The Lord is like a strong tower, where the righteous can go and be safe.
Proverbs 18:10

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DIYARYO
KABITENYO
Nagmamalasakit sa lalawigan

Be alert, stand firm in the faith, be brave, be strong.
1 Corinthians 16:13

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DTI 4-A begins the distribution of starter kits in Cavite under the LSP-NSB Program

The DTI develops the LSP-NSB to support a grassroots approach to enterprise development, increase the awareness of Barangay Officials about the services offered by the Department through its Negosyo Centers, and conduct business development assistance and services in barangays. MSME beneficiaries of the LSP-NSB Program may include sole proprietors, cooperatives, or sectoral associations that are located in identified barangays, including those in Local Communist Armed Conflict (LCAC) affected areas, vulnerable communities such as the indigenous people, refugees, and stateless persons. Priority assistance is given to MSMEs affected by natural and human-induced calamities, including health disasters arising from epidemics and pandemics.

External Affairs Administrator Victor Dihan, on behalf of Amadeo Mayor Redel John Dionisio, warm-

Turn to page 2

The Department of Trade and Industry Region 4-A distributed starter kits for sari-sari store, carinderia, food manufacturing equipment, salon and barbershop, laundry, baking, tailoring, and printing supplies to 20 beneficiaries in Amadeo and 15 beneficiaries in Magallanes, Cavite worth PhP 640,000 in total under the Livelihood Seeding Program – Negosyo Serbisyo sa Barangay on July 29 and August 3, respectively.

Public transport banned in Cavite under MECQ

Despite his objections to what he called a "very unwise" move, Gov. Jonvic Remulla said last Aug. 3 he will implement the ban on public transportation in the province.

The ban on public transport is in line with the directive of the Inter Agency Task Force on Emerging Infectious Diseases (IATF) for areas under the modified enhanced community quarantine (MECQ), such as Cavite and Metro Manila, in order to arrest the community contagion.

"Ikinalulungkot ko po sabihin na ang IATF ay mahigpit na binalaan ang ating provincial commander ng PNP (Philippine National Police) na ma higpit na patupadin ang 'no public transportation policy'," Remulla said in a Facebook post.

"This is a very unwise decision but I will respect it," he said.

The governor lamented that the manufacturing industry in

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DIYARYO KABITENYO

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GENER BARCO
Operations Manager

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Artificial organelles created to control cellular behavior

Biomedical engineers at Duke University have demonstrated a method for controlling the phase separation of an emerging class of proteins to create artificial membrane-less organelles within human cells. The advance, similar to controlling how vinegar forms droplets within oil, creates opportunities for engineering synthetic structures to modulate existing cell functions or create entirely new behaviors within cells.

The results appear online on August 3 in the journal Nature Chemistry.

Proteins function by folding into specific 3-D shapes that interact with different biomolecular structures. Researchers previously believed that proteins needed these fixed shapes to function. But in the last two decades, a large new class of intrinsically disordered proteins (IDPs) have been discovered that have large regions that are "floppy" – that is, they do not fold into a defined 3-D shape. It is now understood these regions play an important, previously unrecognized role in controlling various cellular functions.

IDPs are also useful for biomedical applications because they can undergo phase transitions – changing from a liquid to a gel, for example, or from a soluble to an insoluble state, and back again – in response to environmental triggers, like changes in temperature.

(PUBLIC... from page 1)

vincial commander ng PNP (Philippine National Police) na mahigpit na patuparin ang 'no public transportation policy,'" Remulla said in a Facebook post.

"This is a very unwise decision but I will respect it," he said.

The governor lamented that the manufacturing industry in the province will be "severely affected" by the order.

"Sa aking mga kababayan, ako po ay humihingi ng paumanhin. I tried my best to serve your interest, as well as the province and the country," said Remulla.

"Unfortunately, the people in charge see things differently," the official added.

The quarantine status in Cavite, along with Metro Manila, Rizal, Bulacan, and Laguna, was reverted to MECQ from August 4 to 18, following the appeal of the medical community to impose stricter lockdown measures in Metro Manila and nearby areas amid the rising cases of the coronavirus disease under relaxed community quarantine.

