

Jose Rizal

AGRICULTURIST
DOCTOR
MEDICAL SCIENTIST
INNOVATOR

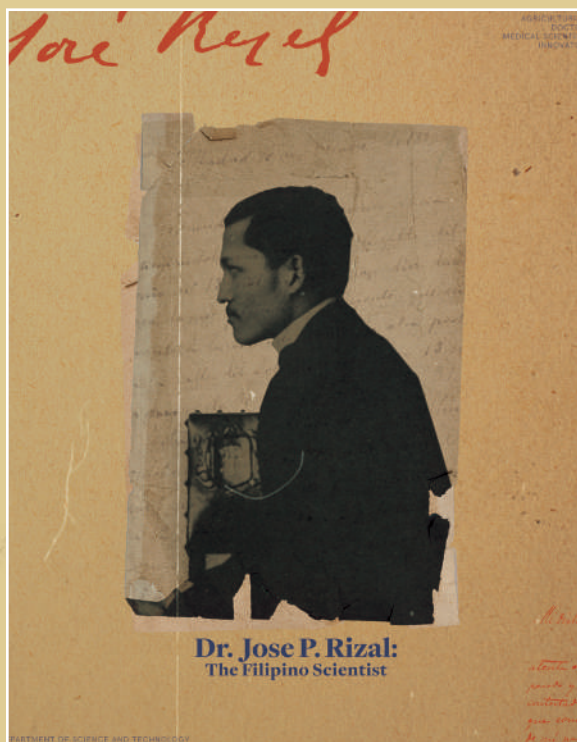


Dr. Jose P. Rizal:
The Filipino Scientist

*Al diestro
atenta de
parado y de
contestado
que conso
de mi pris*

About the Cover

The cover of the Dr. Jose P. Rizal: The Filipino Scientist special publication is a composite image in sepia, underscoring the nostalgia of the rarely used Rizal photograph that symbolizes the less known fact about the identity of our premier patriot. Embellished with opaque images of his prized discoveries and copies of monographs highlighting his works, Rizal as a scientist, is transformed from the persona that we are all familiar with. His works as a scientist are among his most important contributions that define us today as Filipinos. Lastly, the iconic signature denotes the seal of excellence, accentuating the truthfulness of every piece of information contained in each of the pages of this publication, a result of the meticulous research made by the men and women who advocate the pursuit of knowledge.



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MESSAGE

The country's largest 3D-printed monument of Dr. Jose P. Rizal started out as a small idea in 2019 when I attended the Rizal Day celebration at the Rizal Monument in Luneta. Upon learning from Dr. Rizal's descendants that we will soon be celebrating Rizal's 125th martyrdom in two years, I thought that it would be a very good opportunity for the Department of Science and Technology (DOST) to honor and recognize his contributions in the field of science. After all, not many Filipinos are aware of Rizal as a scientist, a facet that has been rarely touched in many public and academic discourses.

I believe that it is an opportune time to emphatically demonstrate, using 3D-printing technology, the capabilities of our scientists and engineers in discovering new knowledge, and creating products and services to help improve lives. So, we decided to build the first 3D-printed monument of our national hero that was unveiled on 30 December 2021 right at the heart of the DOST grounds.

In celebration of Rizal's 161st birth anniversary on 19 June 2022, we offer another simple tribute to him and our scientists by compiling all the learnings from the webinars that the DOST and its attached agencies have conducted in line with the project through a commemorative magazine.

Furthermore, with the scientific community at the center of activity today in helping build a robust pandemic response, it is just right to say that like Dr. Rizal, our **SCIENTISTS ARE ALSO HEROES** in their own right.

In this publication, we share with you latent information about Rizal's contribution to the stock of scientific knowledge and practical technologies and innovations that helped improve the quality of life of the people. May his works be instrumental in influencing our younger generation of Filipinos to embrace science to contribute to the betterment of life. With this publication, we salute all the scientists, engineers, researchers, innovators, and vaccine experts, among others, who just like Dr. Rizal, have selflessly toiled for the benefit of the people and have truly and faithfully embodied DOST's mantra, Science for the People.

FORTUNATO T. DE LA PEÑA

Secretary

Department of Science and Technology

MESSAGE

On 30 December 2021, we launched the largest 3D-printed monument of Dr. Jose P. Rizal dubbed as Dr. Jose P. Rizal: The Filipino Scientist. The statue, first of its kind in the Philippines, is a fitting honor to the country's polymath – a man who inspired millions of Filipino youths to aspire for such greatness in the fields of natural science, engineering, agriculture, arts, sports, and even in medicine.

This event opened the series of activities DOST prepared: from webinars, special features, and stories outlining the often overlooked aspect of Rizal's accomplishments.

Through the 3D-printing technology of the DOST-Advanced Manufacturing Center (AMCEN), art, science, and history worked in harmony to illustrate the life and legacy of our country's national hero. This medium introduced a new type of canvas for our Filipino artists and ensured an advanced way for historians to commemorate the achievements of Rizal. Additive manufacturing also provided an avenue for our engineers to use stronger and more economical materials in their projects.

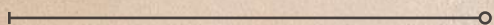
As a follow through effort, the pages of Dr. Jose P. Rizal: The Filipino Scientist will narrate the journey of Rizal and outline his struggles, his thoughts, and his triumphs to help us reflect on his accomplishments as a man of science. His contributions as a scientist are interwoven into his story as a writer, poet, athlete, and patriot.

This publication serves as a tribute not only to Rizal but to the hundreds of scientists, engineers, researchers, doctors, and experts who have dedicated their lives in the pursuit of knowledge for the benefit of mankind.

We truly hope that with this simple publication, we will inspire the future generations of Filipinos to take the path of Science, Technology, Engineering, and Mathematics (STEM) or at the least, acquire the appetite for scientific exploration and critical thinking in the pursuit of new knowledge similar to our scientists who are our modern-day heroes.

ROWENA CRISTINA L. GUEVARA, PH.D.

Undersecretary for Research and Development
Department of Science and Technology



MESSAGE

Dr. Jose P. Rizal is one of the Filipino heroes who do not need much introduction. From the books, novels, TV programs, movies, and academic discussions, many generations have learned about the martyrdom and sacrifices of whom we considered the country's national hero.

Though we are aware that he was an ophthalmologist and agriculturist, many of us have limited knowledge about Rizal as a biologist and scientist, and his significant contributions especially during the time when many Filipinos have limited access to healthcare services and scientific knowledge in the hands of the Spaniards.

When we at the DOST launched Dr. Jose P. Rizal: The Filipino Scientist project and unveiled Rizal's 3D-printed monument during the 125th year of his martyrdom, we received feedbacks filled with excitement and curiosity, not only from the scientific community but also from other sectors, on hearing and learning the noble works of Rizal in the field of scientific research.

