photographer and author based in the Kolter and Baym Labs at Harvard Medical School. This image shows a colony of *Bacillus* bacteria that has formed a floating biofilm known as a pellicle. More of Scott's photography and mini-videos can be found at www.microbephotography.com or in the book *Life at the Edge of Sight: A Photographic Exploration of the Microbial World*



Juvenile longfin inshore squid (*Doryteuthis pealeii*) by Stefan Siebert. Stefan Siebert is an evolutionary developmental biologist at the University of California, Davis, where he studies the developmental biology and diversity of hydrozoans. More of his photography can be found at www.stefansiebert.photography



Oil beetle (*Meloe proscarabaeus*)

Taken in La Rioja mountains by David Urry MSB

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Upcoming Science Cafe Lecture - February 2020

Dr. Senthilkumar Palaniyandi, Assistant Professor at the University of Kentucky Medical Centre is visiting DLS-CUTN for delivering a talk on "Murine models of hematopoietic stem cell transplantation and immune complications" in February 2020.

DLS PUBLICATIONS 2019-20

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- Chattopadhyay, I., Verma, M., & Panda, M. (2019) Role of oral microbiome signatures in diagnosis and prognosis of oral cancer. *Technology in Cancer Research & Treatment*, 18:1533033819867354. doi: 10.1177/1533033819867354 (IF: 1.4)
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- Cheong, H. C., Quin Lee, C. Y., Cheok, Y. Y., Shankar, E. M., Sabet, N.S., Yi Tan, G.M., Movahed, E., Yeow, T.C., Sulaiman, S., Wong, W.F., Looi, C.Y., Gupta, R., Hassan, J., Arulanandam, B., & AbuBakar, S. (2019). CPAF, HSP60 and MOMP antigens elicit pro-inflammatory cytokines production in the peripheral blood mononuclear cells from genital Chlamydia trachomatis-infected patients. *Immunobiology*, 224(1):34-41. (IF: 2.798)
- Crisci, E., Ellegård, R., Svanberg, C., Nyström, S., Hellbom, J., Lifson, J.D., Shankar, E.M., Eriksson, K., & Larsson, M. (2019) HSV-2 cellular programming enables productive HIV infection in dendritic cells. *Frontiers in Immunology*, (In press)(IF: 4.716)
- Dhanya Thomas, T.T., Dinakar, C., & Puthur, J.T. (2019) Effect of UV-B priming on the abiotic stress tolerance of stress-sensitive rice seedlings: Priming imprints and cross-tolerance. *Plant Physiology and Biochemistry*, 147: 21-30. (IF: 3.404)
- Dhanya Thomas, T.T., Dinakar, C., & Puthur, J.T. (2019) UV-B priming of *Oryza sativa* var. Kanchana seedlings augments its antioxidative potential and gene expression of stress-response proteins under various abiotic stresses. *3Biotech*, 9: 375. (IF: 1.786)
- Ganesh, P.S., Vishnupriya, S., Vadivelu, J., Mariappan, V., Vellasamy, K.M., & Shankar, E.M. (2019) Intracellular survival and innate immune evasion of *Burkholderia cepacia*: Improved understanding of quorum sensing-controlled virulence factors, biofilm and inhibitors. *Microbiology & Immunology*, (In press)(IF: 1.335)
- Kannan, M., Ahmad, F., & Saxena, R. (2019) Platelet activation markers in evaluation of thrombotic risk factors in various clinical settings. *Blood Reviews*, 2019;37:100583 (IF: 6.600)
- Liu, X., Challabathula, D., Quan, W., & Bartels, D. (2019). Transcriptional and metabolic changes in the desiccation tolerant plant *Craterostigma plantagineum* during recurrent exposures to dehydration. *Planta*, 249:1017-1035. (IF: 3.060)
- Murugesan, A., Ibegbu, C., Styles, T.M., Jones, A.T., Jagadeesh Reddy, P.B., Shanmugasundaram, U., Shankar, E.M., Amara, R.R., & Velu, V. (2019) Highly activated MAIT cells are associated with control of simian-human immunodeficiency virus infection. *Frontiers in Immunology* (In press)(IF: 4.716)
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DLS BOOK CHAPTERS 2019-20

- Chattopadhyay I. Evaluation of environmental contaminants and natural products: A human health perspective/environmental pollutants and risk of cancer - Pp. 24-46 (23): 2019, DOI: 10.2174/9789811410963119 0101. Bentham Science Publishers, Singapore; eISBN: 978-981-14-1096-3, 2019; ISBN: 978-981-14-1095-6
- Shankar, E.M., Saeidi, A., Velu, V., & Larsson, M. Mechanistic insights on immune senescence, exhaustion and immune activation in HIV-tuberculosis co-infection. In: *Handbook of Immunosenescence* (Eds. T. Fulop, C. Franceschi, K. Hirokawa, G. Pawelec) 2nd Edition, 2019. Springer Science+Business Media B.V. ISBN-978-3-319-64597-1.
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Submission of Manuscripts

Students from the School of Life Sciences-CUTN interested to write scientific articles for Access Biology are required to send their manuscripts/descriptions directly to the Editor-in-Chief at hodlifesciences@cutn.ac.in.

The soft copy of prospective articles should not exceed 300 words. The manuscript will be checked for plagiarism before consideration of review by expert members. The decision of the editorial board members will be final for consideration of publication in Access Biology. Prospective authors must ensure that the manuscript deemed for submission shall be within the scope of biological sciences or allied biomedical science disciplines.

Suggestions for improvement are welcome from readers.

The editorial team also solicits Student Editors from the upcoming April 2020 issue onwards.



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