(DTI... from page 1)

welcomed the DTI Team, acknowledging the presence of DTI-Regional Operations Group Assistant Secretary Dominic Tolentino, Jr. and DTI 4-A Director Marilou Q. Toledo who, according to Ms. Dillan, have been in the service of Caviteños for a significant amount of time. Likewise, recognition was given to Mr. [illegible] of the Business Permit and Licensing Office, Ms. Lynette [illegible] of the Public Employment Service Office, and the Barangay Captains of Brgy. [illegible], [illegible], [illegible] and [illegible] Amador for their cooperation in the execution of the project.

During her message, Director Toledo emphasized her hopes for the success of the LSP-NSB program, underscoring its positive effect in the barangay-level economy.

"Ang layunin ng DTI, sa pamamagitan ng LSP-NSB, ay makapag-ambag sa [illegible] ng maliit na negosyo. At mula sa maliit na negosyo na ito, [illegible] ang [illegible] na [illegible] ng ating mga ka-barangay," said Dir. Toledo.

She added, "Let us help ourselves, so we can also help our economy to move forward. Magtulong-tulong po tayo at huwag nating hayaang maging hadlang ang pandemic sa ating kabuhayan."

Meanwhile, Asec. Tolentino delivered an inspirational message highlighting the importance of business opportunities granted by the government in this time of pandemic.

"During COVID-19, ang ating mga kababayan ay [illegible] [illegible] ng [illegible] ng kabuhayan at [illegible] pa ang mga [illegible] nating micro, small, and medium enterprises," he stated.

In her speech, Ms. [illegible] Mayor [illegible] Angeli [illegible] expressed her gratitude to DTI for providing livelihood assistance to their community.

"The unwavering support of DTI to [illegible] is very much appreciated. We hope that our beneficiaries will make use of the starter kits well and eventually grow their businesses," said Mayor Bautista.

Amid the COVID-19 pandemic, the LSP-NSB program targets to benefit 27 barangays of the 4th and 5th class municipalities in Cavite this year.

REPUBLIC OF THE PHILIPPINES
FOURTH JUDICIAL REGION
REGIONAL TRIAL COURT
BRANCH 15, NAIC, CAVITE

HOME DEVELOPMENT MUTUAL FUND (Pag-IBIG Fund),
Mortgagee/Petitioner,

-versus-

FNC - 2020-[illegible]
For: Extra-Judicial Foreclosure of Real Estate Mortgage under Act 3135, as Amended by Act No. 4118

CHRISTIAN BERNARD BOLDAN ROXAS married to MARIANNE MAMAYSON ROXAS,
Mortgagors/Respondents.

AMENDED NOTICE OF EXTRA-JUDICIAL SALE

Upon Extra-Judicial petition for sale under Act 3135, as amended by Act 4118 filed by **HOME DEVELOPMENT MUTUAL FUND (Pag-IBIG Fund)** mortgagee-petitioner, a government financial institution duly organized and existing under and by virtue of Republic Act No. 9679 with principal office at 12th Floor HLP Business Solutions Center, No. 409 Shaw Blvd., Mandaluyong City, which mortgage against **CHRISTIAN BERNARD BOLDAN ROXAS married to MARIANNE MAMAYSON ROXAS**, with postal address at [illegible] Cavite, to satisfy the mortgage indebtedness which as of **January 8, 2020** amounts to **FOUR HUNDRED THIRTY TWO THOUSAND SIX HUNDRED TWELVE PESOS & 07/100 (P432,612.07)** Philippine currency, inclusive of interest and other charges, the undersigned Sheriff will sell at public auction on **September 8, 2020 at 10:00 o'clock** in the morning or soon thereafter at the main entrance of the Office of the Ex-Officio Sheriff at the Hall of Justice formerly Mayor [illegible] Memorial Hall, Naic, Cavite, to the highest bidder, for cash and in Philippine currency, the following described property with all the improvements standing thereon, to wit:

TRANSFER CERTIFICATE OF TITLE NO. 057-2017[illegible]

A PARCEL OF LAND (LOT [illegible], BLOCK [illegible] OF THE CONSOLIDATION SUBDIVISION PLAN [illegible], BEING A PORTION OF LOT [illegible] [illegible] SITUATED IN BARANGAY TIMALAN, MUNICIPALITY OF NAIC, PROVINCE OF CAVITE, ISLAND OF LUZON. [illegible] **CONTAINING AN AREA OF SEVENTY THREE (73) SQUARE METERS** [illegible]

All sealed bids must be submitted to the undersigned on the above stated time and date.