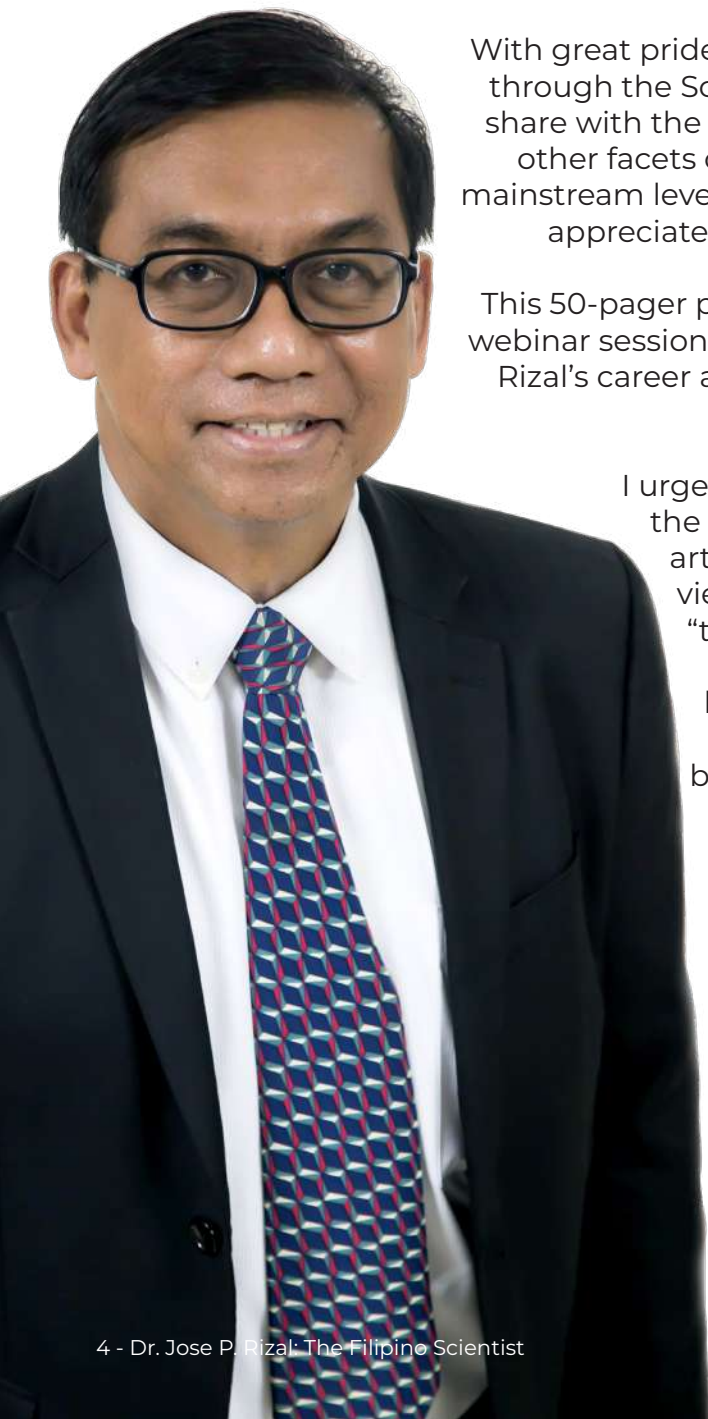
With great pride, the DOST releases this commemorative magazine through the Science and Technology Information Institute (STII) to share with the public, especially with the younger generations, the other facets of Rizal's profession that are not often discussed in a mainstream level and platform. We aim to inspire them to value and appreciate more the efforts of our modern-day hero-scientists.

This 50-pager publication features stories, discussions from various webinar sessions, and literary works that would put the spotlight on Rizal's career as a scientist and the cultural impact he shared with every Filipino.

I urge our readers to come into the world of Rizal through the pages of this commemorative magazine. May these articles and poems motivate you and give you a better view of scientific research in our country. As Rizal said, "the appetite is sharpened by the first bites." May this magazine be among your first bite for an appetite big enough to encourage our youth to pursue STEM careers and be one with us in creating science-based and innovative solutions. Together let us make
Science for the People!

RENATO U. SOLIDUM, JR., PH.D.

Undersecretary for Scientific and Technical Services
Department of Science and Technology



MESSAGE

The Dr. Jose P. Rizal: The Filipino Scientist commemorative magazine showcases the many contributions of Dr. Jose Rizal, who is not just famously known for being a national hero but also for his many accolades as a prolific writer, agriculturist, ophthalmologist, and artist, among others.

Featured in this magazine is Rizal's story as he dedicated his life to the various fields of science and how his contributions made during his time paved the way for the many technologies and innovations that we know today. His deep love and loyalty to his fellow Filipinos were not just apparent in his literature but also in his many achievements in the fields of medicine, agriculture, and engineering.

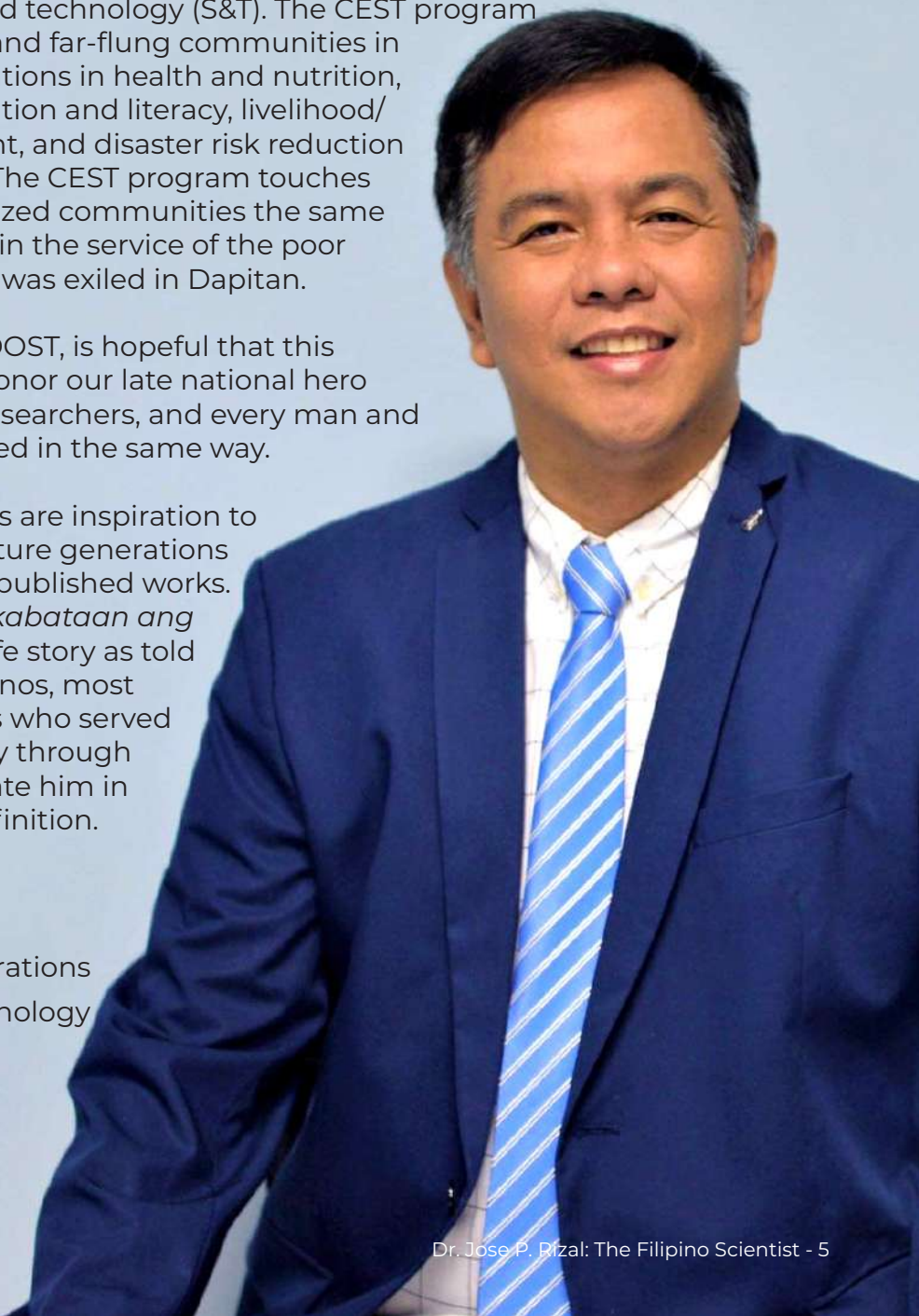
Likewise, Rizal's vision to help the Filipino people is one of the foundations of many regional programs that we have under the Department of Science and Technology (DOST). One of these flagship programs is the Community Empowerment thru Science & Technology or CEST, which aims to build progressive, empowered and resilient rural communities through science and technology (S&T). The CEST program targets to empower the poorest and far-flung communities in the country through S&T interventions in health and nutrition, water and sanitation, basic education and literacy, livelihood/ economic enterprise development, and disaster risk reduction and climate change adaptation. The CEST program touches the lives of many of our marginalized communities the same way that Rizal immersed himself in the service of the poor communities especially when he was exiled in Dapitan.

