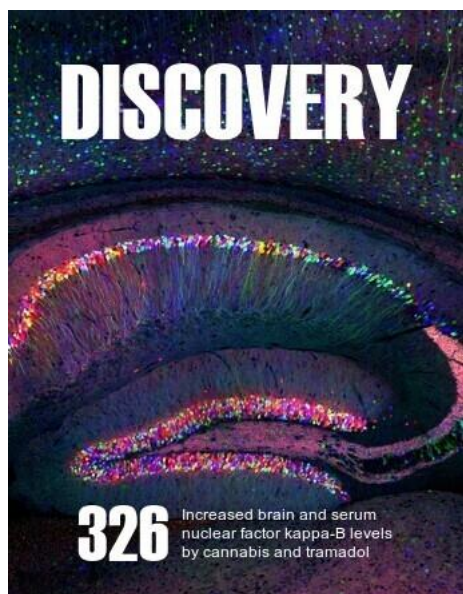


# DISCOVERY

## About the Cover



Nuclear factor kappa-B (NF- $\kappa$ B) is transcription factor that controls the expression of several genes involved in inflammation and immunity. The aim of the present study was to evaluate the levels of NF- $\kappa$ B in brain and serum of rats treated with *Cannabis sativa* resin, tramadol or their combination. Rats were treated with cannabis resin extract (5, 10 or 20 mg/kg) (expressed as  $\Delta^9$ -tetrahydrocannabinol), tramadol (5, 10 or 20 mg/kg) or tramadol (10 mg/kg) combined with cannabis (5, 10 or 20 mg/kg) subcutaneously (s.c.) once a day, for 6 weeks. Results showed that NF- $\kappa$ B was significantly increased in the brain by 21.8-84.3% after treatment with 5-20 mg/kg cannabis and in serum by 37.7% and 70.8% after treatment with 10 or 20 mg/kg cannabis. NF- $\kappa$ B was also significantly increased in the brain by 25.7-48.2% following treatment with 5-20 mg/kg tramadol and in serum by 34.8% after 20 mg/kg tramadol. After the combined administration of both cannabis and tramadol, NF- $\kappa$ B levels were significantly raised in the brain by 45.5-101.2% and in serum by 40.7-91.8%. The increase in brain tissue and serum levels of NF- $\kappa$ B in rats treated with cannabis and/or tramadol suggest that NF- $\kappa$ B may play a role in the pathogenesis of neuronal injury by these drugs of abuse. (Ref: Abdel-Salam OME, Youness ER. Increased brain and serum nuclear factor kappa-B levels by cannabis and tramadol. *Discovery* 2023; 59: e19d1015).

**Variations in soil pH, N, P and K due to influence of rates, split applications of nitrogen fertilizer and ratoon crop of sugarcane varieties**

G Oindo Achieng, P Okinda Owuor , C Ogutu Omondi , G Onyango Abayo

Fertilizer Best Management Practices (BMPs) include soil testing that is performed to determine the availability of essential elements for profitable and productive yields of crops. The objective of this research was to establish the influence of nitrogen fertilizer either applied in single or split to ratoon crops of new (D8484) and old (CO421) varieties on soil nutrient levels. The experimental design was a 2x4x3 split split-plot on a continuation of research at the Sugar Research Institute, Opapo, where the plant crop received similar treatments. Analysis of soil nutrient levels was done using recommended methods. The results revealed that despite the randomization of the treatments, the pH was lower ( $p \leq 0.05$ ) in D8484 plots than the CO421 plots. However, both at the start and harvest of ratoon, the pH remained within the range suitable for sugarcane growing. A general decline in soil pH with high rates of nitrogen was observed. Precisely, there was a higher pH decline at 15-30 cm soil depth compared to 0-15 cm soil depth. On the other hand, splitting nitrogenous fertilizer application did not affect the soil pH. The varieties did not influence soil nitrogen levels at the beginning of the ratoon and harvest. Although soil nitrogen level was low where nitrogen had not been applied, this was only significant ( $p \leq 0.05$ ) for variety CO421 at the start of ratoon. Splitting nitrogen application recorded a significantly ( $p \leq 0.05$ ) lower effect on soil nitrogen levels for variety D8484 than CO421 at the start of ratoon at 15-30 cm soil depth. There were no significant effects of the treatments on soil P levels. Soil K considerably ( $p \leq 0.05$ ) dropped due to variety D8484 at 0-15 cm at harvest and both start of ratoon and harvest at 15- 30 cm soil depth. It is concluded that variety D8484 acidifies the soil more than CO421. However, the pH endured the levels appropriate for sugarcane growth both at the start of the ratoon and harvest. Current agronomic practices did not lead to much change in soil N and P. The study recommends that soil sampling and testing should not be frequently done since the treatment effects on soil physico-chemical parameters could manifest after a long period.