Prospective bidders or buyers are hereby enjoined to investigate for themselves the title herein above-described and the encumbrances thereon, if any there be.

In case of the absence of any participating bidder on the above-scheduled date, said auction sale will be reset and finally held on **September 15, 2020** at the same place and time above mentioned.

Naic, Cavite, July 7, 2020.

(Sgd.) [illegible]
Sheriff IV

HOME DEVELOPMENT MUTUAL FUND (Pag-IBIG Fund)
12th Floor HLP Business Solutions Center
No. 409 Shaw Blvd., Mandaluyong City

[illegible]

Publication : DIYARYO KABITENYO
Dates : [illegible]

REPUBLIC OF THE PHILIPPINES
FOURTH JUDICIAL REGION
REGIONAL TRIAL COURT
OFFICE OF THE CLERK OF COURT
TRECE MARTIRES CITY

CHINA BANK SAVINGS, INC.,
Mortgagee,

-versus-

Foreclosure Case No. F-028-20

SPS. CHARLYN KAE C. PENILLA AND FERDINAND V. PENILLA,
Mortgagor/s.

NOTICE OF EXTRA-JUDICIAL SALE

Upon Extra-Judicial Petition for Sale under Act 3135, as amended by Act. 4118, filed by Mortgagee, **CHINA BANK SAVINGS, INC.**, with business address at 314 Sen. Gil. J. Puyat Avenue, Makati City against the Mortgagor/s, **SPS. CHARLYN KAE C. PENILLA AND FERDINAND V. PENILLA**, with residence and postal address at 9013 Oagu St., Orgas Subd., Brgy. Gulang Gulang, Lucena City to satisfy the mortgage indebtedness as of January 11, 2020 amounts to **TWO MILLION NINE HUNDRED SEVENTY NINE THOUSAND ONE HUNDRED SEVENTY SEVEN PESOS and 54/100 (P2,979,177.54)**, Philippine Currency, including interest, penalties, and other charges as of said date but exclusive of all other expenses incidental to this foreclosure and sale; the undersigned Sheriff will sell at public auction on **October 1, 2020** at 10:00 o'clock in the morning at the main entrance of the Government Center Bldg. located at the Provincial Capitol Compound, Trece Martires City, to the highest bidder of CASH and in Philippine Currency, the following described property with all the improvements thereon, to-wit:

TRANSFER CERTIFICATE OF TITLE NO. 057-2018[illegible]

IT IS HEREBY CERTIFIED that certain land situated in BRGY. OF DE FUEGO, MUN. OF GEN. TRIAS, PROVINCE OF CAVITE, ISLAND OF LUZON, bounded and described as follows:

A PARCEL OF LAND (LOT 25, BLK. 60 OF THE CONS. SUBD. PLAN PCS-04-011869, BEING A PORTION OF CONS. OF LOTS 2680-G-1 TO K, ALL OF (LRC) PSD-222174, LOT 2680-J-2, (LRC) PSD-101732, LOTS 2680-H, I AND K, ALL OF PSD-33619, LRC REC. NO.) SITUATED IN THE BRGY. OF DE FUEGO, MUN. OF GEN. TRIAS, PROVINCE OF CAVITE, IS OF LUZON. BOUNDED ON THE NW., ALONG LINE 1-2 BY LOT 25, ON THE NE., ALONG LINE 2-3 BY LOT 26, BOTH OF BLK. 60; ON THE SE., ALONG LINE 3-4 BY THE ROAD LOT [illegible] M. WIDE); ON THE SW., ALONG LINE 4-1 BY LOT 26, BLK. 60, ALL OF THE CONS. SUBD. PLAN BEGINNING AT A PT. MARKED "1" ON PLAN/XXX CONTAINING AN AREA OF FORTY ONE SQ. METERS AND FORTY SEVEN SQ. DECIMETERS (41.47).