We, at the regional office of the DOST, is hopeful that this magazine serves its purpose to honor our late national hero just like we want our scientists, researchers, and every man and woman in science to be recognized in the same way.

Truly, Dr. Jose Rizal's contributions are inspiration to every Filipino, especially to the future generations that he speaks so highly of in his published works. As his famous saying goes, "*Ang kabataan ang pag-asa ng bayan.*" May Rizal's life story as told in this magazine encourage Filipinos, most importantly our Filipino scientists who served and continue to serve the country through science and technology, to emulate him in achieving heroism in its every definition.

SANCHO A. MABBORANG

Undersecretary for Regional Operations
Department of Science and Technology



MESSAGE

Aside from being a martyr of freedom and a literary figure, the achievements of Dr. Jose Rizal in the field of science are worthy of remembrance. Looking from this perspective, the launching of Dr. Jose P. Rizal: The Filipino Scientist Commemorative Magazine is an excellent supplement to highlight Rizal's character as an archaeologist, ophthalmologist, engineer, agriculturist, naturalist, anthropologist, and linguist, among others.

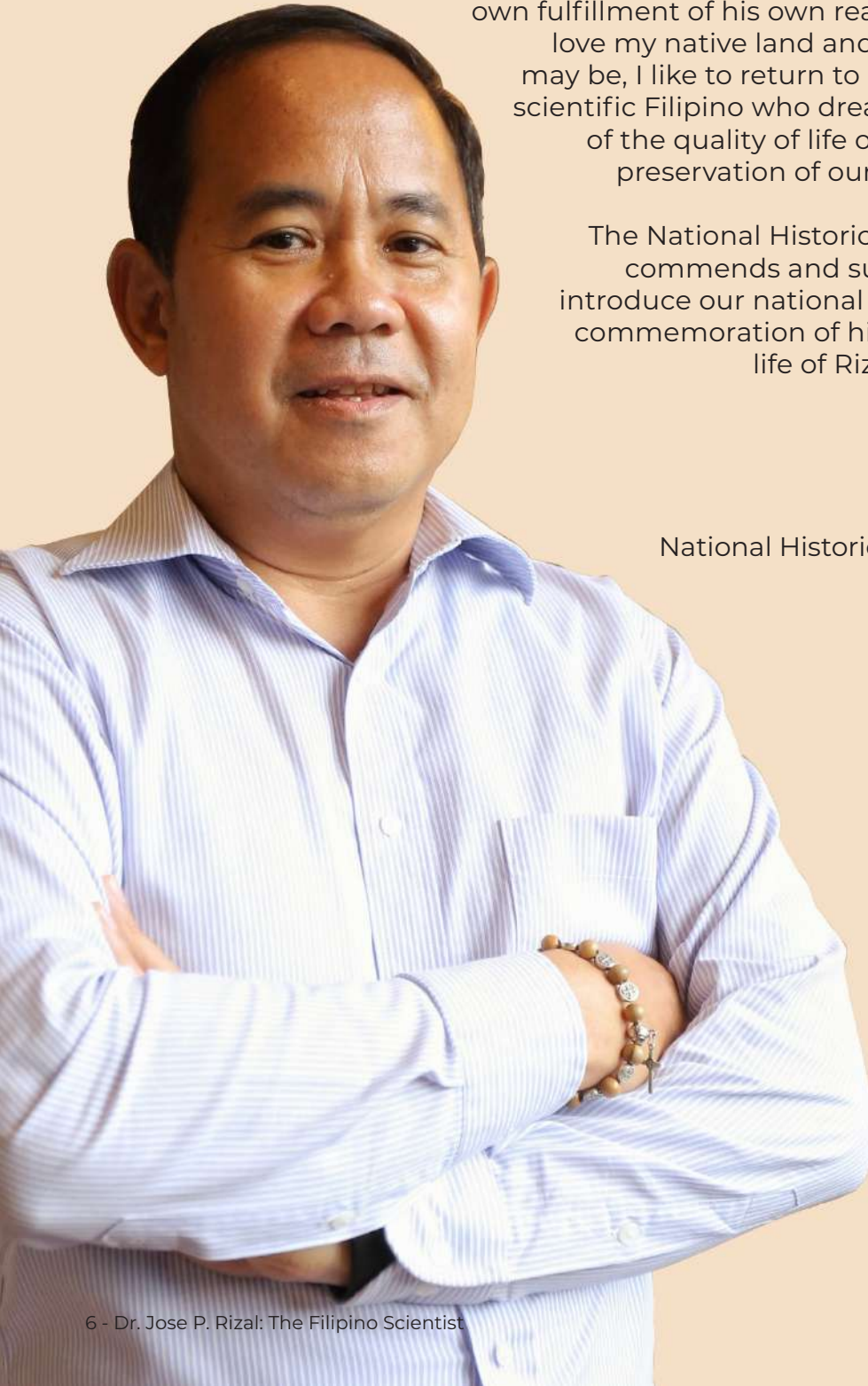
Rizal's scientific persona became fruitful while in exile in Dapitan. The said town was his laboratory of his ideal society. He loved his civic work in Dapitan despite how pleasing Europe was. This was his own fulfillment of his own realization while in Marseilles "I, too, love my native land and no matter how beautiful Europe may be, I like to return to her. In short, Rizal wanted to be a scientific Filipino who dreams and works for the upliftment of the quality of life of our fellow countrymen and the preservation of our natural resources is nationalism.

The National Historical Commission of the Philippines commends and supports the DOST for its efforts to introduce our national hero as an advocate of science in commemoration of his 161st birth anniversary. Truly, the life of Rizal is a sublime example to follow.

RENE R. ESCALANTE, PH.D.

Chairperson

National Historical Commission of the Philippines



MESSAGE

As we innovate and make science and arts work through S&T projects and R&D programs, we are also promoting the instrumentalization of our efforts to serve the people and communities. This goes hand in hand with the DOST's aim to motivate more students to take up a STEM career by offering scholarships and thesis grants, hence, build a workforce to drive the Philippines at par with the global scientific community. We have a unified aspiration in becoming a country equipped with scientists, researchers, engineers, and artists who will provide the foundations in a knowledge-based economy imbued with a science culture.

Above all else, I truly believe in the power of inspiration and role modeling which can catapult the county to higher notches of competitiveness. Who can better represent this and the embodiment of patriotism, courage, and service to the Filipino people by using his expertise in various fields other than our national hero, Dr. Jose P. Rizal?

Whence, the National Research Council of the Philippines (NRCP) convened its Scientific Division members and other experts in history, taxonomy, biology, and herpetology to generate ideas about Rizal's identity as a Filipino scientist. Meaningful conversations and sharing of knowledge were made with reputable historians, Dr. Francis Gealogo and Mr. Ambeth Ocampo; National Scientist Angel Alcalá; biologist and herpetologist, Dr. Arvin Diesmos; taxonomists, Dr. Analyn Cabras and Dr. Aimee Lynn Dupo; architect Sylvia Clemente; and sculptor, Prof. Jose Manuel Sicat with the able guidance of DOST Undersecretary Rowena Cristina Guevara and the NRCP Governing Board.

As NRCP experts unfolded Rizal's identity as a Filipino scientist piece by piece, we were introduced to the unsung side of our national hero, the scientist who spent his exile contributing to the community development of Dapitan through his scientific prowess and artistic lens. Amidst having his death at the back of his head, he was able to establish a community school to share his learnings from studying in Spain, Paris, and Germany. In addition to this, he mentored students on how to collect animal and plant specimens. About 200 specimens were sent to Dresden and a few of which were named after him. As a doctor, he offered free consultations and medicine to the poor. As an engineer, he led the construction of waterworks to provide potable water in Dapitan. As an agriculturist, he taught farmers good practices. As a humanist, he was a towering example of humanitarian deeds and humane principles put to action.