*Discovery*, 2023, 59, e13d1013

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**Relish of Beng saga (*Centella asiatica* (L.) Urb.): A nutraceutical food of the Bhuian tribe**

Sradha Swarupa Nayak, Sanath Kumar N, Sanjeet Kumar

The number of diseases and disorders is increasing day-by-day. Therefore, proper nutrition and medicines have become a major necessity for mankind. Synthetic medicines have side effects. So now a day, people are shifting their needs from manmade to classical wild therapeutic agents. There are some plants having both nutritional and medicinal properties known as nutraceuticals. One of the best examples of a nutraceutical plant is Beng saga (*Centella asiatica*). Beng saga is commonly found in moist areas usually nearby rivers, wetlands and streams. Keeping the importance of Beng saga, information was gathered about the food and medicinal values from the Bhuian tribe of the Bonai Forest Division (BFD), Sundargarh, Odisha. It was noticed that the elder members of the Bhuian tribe have good knowledge about the collection of the beng saga, its cooking process and its various health benefits. It was observed that the tribal people consume leaves of beng saga to cure fever and bloating. Normally, it can be served as an appetizer along with delicious pakhala bhata (fermented water rice). Apart from this, it has numerous health benefits which call for its documentation and value addition. In the present study, the authors have discussed the traditional tribal cooking process of the beng saga, its food, medicinal and market value. The communication brings attention to the importance of wild food.

*Discovery*, 2023, 59, e14d1014

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**Diversity of weed flora of eight selected crop fields in Joypurhat district of Bangladesh**

Md Mozahidul Islam, AHM Mahbubur Rahman

From October 2021 to September 2022, weed flora variation was studied in eight selected crop fields in the Joypurhat district of Bangladesh. These fields included rice, wheat, potato, maize, brinjal, chili, black gram and sugarcane. There was a total of 77 weed species that belonged to 27 families were recorded and described below 53 genera. Asteraceae accounted for 20.78%, Amaranthaceae for 6.49%, Poaceae for 15.58%, Euphorbiaceae for 6.49%, Cyperaceae for 3.89%, Marsileaceae for 6.49% and Solanaceae for 3.89% of the influential families. Among the species that were found *Anagalis arvensis*, *Euphorbia helioscopia*, *Glinus oppositifolia*, *Senna tora* and *Ludwigia perennis* were all listed as rare species. The survey found the most species in sugarcane fields (94.80%), followed by wheat fields (84.42 %), maize fields (81.81%), brinjal fields (77.92 %), chili fields (68.83 %), potato fields (64.96 %), rice fields (46.75%) and black gram fields (45.45 %). Monocot species had less influence than dicot species. Scientific name, local name, flowering time and family name were recorded of each species.

*Discovery*, 2023, 59, e15d1017

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**First photographic record of albinism in chital (*Axis axis*) from Chitwan National Park, Nepal**

Abhinaya Pathak, Arjun Tamang, Bishal Sintan, Sujan Khanal, Bikash Pathak, Prashamsa Paudel

Chital or spotted deer (*Axis axis*) is one of the important cervid in Chitwan National Park of Nepal. They are easily observed roaming around. However, albino chital is barely found in the park. This study presents the first photographic report of albino chital in buffer zone community forest of the park. Albinism is associated with melanin and rare mutation.

*Discovery*, 2023, 59, e16d1018

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## Aquatic vascular flora at Sadar Upazila of Chapai Nawabganj district, Bangladesh