TRANSFER CERTIFICATE OF TITLE NO. 057-2018[illegible]

IT IS HEREBY CERTIFIED that certain land situated in BRGY. OF DE FUEGO, MUN. OF GEN. TRIAS, PROVINCE OF CAVITE, ISLAND OF LUZON, bounded and described as follows:

A PARCEL OF LAND (LOT [illegible], BLK. 60 OF THE CONS. SUBD. PLAN, PCS-04-011869, BEING A PORTION OF THE CONS. OF LOTS 2680-G-1 TO K, ALL OF (LRC) PSD-222174, LOT 2680-J-2, (LRC) PSD-101732, LOTS 2680-H, I & K, ALL OF PSD-33619, L.R.C. REC. NO.) SITUATED IN THE BRGY. OF DE FUEGO MUN. OF GEN. TRIAS, PROVINCE OF CAVITE, IS. OF LUZON. BOUNDED ON THE NE., ALONG LINE 1-2 BY LOT 12, BLK. 60; ON THE SE., ALONG LINE 2-3 BY ROAD LOT [illegible] M. WIDE); ON THE SW., ALONG LINE 3-4 BY LOT 28; ON THE NW., ALONG LINE 4-1 BY LOT 27, BOTH OF BLK. 60, ALL OF THE CONS.-SUBD. PLAN. BEGINNING AT A PT. MARKED "1" ON PLAN/XXX **CONTAINING AN AREA OF FORTY ONE SQ. METERS AND FORTY SEVEN SQ. DECIMETERS (41.47).**

All sealed bids must be submitted to the undersigned on the above-stated time and date.

In the event the public auction should not take place on the said date and time, it shall be held on **October 8, 2020** without further notice.

Prospective bidders/buyers are hereby required to investigate for themselves the title to the said property and encumbrances thereon, if any there be.

Trece Martires City, **July 24, 2020.**

(Sgd.) **RICARDO A. TOLEDO**
Sheriff IV

Copy Furnished:

CHINA BANK SAVINGS, INC.,
314 Sen. Gil J. Puyat Avenue, Makati City

SPS. CHARLYN KAE C. PENILLA AND FERDINAND V. PENILLA,
9013 Oagu St., Orgas Subd.,
Brgy. Gulang Gulang, Lucena City

WARNING: IT IS ABSOLUTELY PROHIBITED TO REMOVE, DEFACE, OR DESTROY THIS NOTICE OF EXTRA-JUDICIAL SALE ON OR BEFORE THE DATE OF SALE

Publication : DIYARYO KABITENYO
Dates : August 3, 10 & 17, 2020

Scientists discover the switch that makes human brown fat burn energy

An international research team have discovered how to activate brown fat in humans, which may lead to new treatments for type 2 diabetes and obesity.

The results of the collaboration between the Centre de recherche du Centre hospitalier universitaire de Sherbrooke (CRCHUS) and the Novo Nordisk Foundation Center for Basic Metabolic Research (CBMR) at the University of Copenhagen were published August 5, 2020 in Cell Metabolism.

Brown fat burns energy and generates heat — a process called thermogenesis — after being activated by cold temperature or chemical signals.

REPUBLIC OF THE PHILIPPINES
FOURTH JUDICIAL REGION
REGIONAL TRIAL COURT
OFFICE OF THE CLERK OF COURT
TRECE MARTIRES CITY

HOME DEVELOPMENT MUTUAL FUND,
Mortgagee,

Foreclosure Case No. F-088-20

-versus-

MS. ALMA L INDANGAN,
Mortgagor.