If we step farther aback, from a larger scope of perspective, what Rizal did in Dapitan is a microcosm of our identity and mandate in the DOST. This overshadowed identity of Rizal mirrors how DOST wields science to serve the people.

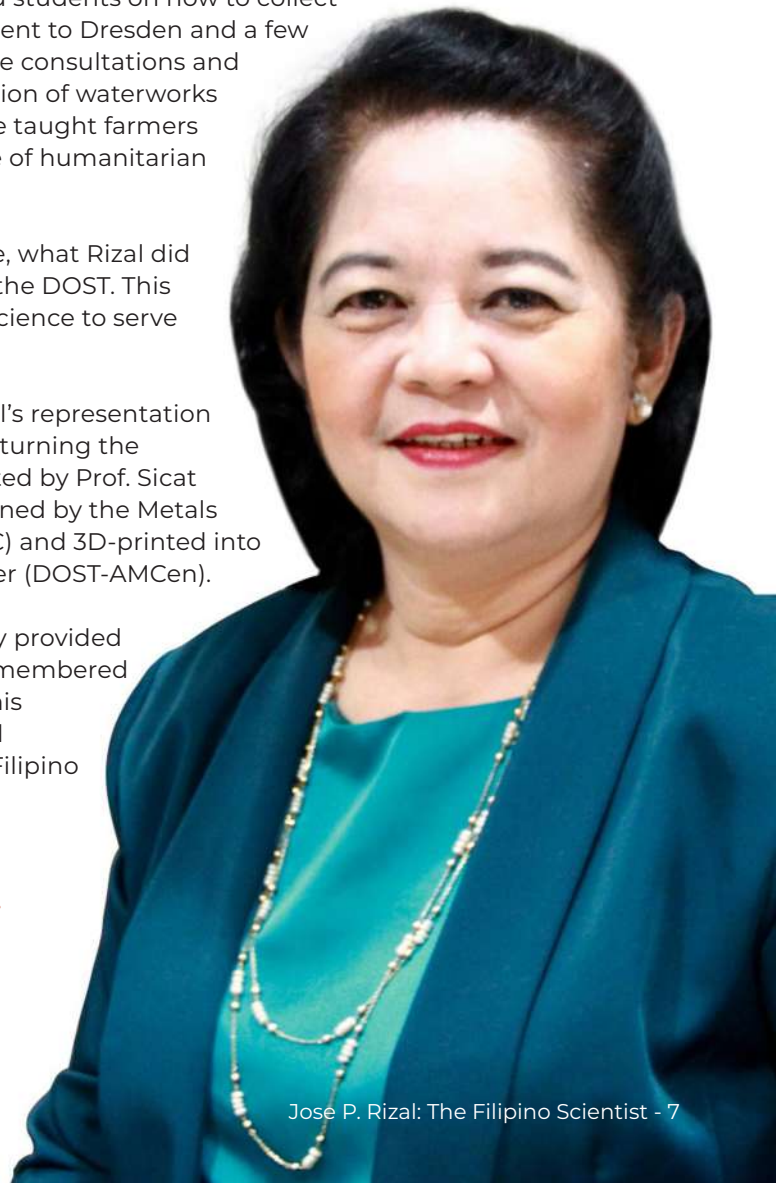
Following the finalization of the essential elements of Rizal's representation as a Filipino Scientist, the NRCP worked with Prof. Sicat in turning the ideas into tangible material. The one-foot maquette sculpted by Prof. Sicat and conceptualized by NRCP experts (above) was 3D-scanned by the Metals Industry Research and Development Center (DOST-MIRDC) and 3D-printed into a 12.5-ft monument by the Advanced Manufacturing Center (DOST-AMCen).

By erecting this monument using the inspiration originally provided by DOST Secretary Fortunato T. de la Peña, Rizal will be remembered not only for his novels and reformist thinking but also for his scientific contributions. NRCP envisions that Rizal's life will influence the youth to fuse science and arts in building a Filipino nation that is inclusive, sustainable, and resilient.

MARIETA BAÑEZ-SUMAGAYSAY, PH.D.

Executive Director III

DOST-National Research Council of the Philippines



MESSAGE

We embarked on a research and development project to study the suitability of acrylonitrile styrene acrylate (ASA) as a material for a 3D-printed statue in October 2021. We also took advantage of a design and simulation software to ensure that the statue can withstand winds of up to 330 kph and earthquakes of up to 7.0 magnitude.

We were able to build the 12.5-ft tall Dr. Jose P. Rizal: The Filipino Scientist statue through the Advanced Manufacturing Center (AMCen). This statue, the first and the largest 3D-printed statue of Dr. Rizal was unveiled during the commemoration of his 125th year of martyrdom on 30 December 2021 at the DOST Science Complex in Taguig City.

We are still in the process of learning and exploring all the possibilities that we can pursue with the use of new technologies such as additive manufacturing. What truly matters is the fact that we are using technologies as tools to grow and move forward.

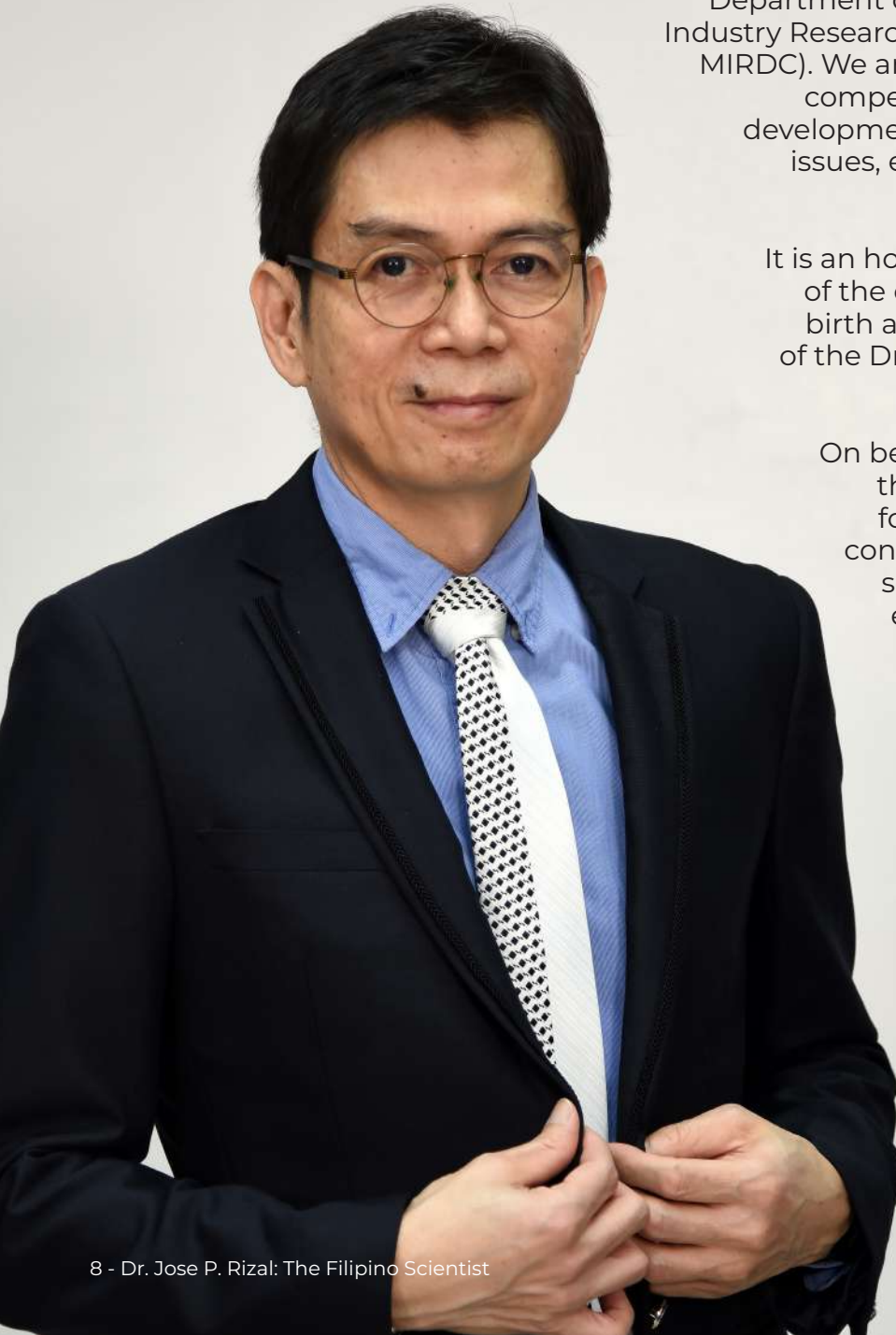
Dr. Rizal's life inspires and challenges us at the Department of Science and Technology – Metals Industry Research and Development Center (DOST-MIRDC). We are determined to let this inspiration compel us to continue to do research and development (R&D), find solutions to pressing issues, educate people, and make a lasting difference in countless lives.