Md Haiule Basar, AHM Mahbubur Rahman

The current study concentrated on the aquatic plants and their conservation status in both naturally occurring and artificially created wetlands across Chapai Nawabganj Sadar Upazila. The research was done from October 2021 to September 2022. In the current study, a total of 35 species of aquatic plants were discovered in Chapai Nawabganj Sadar Upazila. These belong to 28 families and 32 genera. Scientific names, local names, families, divisions, habits, habitats, uses and status are all given for each species. Aquatic ecological habitat analysis reveals variances. Among them 34.78% of the species prefer to grow close to the edge of the water, followed by 8.70% that grow underwater, 10.87% that emerge, 13.04% that float freely and 32.61% that grow rooted in the water. When it comes to submerged species, they bloom on the water's surface. Fruits are submerged in water until they reach maturity after pollination. Of these, 50% of the species are used as fodder, 23.91% are used medicinally, 2.17% are used in aquariums, 6.52% are used as vegetables, 6.52% are edible and 10.87% are used as fish food in the study area. Varied aquatic plant species have different densities in their habitats. According to analysis, there were 10.87% species that were abundant, 43.48% common and 45.65% rare aquatic plant species in the research region. From the research region, the investigation identified several rare aquatic plant species was recorded. These are *Ottelia alismoides* (Panikola), *Enhydra fluctuans* (Titidata), *Centrostachys aquatica*, *Trapa bispinosa* (Singara), *Nelumbo nucifera* (Paddo), *Nymphaea pubescens* (Sadashapla), *Oenanthe javanica* (Panidhone) and *Nymphaea rubra* (Lal shapla). Due to local demand for use, there are relatively few of these species left in the wild. Conservation efforts must be made to protect these species. If not, the species will eventually disappear entirely from the wild. A preliminary survey conducted in Chapai Nawabganj Sadar Upazila revealed that making informed judgments about the state of aquatic plants is exceedingly challenging. The findings of the current study demonstrated that Chapai Nawabganj Sadar Upazila's water habitats are floristically abundant in terms of area and that the district is also the home to numerous endangered aquatic plant species in Bangladesh. Further long-term study is required to create a comprehensive inventory of the aquatic flora in Chapai Nawabganj Sadar Upazila.

*Discovery*, 2023, 59, e17d1019

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## ENGINEERING

### On the two different formulations of mechanical energy in driven oscillations

Jeong Ryeol Choi, Ji Nny Song

We introduce two different formulae of mechanical energy of harmonic oscillators driven by an external force in this work. In the first formula, the energy is composed of two terms, i.e., the kinetic energy and quadratic-potential-energy terms. Another formula is that it is just the same as the Hamiltonian itself. While the first kind of energy reflects the mechanical energy remained in the system at a certain instant of time, the second energy depends on the linear potential term as well as the terms quadratic in canonical variables. Time evolution of the two energies is analyzed for two specific cases of which driving force is different from each other. The second kind of energy can be negative, whereas the first kind is always positive. The second formula of energy has generally been used in optimal control theory in relation with shortcuts to adiabaticity.

*Discovery*, 2023, 59, e18d1023

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## MEDICINE

### Increased brain and serum nuclear factor kappa-B levels by cannabis and tramadol

Omar ME Abdel-Salam, Eman R Youness

Nuclear factor kappa-B (NF- $\kappa$ B) is transcription factor that controls the expression of several genes involved in inflammation and immunity. The aim of the present study was to evaluate the levels of NF- $\kappa$ B in brain and serum of rats treated with *Cannabis sativa* resin, tramadol or their combination. Rats were treated with cannabis resin extract (5, 10 or 20 mg/kg) (expressed as  $\Delta^9$ -tetrahydrocannabinol), tramadol (5, 10 or 20 mg/kg) or tramadol (10 mg/kg) combined with cannabis (5, 10 or 20 mg/kg) subcutaneously (s.c.) once a day, for 6 weeks. Results showed that NF- $\kappa$ B was significantly increased in the brain by 21.8-84.3% after treatment with 5-20 mg/kg cannabis and in serum by 37.7% and 70.8% after treatment with 10 or 20 mg/kg cannabis. NF- $\kappa$ B was also significantly increased in the brain by 25.7-48.2% following treatment with 5-20 mg/kg tramadol and in serum by 34.8% after 20 mg/kg tramadol. After the combined administration of both cannabis and tramadol, NF- $\kappa$ B levels were significantly raised in the brain by 45.5-101.2% and in serum by 40.7-91.8%. The increase in brain tissue and serum levels of NF- $\kappa$ B in rats treated with cannabis and/or tramadol suggest that NF- $\kappa$ B may play a role in the pathogenesis of neuronal injury by these drugs of abuse.