NOTICE OF EXTRA-JUDICIAL SALE

Upon Extra-Judicial Petition for Sale under Act 3135, as amended by Act. 4118, filed by Mortgagee, **HOME DEVELOPMENT MUTUAL FUND,** with business address at 12th Floor, JELP Business Solutions Center, No. 400 Shaw Boulevard, Mandaluyong City, against the Mortgagors, **MS. ALMA L INDANGAN,** with residence and postal address: LOT 20 BLK 2 PH 2 TIERRA NEVADA BRGY SAN FRANCISCO GEN TRIAS CAVITE to satisfy the mortgage indebtedness as of February 14, 2020 amounts to **EIGHT HUNDRED EIGHTY NINE THOUSAND THIRTY PESOS and 15/100 (P889,030.15),** Philippine Currency, including interest, penalties, and other charges as of said date but exclusive of all the other expenses incidental to this foreclosure and sale, the undersigned Sheriff will sell at public auction on **October 1, 2020** at 10:00 o'clock in the morning at the main entrance of the Government Center Bldg. located at the Provincial Capitol Compound, Trece Martires City, to the highest bidder for CASH and in Philippine Currency, the following described property with all the improvements thereon, to wit:

TRANSFER CERTIFICATE OF TITLE
No. 697-2014004473

A PARCEL OF LAND (LOT 24 BLK 2 OF THE CONS.-SUBD. PLAN PCS-04-012451 BEING A PORTION OF THE CONS. ALL OF THE LOTS OF BLKS. 80 TO 101 AND LOTS 6-A, 15-B, 17 TO 21, 23-A, 22-23, 25-A, 24, 24-A, 24-B, 25, 25-A, 26 TO 28, 28-A, 28-B, 29 TO 31, 31-A, 32 TO 35, 35-A, 36, 40-B ALLEYS 19 TO 26, 28-A, 30 TO 39, 39-A, 40, 40-A, 41, 41-A, 42 & 43, ALL OF PCS-04-011037, L.R.C. REC. NO.), SITUATED IN THE BRG. OF SAN FRANCISCO, MUN. OF GEN. TRIAS, PROV. OF CAVITE, IS OF LUZON, BOUNDED IN THE N., ALONG 1-2 BY LOT 23; ALONG LINE 2-3 BY LOT 25, ON THE E., ALONG LINE 3-4 BY LOTS 26, ALL OF BLK. 2; ON THE S., ALONG LINE 4-5 BY RD. LOT 3; AND ON THE W., ALONG LINE 5-1 BY LOT 22 BLK. 2, ALL OF THE CONS.-SUBD. PLAN, BEGINNING AT PT. MARKED "1" ON THE PLAN **XXX CONTAINING AN AREA OF ONE HUNDRED TWO (102) SQUARE METERS XXX.**

All sealed bids must be submitted to the undersigned on the above-stated time and date.

In the event the public auction should not take place on the said date and time, it shall be held on **October 8, 2020** without further notice.

Prospective bidders/buyers are hereby enjoined to investigate for themselves the title to the said property and encumbrances thereon, if any there be.

Trece Martires City, **July 24, 2020.**

(Sgd.) **RICARDO A. TOLEDO**
Sheriff IV

Copy Furnished:

HOME DEVELOPMENT MUTUAL FUND
12th Floor, JELP Business Solutions Center
No. 400 Shaw Boulevard, Mandaluyong City

MS. ALMA L INDANGAN
LOT 20 BLK 2 PH 2 TIERRA NEVADA
BRGY SAN FRANCISCO GEN TRIAS CAVITE

ATTY. CAESAR S. EUROPA
24K ACCOUNTS CONSULTANT, INC.
3F Faes Insul College Bldg., No. 13, Pittsburgh St.,
Brgy. Silangan, Cubao, Quezon City

WARNING: IT IS ABSOLUTELY PROHIBITED TO REMOVE, DEFACE, OR DESTROY THIS NOTICE OF EXTRA-JUDICIAL SALE ON OR BEFORE THE DATE OF SALE.

Publication : DIYARYO KABITENYO
Dates : August 3, 10 & 17, 2020

REPUBLIC OF THE PHILIPPINES
PROVINCE OF CAVITE
MUNICIPALITY OF NAIC

NOTICE TO THE PUBLIC

CCE-0030.2020 R.A. 10172

In compliance with the publication requirement and pursuant to OCRG Memorandum Circular No. 2013-1, Guidelines in the Implementation of the Administrative Order No. 1, Series of 2012 (IRR on R.A. 10172), Notice is hereby served to the public that **JERAMIE GOMEZ ALMANO** has filed with this Office, a petition for correction of entry in **sex** from **"Male" to "Female"** in the Certificate of Live Birth and whose parents are Carlo Almano and Melody Gomez.