It is an honor for the DOST-MIRDC to be part of the celebration of Dr. Jose P. Rizal's 161st birth anniversary through the publication of the Dr. Jose P. Rizal: The Filipino Scientist Commemorative Magazine.

On behalf of the DOST-MIRDC, I applaud the Filipino nation for having a heart for science. I encourage everyone to continuously engage in and champion science, technology, and innovation, especially during these times when we are recovering from the effects of the pandemic. Let us work together to bring science closer to the people. By doing that, we let the legacy of Dr. Rizal, the Filipino scientist, live on in all of us.

ENG'R. ROBERT O. DIZON

Executive Director
DOST-Metals Industry Research
and Development Center



MESSAGE

When the COVID-19 pandemic struck the entire world and everyone is looking for appropriate solutions, many have wondered how Dr. Jose P. Rizal, if still alive, would react and help in finding a cure or a vaccine?

On a positive note, the pandemic became the opportune time for every Filipino to learn and have a better appreciation of the sacrifices and efforts of our science workers, doctors, and researchers to provide timely and appropriate solutions to the challenges posed by COVID-19.

And the right moment is now to deep dive into the career of Dr. Rizal as a scientist during the colonial period and make his works more relevant today.

Most of us would admit that we have limited knowledge of Dr. Rizal's life as an ophthalmologist, agriculturist, and biologist. And to quote History Professor Dr. Francis A. Gealogo from the Ateneo de Manila University, it could be rooted in the fact that studies and discussions mostly focused on Rizal's literary works, his world travels, as well as his love interests possibly influenced by the 'macho culture.'

When we thought of the Dr. Jose P. Rizal: The Filipino Scientist project a few years back, we decided to create a 3D-printed monument that would become a centerpiece in elevating the discourse about the life and legacy of Dr. Rizal. I believe that this uniquely designed monument will help us recognize not only the extent of his knowledge, but also how he used his mind and talent to make significant impact that improved the lives of many Filipinos back then. Rizal's 3D-printed monument at the DOST Plaza is a tribute to his heroism and achievements as a scientist for the people.

On his 161st birth anniversary on 19 June 2022, we, at the DOST-Science and Technology Information Institute, offer you this commemorative magazine that contains different narratives and discussions on Rizal's life, works, and significant contributions to the field of science, culture and the Filipino society.

Truly, Dr. Rizal is not a relic from the past as he continues to inspire us to be knowledge-seeking, innovative, and progressive – knowing too well that science and technology offer solutions well into the future!

RICHARD P. BURGOS

Director

DOST-Science and Technology
Information Institute



NATURA ABHORRET VACUUM

NAPAKAHIRAP HULÍHIN ANG ísip ni Rizal. Magsabi ka ng larang na akademiko at tiyak na may ginawa siyá sa disiplinang iyon. Natatandaan kong may lumabas na noong koleksiyon ng artikulo tungkol sa kaniyang pagiging agrikultor, inhinyero, kartograpo, negosyante, atbp. Kayâ waring ang lahat ng modernong sangay ng pag-aaral ay pinasukan niya, kung hindi man pinasimulan niya. Isa siyáng Renaissance Man. Higit kaysa ibáng Filipinong henyo ng kaniyang panahon at hanggang ngayon. Higit lámang natin siyáng ibinantayog sa pagiging manunulat dahil sa Noli at Fili (at kahit sa Ultimo Adios) na itinuturing nating nagpaalab sa damdaming mapagpalayà ng mga Filipino at naging inspirasyon ng Himagsikang 1896.

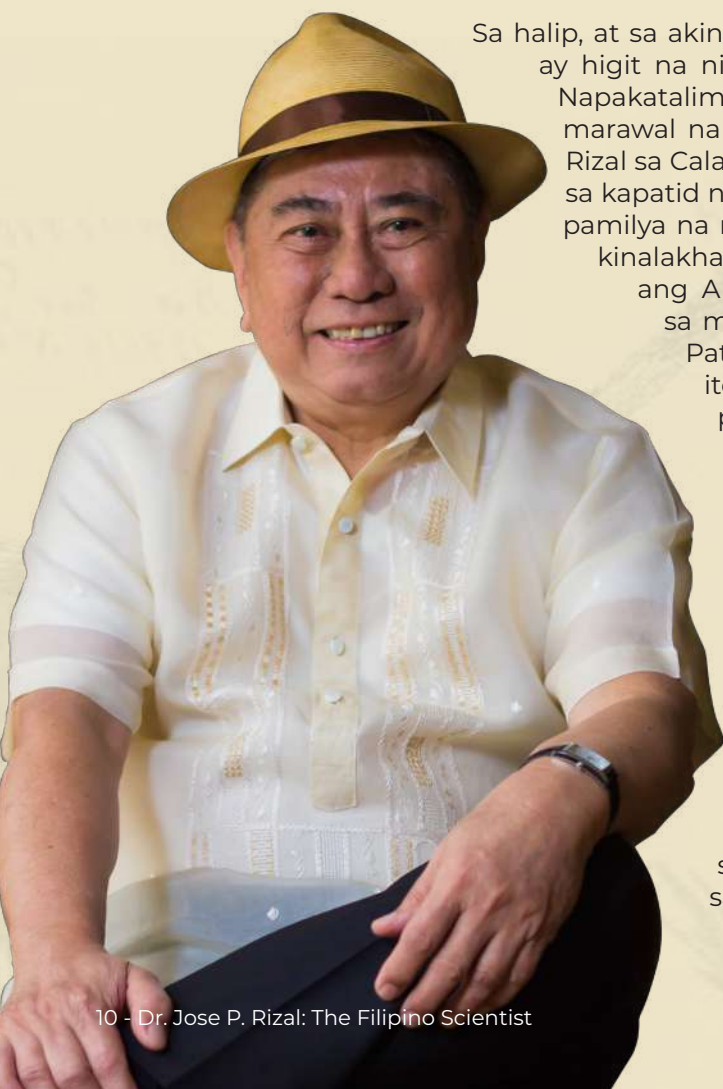
Kayâ bukod sa pagiging Humanista ay nais kong magpugay sa kaniyang pagiging Siyentista. Madalí itong patunayan ng kaniyang naging propesyon: isa siyâng doktor. Gayundin, ng mga aktibidad niya sa maikling panahong nadestihero sa Dapitan. Subalit, ang siyentipikong pag-iisip ni Rizal ay nakatimo mismo sa kaniyang pagsúlat, lalo na sa paraan ng kaniyang pagtistis (gaya ng isang siruhano) sa mga kanser (o mga problema) ng lipunang kolonyal sa Filipinas. Warì ngang higit na pinatalas ng kaniyang oryantasyong siyentista ang kaniyang mga artikulong inilathala sa La Solidaridad at ang kaniyang mga pagbubunyag tungkol sa umiiral na korupsiyon sa kaniyang panahon sa pamamagitan ng kaniyang mga nobela.