*Discovery*, 2023, 59, e19d1015

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### Review of cases of diarrhea among infants in Africa: Causative organisms, detection methods and infant age distribution

Abidemi David Adetulubo, Oluwole Moses David, Pius Olalekan Adeola

Diarrhoea is one of the most common health problems in Africa. This faecal-orally transmitted disease is responsible for the death of 1.9 million children under five years with a high proportion from resource-poor nations. The objective of this study is to review existing articles on the incidence of diarrhoea among infants in Africa. In this study different databases which include PubMed, Google Scholar and CrossRef were searched for articles published in Africa and the year range between 2000 to 2020. The study design included the population involved (in the hospital and community) and the results were reviewed. In this study, a total of 234,568 subjects were out of which 57,222 were positive. Infants with the age range from 25 to 60 months were diagnosed in this study while the least number was within the age group of 13-24 months. The sex distribution of the children diagnosed with diarrhoea was very close. A total of diagnosed children reported were from Nigeria (n = 32,443 (56.7%)), followed by Kenya with 6,110 infected children. The last occurrence was reported in Namibia with 35 cases. Data from the hospital had the highest occurrence. Among the causative agents detected, viruses had the highest occurrence followed by protozoa. Polymerase Chain Reaction (PCR) followed by cultural methods were the two main methods used in the diagnosis of the infection. This study shows the incidence rate and occurrence of infantile in African countries, the causative agents responsible for diarrhoea among infants and their respective distribution.

*Discovery, 2023, 59, e20d1016*

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## SOCIAL SCIENCE

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### **Implementation challenges of enterprise resource planning systems in the Tanzania mining industry: Evidence from Barrick mining company Tanzania**

Richard Mbogo, Juma Mshana

The study assessed the implementation challenges of ERP systems in the Tanzania mining industry. Mixed research approach was employed, in that regard, case study design was used. Since the approach of the study was qualitative, then the content/ thematic analysis was employed. However, the quantitative data collected were analyzed by using Statistical Packaging for Social Sciences (SPSS). The study finding shows that, despite of the ERP success, the implementation of it has been constrained by some challenges. For example, the challenges which were identified by the respondents were high cost of implantation (87.50%) due to the investment of newly acquired technology which requires investment of a lot of money on which many organizations cannot afford it. Also, the IT infrastructures in the country have been reported by respondents to be incapable of accommodating most of new technologies (84.38%). Furthermore, the findings reveal that the performance and acquisition of ERP system was constrained by lack of enough and qualified personnel which make difficult to make implementation of its at large scale (71.88%). The study concludes that, the system is important to be adopted and applied not only on the mining sector but also in all sectors of the economy. The study recommends that, the management accountants need to be able to communicate with the management team and synthesize and explain the results (the impact of the financial data) in a way that can be easily understood. Management accountants need to take on a partnership role with the managers.

*Discovery, 2023, 59, e21d1020*

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### **Effect of national internet data center colocation service on digital transformation in Tanzania**

Lilian H Mungure, Juma Mshana

The study assessed the effect of NIDC (National Internet Data center) colocation service on digital transformation in Tanzania. The study specifically focused on the effect of NIDC colocation on digital infrastructure and it was guided by six predictors tested towards digital transformation namely cost, power, uptime, reliability, support services and connectivity. Explanatory design was applied using relationship testing between study variables with data collected using questionnaire from a sample of 80 respondents who were employees of the mentioned entity. The collected results were computed in SPSS data sheet version 24.0 to generate statistical tests to present the results. The relationship testing between study variable was facilitated using multiple regression analysis. Findings indicated that five of the tested predictors with the exception of cost had significant effect on advancing digital transformation. The implication of the results is that digital transformation through data center colocation is affected by power, uptime, reliability, support services and connectivity.

*Discovery, 2023, 59, e22d1021*

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### **Challenges hindering effective implementation of sciences, maths and ICT in secondary schools in Tanzania**

K A Nihuka

This study investigated challenges that still hinder effective implementation of sciences, maths and ICT subjects from head of schools' perspective despite recent significant investments in secondary schools in Tanzania. The study used quantitative descriptive survey design where quantitative data from a sample of 275 head of schools drawn using random sampling technique from public and private secondary schools in 15 regions were collected using structured questionnaire. Analysis using SPSS have revealed that over 80% of the head of schools experience the following 4 most critical challenges that hinder effective implementation of sciences, maths and ICT subjects in their secondary schools; shortage of teachers, shortage of laboratory technicians, shortage of laboratories and shortage of facilities. According to the head of schools, the challenges hinder not only effective implementation of sciences, maths and ICT subjects in the schools but also negatively affect students learning and

academic outcomes. Appropriate conclusions and recommendations are suggested based on the findings and experience from the schools.

*Discovery*, 2023, 59, e23d1022