Any person adversely affected by said petition, may file his written opposition with this Office not later than **August 17, 2020.**

(Sgd.) **GLORIA P. BAGO**
Municipal Civil Registrar

DIYARYO KABITENYO - August 3 & 10, 2020

How thoughts could one day control electronic prostheses, wirelessly

Stanford researchers have been working for years to advance a technology that could one day help people with paralysis regain use of their limbs, and enable amputees to use their thoughts to control prostheses and interact with computers.

The team has been focusing on improving a brain-computer interface, a device implanted beneath the skull on the surface of a patient's brain. This implant connects the human nervous system to an electronic device that might, for instance, help restore some motor control to a person with a spinal cord injury, or someone with a neurological condition like amyotrophic lateral sclerosis, also called Lou Gehrig's disease.

The current generation of these devices record enormous amounts of neural activity, then transmit these brain signals through wires to a computer. But when researchers have tried to create wireless brain-computer interfaces to do this, it took so much power to transmit the data that the devices would generate too much heat to be safe for the patient.

Now, a team led by electrical engineers and neuroscientists Krishna Shenoy, PhD, and Boris Murmann, PhD, and neurosurgeon and neuroscientist Jaimie Henderson, MD, have shown how it would be possible to create a wireless device, capable of gathering and transmitting accurate neural signals, but using a tenth of the power required by current wire-enabled systems. These wireless devices would look more natural than the wired models and give patients freer range of motion.

Graduate student Nir Even-Chen and postdoctoral fellow Dante Muratore, PhD, describe the team's approach in a Nature Biomedical Engineering paper.

The team's neuroscientists identified the specific neural signals needed to control a prosthetic device, such as a robotic arm or a computer cursor.

AUCTION SALE

How tumor cells evade the immune defense

Scientists are increasingly trying to use the body's own immune system to fight cancer. A new study by the University of Bonn and research institutions in Australia and Switzerland now shows the strategies tumor cells use to evade this attack. The method developed for this work contributes to a better understanding of the "arms race" between immune defense and disease. The results could help to improve modern therapeutic approaches. They have been published in the journal Immunity.

Cancer cells differ from healthy body cells – in their appearance, their behavior and the genes that are active in them. Often this does not go unnoticed: The immune system registers that something is wrong and dispatches its troops to fight the tumor. However, this response is often too weak to keep the cancer in check in the long term or even destroy it.

Researchers have therefore been trying for many years to strengthen the immune system's defensive reaction. They do this in a similar way to a policeman who puts his dog on the trail of an escaped criminal. In this case, the role of the sniffer dog is taken over by the cytotoxic T cells: They can detect and kill sick or defective cells. Each T cell is directed against a specific characteristic, also called antigen. For cancer therapy, the researchers are therefore looking for T cells in patients that detect tumor antigens. They can then for instance multiply these and inject them back into the patient. In this way they strengthen the patient's immune response against the cancer.

However, many tumors have unfortunately developed strategies that enable them to evade the immune system. "In our study, we investigated what these strategies look like and what this depends on," explains Dr. Maike Effern from the Institute of Experimental Oncology at the University Hospital Bonn. "We focused on skin cancer, namely melanoma cells."

Melanomas differ from healthy cells in several ways. For example, a whole range of different genes are active in them. Each of these is a potential antigen for T cells. But which is particularly suitable for triggering a strong and lasting immune response? To answer this question, the researchers invented a clever method: in their experimental model: They attached a kind of label to various genes that are active in the development of melanoma cells and used them to produce antigens. They then released a group of T cells against the tumor cells, which recognized exactly this molecular label as a disease marker. The researchers then used this strategy to investigate how the cancer cells react to being pursued by the immune system. Depending on the gene tagged with such a label, they found significant differences.

"When the T cells were directed against genes responsible for melanoma-typical characteristics, we observed that the cancer cells changed their appearance and suppressed these genes over time," explains Effern's colleague Dr. Nicole Glodde.