Nais ko ring isapantahà na ang analitikong pananaw niya sa bagay-bagay ay hindi dulot ng paaralan. Hitik sa halimbawa ang Noli at Fili tungkol sa bulok at oskurantistang kairalan sa sistema ng edukasyon noon, mula sa kasawian ng mga musmos na Crispin ng San Diego hanggang sa klase sa pisika ng unibersidad ni Placido Penitente. Kayâ pangunahin sa repormang nais isagawa ni Ibarra ang pagtatayô ng eskuwelahan upang maidulot sa San Diego ang karunungan ipinagkakait ng mga fraile.

Sa halip, at sa aking titig ngayon, ang intelektuwal na development ni Rizal ay higit na nilinang ng kaniyang nakagisnang mundo ng karanasan. Napakatalim ng kaniyang pagdamdám sa mga nakikíta sa paligid—sa marawal na kaligirang hindi matiis pagmunian kahit ng paslit pang Rizal sa Calamba, Laguna—lalo na't may naririnig na nailbáng salaysay sa kapatid na disipulo ni Padre Burgos at may nababása sa aklatan ng pamilya na naghahayag ng mga katotohanang salungat sa kaniyang kinalakhan. Maága niya itong ipinahayag sa pamamagitan ng tula, ang A la Juventud Filipina. Ang naturang tula ay panawagan sa mga kabataang “pag-asa ng bayan” (bella esperanza de la Patria mia). Subalit maaari nating ituring na isa ring kredito ito ng kabataang nais sumúlat para sa kaniyang sariling pagkatáo. Wika niya sa ikatlong sакnong:

*Baja con la luz grata
De las artes y ciencias a la arena,
Juventud, y desata
La pesada cadena
Que tu genio poético encadena.*

Ang “makinis na noo” (tersa frente) ng juventud filipina ay kailangan diumanong gamítin upang lagutin ang mabigat na kadenang pumipigil sa pagsúlong ng kaniláng henyo. Ngunit, at narito na ang ating pahiwatig, kailangan nilá ng liwanag ng magkasaniib na mga sining at mga agham (de las artes y ciencias) upang maging sandata sa pakikihamok. Ang kabataang makata ay hindi nagtitiwalà sa kaniyang talinong pansining lámang. Kailangan din niya



ng karunungan siyentipiko, o ang kombinasyon ng mga artes y ciencias upang matupad ang adhikang paglayà mula sa tanikala ng pagiging busabos at mangmang.

Anupa't sa isang paraan ng pagtingin, ang buong adhikang “mapagmulat” ng Kilusang Propaganda ay paglitis sa mga realidad sa Filipinas upang maitanghal ang katotohanan. Na nangangahulugan ng pagdudulot ng totoong karunungan sa mga Filipino. Alinsunod sa ganitong pagtingin, ang Noli halimbawa ay isang pagsisiwalat kung paanong naghahari ang kamangmangan sa lipunang kolonyal noon. Bawat pangyayári sa nobela ay naghahandog ng ehemplo ng naturang tesis. Sa isang bandá, ang mga sákop ay nananatíling busabos dahil mga biktima ng binaluktot na karunungan. Sa kabilâng bandá, ang mga mananákop ay nakapaghahari sa pamamagitan ng pagpapalaganap ng baluktot na karunungan. Sa ganitong sitwasyon, ang umiiral ay dunong-dunungan—isang uri ng kamangmangan na hindi nakikilála ang sarili. Kayâ ang nobela ay hitik sa nakatatawáng mga balintunà't parikalà upang isiwalat ang korupsiyong moral at sosyal na ibinubunga ng dunong-dunungan.

Pinakarurok at paborito kong eksena ng gayong nakatutuwâng pagsisiwalat ang Kabanata 60: “Pambayan at mga Pansariling Kapakanan.” Matagumpay ang kunwa-kunwaríang rebelyong ipinlano ni Padre Salvi sa San Diego at ibinilanggo si Ibarra bílang “filibustero” at lider ng mga rebelde. Itinelegrama sa Maynila ang naganap, kumalat ang mga “feyk nyus”, at ipinakíta sa kabanata kung paanong tinanggap ng ibá-ibáng sektor ng lipunan ang pangyayári. Maraming naging hakà-hakà, ang di-totoo'y itinuring na totoo at dinagdagan pa alinsunod sa pansariling motibo't interes ng nagbabalita at tumatanggap ng balita. Siyempre, biktima ng matinding tákot ang tulad ni Kapitan Tinong dahil sa simula'y masugid na tagahanga ni Ibarra. Nangamba siyáng madawit, gaya ng Gomburza, kayâ di-maláman ang gagawin para makaiwas sa inaasahang pagdakip sa mga mapaghinalàang “kaibigan” ng kondenadong si Ibarra.

Subalit sukdulang nakatutuwâ ang karikatura ng dunong-dunungan sa panig ng maykapangyarihan. Halimbawa, si Don Primitibo, ang edukadong dalubhasa sa Latin dahil walang bukambibig kundi mga minemoryang pangungusap sa Latin at walâng tunay na kabuluhan sa sitwasyon. Siyá ang karikatura ng ilustrado. Ikalawa, at napakarikit, ang kumbersasyon ng mga relihiyosong fraile. Sa isang bandá, naiinggit silá sa tatamuhing gantimpala ni Fray Salvi. Sa kabilâng banda, ikinonekta nilá si Ibarra sa mga Heswita, kayâ inismiran ang masamâng epekto ng liberal na karunungan itinuturò ng naturang orden. Noon nawika ng isa sa kanilá na: “Natura abhorret vacuum.” Isa itong kawikaan sa Latin na mula diumano kay Aristotle: “Nasusuklam ang kalikásan sa basyo o walang-lamán.” Ang ibig sabihin ng nagsalitâ: “Dahil mga mangmang o basyo ang utak ng mga Heswita ay kung ano-anong mapanganib na bagay ang naiísip.” Pinipintasan din kasi nilá ang mga eksperimentong siyentipiko noon ng mga Heswita para sa pagsubaybay ng bagyo at lindol. Na siyentipiko, ngunit para sa kanilá ay malakíng aksaya ng talino, panahon, at salapi. Hindi nilá namamalayan, dahil sa kaniláng kamangmangan, na silá ang tinatamaan ng binanggit na kawikaan sa Latin. Silá ang walang-lamán ang utak at kayâ pawang baluktot at buktot na kaisipán ang ipinalamán ng mapag-alagang kalikásan sa kaniláng basyong bungo.

May hihigit pa bang kamangmangan sa gayong pagdudunong-dunungan? Subalit ang aral ng Noli: Pinakamapanganib ang tulad nilá kapag may hawak na kapangyarihan at naghahari-harian sa lipunan. Ang naturang parikalà'y maaari lámang bumukal mula sa siyentipikong pagmumuni ni Rizal kayâ nakaambag sa pagtaas ng karunungan ng mga Filipino. Gayunman, hindi naman gayon kabobo ang mga kolonyalista para hindi nilá makuha ang uyam ni Rizal. At bahagi ng kaniláng pagtatanggol sa kaniláng dunong-dunungan ang pagpaslang sa nagdadalá ng Ilaw ng Karunungan. Sa tingin ng mga nagdudunong-dunungan, (at hanggang ngayon) baliw at mapanganib ang mga Diogenes.

VIRGILIO S. ALMARIO

Pambansang Alagad ng Sining sa Panitikan

Dr. Jose P. Rizal: Hero and Scientist

By Jil Danielle M. Caro

Born on 19 June 1861 in Calamba, Laguna, Jose, who would later grow up to be an extremely gifted individual, became the seventh of the 11 children of Francisco Engracio Rizal Mercado y Alejandro and Teodora Alonso Realonda y Quintos. Having been born into a prominent family, Jose was not deprived of education from early childhood to adolescence.