Molecular forces: The surprising stretching behavior of DNA

When large forces, for example in bridge construction, act on a heavy beam, the beam will be slightly deformed. Calculating the relationship between forces, internal stresses and deformations is one of the standard tasks in civil engineering. But what happens when you apply these considerations to tiny objects — for example, to a single DNA double helix?

Experiments with DNA molecules show that their mechanical properties are completely different from what those of macroscopic objects — and this has important consequences for biology and medicine. Scientists at TU Wien (Vienna) has now succeeded in explaining these properties in detail by combining ideas from civil engineering and physics.

At first glance, you might think of the DNA double helix as a tiny little spring that you can simply stretch and compress just like you would an ordinary spring. But it is not quite that simple: "If you stretch a piece of DNA, you would actually expect the number of turns to decrease. But in certain cases the opposite is true: When the helix gets longer, it sometimes twists even more," says civil engineer Johannes Kalliauer from the Institute of Mechanics of Materials and Structures at TU Wien. "Apart from that, DNA molecules are much more ductile than the materials we usually deal with in civil engineering. They can become 70% longer under tensile stress."

These strange mechanical properties of DNA are of great importance for biology and medicine. "When the genetic information is read from the DNA molecule in a living cell, the details of the geometry can determine whether a reading error occurs, which in the worst case can even cause cancer," says Johannes Kalliauer. "Until now, molecular biology has had to be satisfied with empirical methods to explain the relationship between forces and the geometry of DNA."

In his dissertation, Johannes Kalliauer got to the bottom of this issue — and he did so in the form of a rather unusual combination of subjects. His work was supervised on the one hand by the civil engineer Prof. Christian Hellmich, and on the other hand by Prof. Gerhard Kahl from the Institute of Theoretical Physics.

"We used molecular dynamics methods to reproduce the DNA molecule on an atomic scale on the computer," explains Kalliauer.

"You determine how the DNA helices are compressed, stretched or twisted — and then you calculate the forces that occur and the final position of the atoms." Such calculations are very complex and only possible with the help of large supercomputers — Johannes Kalliauer used the Vienna Scientific Cluster (VSC) for this purpose.

That way, the strange experimental findings could be explained — such as the counterintuitive result that in certain cases the DNA twists even more when stretched. "It's hard to imagine on a large scale, but at the atomic level it all makes sense," says Johannes Kalliauer.

Within the atomic models of theoretical physics, interatomic forces and distances can be determined. Using certain rules developed by the team based on principles from civil engineering, the relevant force quantities required to describe the DNA strand as a whole can then be determined — similar to the way the statics of a beam in civil engineering can be described using some important cross-sectional properties.

"We are working in an interesting intermediate world here, between the microscopic and the macroscopic," says Johannes Kalliauer. "The special thing about this research project is that you really need both perspectives and you have to combine them."

This combination of significantly different size scales plays a central role at the Institute for Mechanics of Materials and Structures time and again.

Cannabinoids may affect activity of other pharmaceuticals

Cannabinoid-containing products may alter the effects of some prescription drugs, according to Penn State College of Medicine researchers. They published information that could help medical professionals make safe prescribing choices for their patients who use prescription, over-the-counter or illicit cannabinoid products.

Kent Vrana, professor and chair of pharmacology at the College of Medicine, and Paul Kocis, a pharmacist at Penn State Health Milton S. Hershey Medical Center, compiled a list of 57 medications that may not function as intended when used with medical cannabinoids, CBD oil (hemp oil) and medical or recreational marijuana. The list was published in the journal Medical Cannabis and Cannabinoids.

The medications on the list have a narrow therapeutic index, meaning they are prescribed at specific doses — enough to be effective, but not enough to cause harm. Vrana says it's important for medical professionals to consider the list when prescribing medical cannabinoids and how it may affect other medications a patient is taking.

To develop the list, the researchers looked at the prescribing information for four prescription cannabinoid medications. This information included a list of enzymes in the body that process the active ingredients in these medications, which can include delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD). They compared this information against prescribing information from common medications using information available from regulatory agencies like the U.S. Food and Drug Administration to identify where there may be overlap, called a drug-drug interaction.