At a young age, Jose took his education seriously, which helped him excel in different schools and universities in the Philippines and other countries. Jose's constant pursuit of knowledge, intelligent observation of the society under the Spanish colonial rule, and travels around the world transformed him into a progressive thinker. He saw the injustices perpetuated by the Spanish government and friars and made it his mission to expose these atrocities and empower Filipinos to assert their rights and fight oppression.

Rizal as a Hero

"The pen is mightier than the sword."

A pen, a literary genius, and notable works like the *Noli Me Tangere* and *El Filibusterismo* are some of the things that first come to our minds when we hear the name of Jose P. Rizal. How could it be otherwise? It was his writings and his novels that fueled the Filipinos' quest for independence and freedom from colonial tyrants.

Rizal was a leader of the reformists who started the Great Propaganda Movement to campaign for political and social changes. He echoed the pleas and aspirations of the Filipino people in his stories for the Propaganda's mouthpiece, *La Solidaridad*. As expected, his subversiveness and popular influence on Filipinos angered Spanish authorities.



Officials of *La Solidaridad*:
Dr. Jose P. Rizal, Marcelo H. del Pilar,
and Mariano Ponce

Shortly after Rizal founded *La Liga Filipina*, a secret group created to advocate for unity and equality among Filipinos and Spaniards in the country, he was arrested due to the following: publishing anti-Catholic and anti-friar books and articles; possessing a bundle of handbills that were in violation of Spanish orders; writing his two novels; and criticizing the religion introduced by Spain. He was then thrown to Dapitan where he spent four uneventful but fruitful years from 1892 to 1896. During his exile, Rizal devoted his time and seized numerous opportunities to continue serving the people using the knowledge and skills that he acquired over time.

On 6 October 1896, while Rizal was en route to Cuba to serve as a military doctor, he was captured and deported back to the Philippines. Due to his association with the members of the Katipunan, which at that time was gaining more force against Spanish authorities, Rizal was implicated and tried for sedition, rebellion, and conspiracy before a military court. He was immediately convicted of all charges and sentenced to death.

On 30 December 1896, Rizal was killed by a firing squad in Bagumbayan (now Luneta Park) and the rest was history. We have in our historical memory a century of struggle against foreign colonizers: Spain, the United States, and Japan; and a century in search of our national identity, independence, freedom, and genuine social transformation. Yet, these important events undeniably shaped our nation and our people leading to the Philippines that we know today.

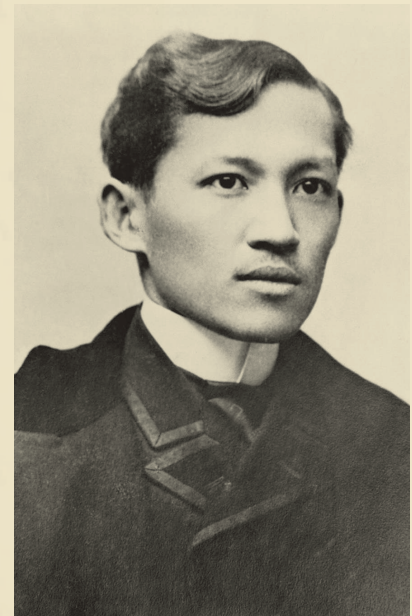


Photo of Dr. Jose P. Rizal

Rizal as a Quintessential Scientist

There's another side of Rizal unknown to many: his colorful life as a scientist ahead of his time.

It is beyond doubt that Rizal was a man of many things. Having lived for only 35 years, Rizal left a legacy of greatness that would inspire and empower generations. Rizal was not only a writer, poet, painter, and freethinker. He was also an agriculturist, biologist, innovator, and medical scientist, who used science and technology for the greater good.

Like most people, Rizal's accomplishments were largely influenced by his childhood. Growing up in Calamba, Laguna, he was exposed to the majestic beauty of Mount Makiling and Laguna de Bay. Rizal's family home also had a garden where he spent time looking at and studying birds and fruit trees, which were common themes in his drawings and were frequently mentioned in his writings.

His interest in the natural sciences developed over the years and motivated him to pursue studies in Mineralogy, Botany, Zoology, and other science-related fields in the Philippines and overseas. Rizal also studied Ophthalmology and set up a practice in Calamba right after his return from Europe. Trained by leading eye doctors in Paris, France and Heidelberg, Germany, Rizal brought back his extensive knowledge and specialized skills on eye surgery into his hometown. He was considered as one of the leading ophthalmologists of his time and attracted patients from nearby provinces and even other countries. Among Rizal's first patients was none other than his mother suffering from cataract.

Meanwhile, Rizal's aspiration to use science and technology to uplift the poor became most evident during his exile in Dapitan.

As a physician, Rizal treated indigent patients for free. As an engineer, he constructed a waterworks system to help provide clean water to the community. As an agriculturist, he bought lands for scientific farming and planted valuable crops and fruit-bearing trees. He imported agricultural machinery from the United States and introduced modern agricultural methods to help farmers increase their output.

Rizal's unceasing quest for knowledge led him to study and collect specimens of plants and animals in Dapitan. He collaborated with esteemed scholars and scientific institutions in Europe to further examine his discoveries. In honor of his significant contributions to science, three zoological specimens were named after him: *Apogonia rizali*, a small beetle; *Rhacophorus rizali*, a toad; and *Draco rizali*, a flying lizard.

Dr. Jose P. Rizal, with all his unparalleled accomplishments in his short life, whose sacrifices transformed our history and paved the way for the birth of a nation, and whose efforts were always for the betterment of the society and empowerment of the poor, deserves to have his legacy as hero and scientist preserved and celebrated by all generations.



Rizal's house in Dapitan (Photo Source: National Historical Commission of the Philippines)



Rizal's execution in Bagumbayan on 30 December 1896

HUNOS-DILA

Rosmon Tuazon

Kung may bagay na hindi nasagap ang mga historyador,
ito ay gabi-gabing pinuputol ni Rizal ang sariling dila

bago naimbento ang salitang *kalayaan*.
Pagdilim ay kinukumbinsi niya ang sarili

na hindi siya ang dayuhan kundi ang kaniyang paligid:
ang silid-otel, ang niyebeng pinagpag sa pintuan,

ang pamamaluktot sa harap ng apoy
habang subo ang tuwalyitang tigib ng laway, luha, dugo.

Kinaumagahan ay ngumanganga siya sa salamin
para salatin ang dilang muling tumubo

bagama't gaya dati ay kalamnan itong
rumurolyo lamang sa *libertad*, *redencion*, mga salitang

hindi niya maiuuwi sa bayang
unang tinatabas ang matatatas. Rizal, Rizal, hindi ikaw

ang banyaga kundi ang gusto mong isubo sa kanila
dahil hindi sumasapat ang *kaligtasan*,

hindi tumutumbas ang *kasarinlan*—
hayaan mo silang umawit,

isakataga ang himutok nang buong pagpaparaya.
Hayaan silang umungol sa hinagpis

tulad ng mga gabing tangan mo ang labaha

at kumikisay sa lababo, sa dugo ang pinawalang dila.

SONETO SA SIYENTIPIKO

Aldrin Pentero

Kilala ng mundo ang bayaning sa Bagumbayan man ay nabuwal,
Tinuruan namang manindigan ang buong bansa para lumaban.
Ngunit kakaunti ang may alam sa Rizal na nagbabad sa agham
Upang maglingkod sa kababayan noong ipatapon sa Dapitan.

Iba't ibang kabibe'y kinalap upang ipakilala sa mundo.
Siniguradong ang paghihintay at pananatili'y produktibo.
Hayop at halaman ay tinuklas, pinag-aralan ang mga ito,
Naging kapangalan pa ay isang palaka, butiki, at insekto.