The list contains a variety of drugs from heart medications to antibiotics and antifungals. As one example, researchers identified warfarin, a common anticoagulant that prevents harmful blood clots from forming, as having a potential drug-drug interaction with cannabinoid products. Often prescribed for patients with atrial fibrillation or following cardiac valve replacement, the drug has a narrow therapeutic index, and Vrana cautions that medical professionals consider this potential drug-drug interaction both when prescribing warfarin to patients on prescription cannabinoids or prescribing cannabinoids to a patient taking warfarin.

The researchers say that medical professionals should also consider patient use of CBD oil products and medical and recreational marijuana when using or prescribing drugs on the identified list. Most of these products lack government regulation and there is little to no prescribing or drug-drug interaction information for those products.

"Unregulated products often contain the same active ingredients as medical cannabinoids, though they may be present in different concentrations," Vrana said. "The drug-drug interaction information from medical cannabinoids may be useful as medical professionals consider the potential impact of over-the-counter or illicit cannabinoid products."

Vrana advises that patients be honest with their health care providers about their use of cannabinoid products — from over-the-counter products to recreational marijuana. He says that doing so can help ensure the safe and effective use of prescribed medications.

In addition to the identified list of 57 prescription medications with a narrow therapeutic index that is potentially impacted by concomitant cannabinoid use, a comprehensive list of 139 medications that could have a potential drug-drug interaction with a cannabinoid is available online. Vrana and Kocis plan to routinely update this drug-drug interaction list as newer medications are approved and real-world evidence accumulates.

Kent Vrana received a sponsored research agreement from PA Options for Wellness, a medical cannabis provider and clinical registrant in Pennsylvania, and this research was supported in part by the agreement.

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New strategy against osteoporosis

Osteoporosis is the most common age-related bone disease which affects hundreds of millions of individuals worldwide. It is estimated that one in three women and one in five men aged over 50 suffer from osteoporotic bone fractures.

Osteoporosis is caused by excessive activity of bone resorbing cells, while activity of bone-forming cells is reduced. In healthy individuals, a balanced activity of these two cell types allows constant bone turnover to maintain healthy and strong bones.

In osteoporosis, disproportionate bone resorption leads to low bone mineral density and consequently weak and fracture-prone bones. When new bone formation is unable to catch up with bone loss, bone eventually weakens, and becomes more prone to fractures.

Most current osteoporosis therapies include the use of bisphosphonates, which block the activity of bone resorbing cells, and thus prevent excessive bone resorption. However, prolonged treatment with these drugs eliminates the necessary bone turn-over leading to increased fracture risk and other unwanted side effects. Therefore, there is an urgent need to develop new strategies that overcome the limitations of current treatments.

There are now new progresses in this area. They have been developed in a cooperation of Professors Christoph Winkler (Department of Biological Sciences, National University of Singapore, NUS) and Manfred Schartl (Biocenter, Julius Maximilians-Universität Würzburg, JMU, Germany); the results have been published in the journal PNAS.

New study on development of Parkinson's disease is 'on the nose'

The loss of a sense of smell is known to be one of the earliest signs of Parkinson's disease (PD) and can even appear years before the characteristic tremors and loss of motor functions are seen. Some scientists believe that olfactory dysfunction may not just be a sign of broader neural damage, but rather may have a more direct linkage to the generation of the disorder itself. In support of this idea, deposits of a protein called alpha-synuclein that form Lewy bodies can be found in olfactory areas, as well as in dying dopamine neurons whose loss triggers PD, and mutations in the gene encoding alpha-synuclein produce PD.

In the central nervous system, the sensory neurons that line the nasal epithelium are particularly susceptible to neuroinflammatory attack due to their accessibility to toxic agents inhaled from the environment. Indeed, the olfactory system is directly exposed to a barrage of environmental toxins arising from bacteria, viruses, mold, dust, pollen and chemicals. These toxins lead to local inflammatory responses inside the nose where olfactory neurons send their sensitive endings, and inflammation can spread to promote activation of inflammatory cells called microglia deeper in the brain.