Mga may sakit ay ginagamot, naghihikahos man o matanda
At bawat hapon ay ginugugol sa pagtuturo sa mga bata.
Pinaunlad ang pamamaraan ng pagsasaka at pangingsida.
Lahat ng nasa paligid niya ay pinabubuti ng alaga.

Pagkat ang pagsisilbi sa tao'y hindi lang sa itak o panulat,
Maaaring sa pagsisiyasat at sa mikroskopyong hawak-hawak.

Rizal 3D-Printed Monument: A Shape of History and Advancement of Technology thru Science

By Mark Lavien R. Inocencio

For our national hero, Dr. Jose P. Rizal, everything he had set his mind to eventually became fruitful. He conquered and traversed many fields, much to his interest and passion. Although he had lived for only 35 years, his life was filled with meaningful endeavors that resonate with honor and acknowledgment up to this day.

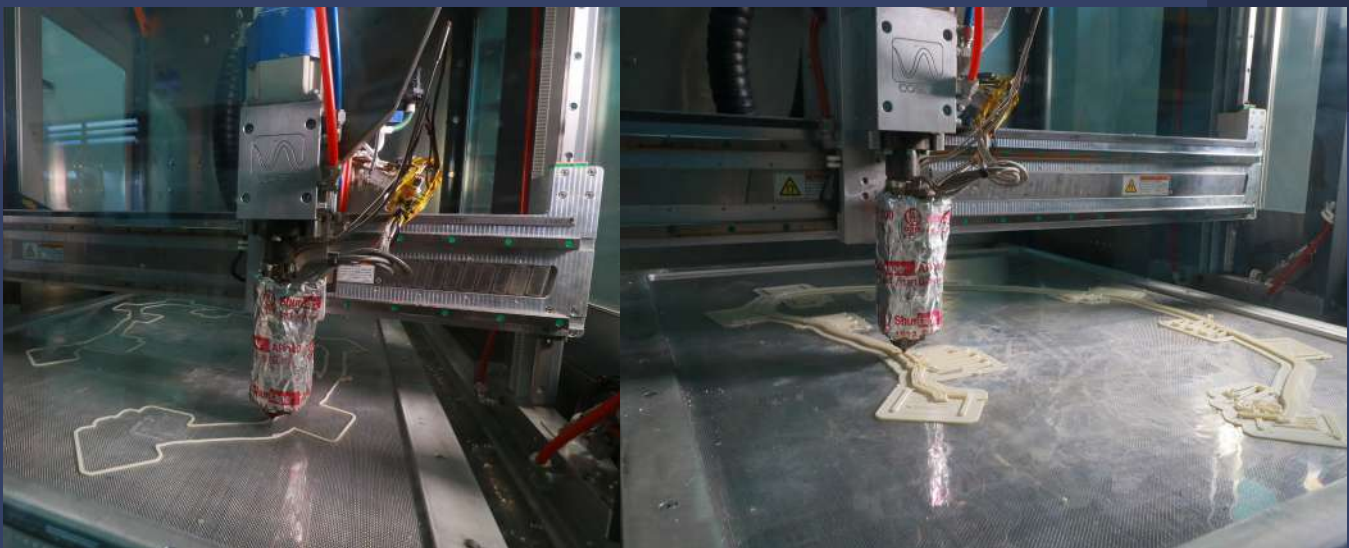
Rizal is recognized for his art not only in the Philippines but all over the world. His artworks symbolize his dreams and desires for our country—to become an independent and prosperous land with free and empowered citizens.

Because of his remarkable achievements in different fields of science and the arts, the Department of Science and Technology (DOST) saw it fit to honor Rizal and his contributions to the society with a unique monument using modern technology.

In commemoration of his 125th year of martyrdom last 30 December 2021, the DOST, in partnership with the National Historical Commission of the Philippines (NHCP), unveiled to the public the Dr. Jose P. Rizal: The Filipino Scientist 3D-printed monument and historical marker, installed inside the DOST Compound in Bicutan, Taguig City.

During the conceptualization stage, the DOST, through the National Research Council of the Philippines (NRC), gathered respected luminaries like National Scientist Angel Alcala, known historian and Rizal expert Professor Lamberto “Ambeth” R. Ocampo, Arvin C. Diesmos of the National Museum, and other scientists and experts to get their insights on the project.

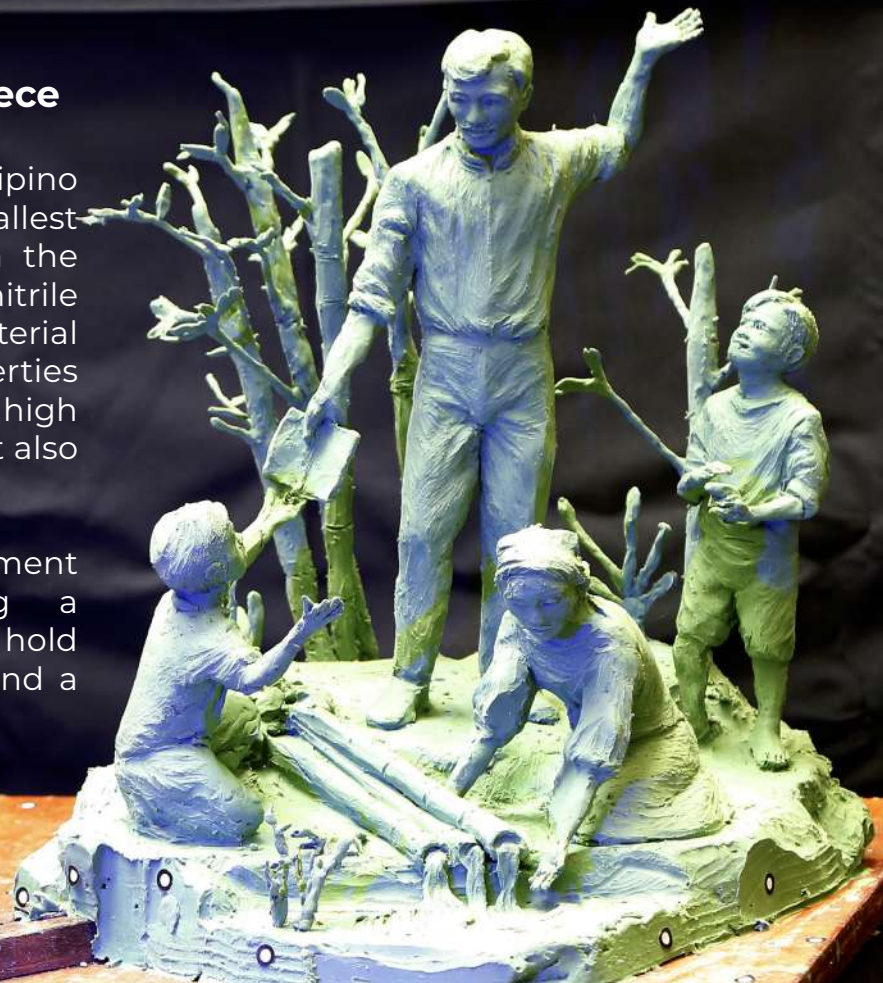
The design was inspired by studies and works of scientists, historians, and artists, depicting the national hero as a multi-talented person.



Science Behind the Masterpiece

The 12.5-ft Dr. Jose P. Rizal: The Filipino Scientist monument, the first and tallest 3D-printed statue of the hero in the country, was created using Acrylonitrile Styrene Acrylate (ASA). It is a material known for its high mechanical properties that can withstand strong impact, high temperature, and ultraviolet rays. It also has chemical resistant quality.

During its construction, the monument was further reinforced using a steel structure inside so it can hold against winds of up to 330 kph and a 7.0-magnitude earthquake.





Through the state-of-the-art Advanced Manufacturing Center of the DOST-Metals Industry Research and Development Center (DOST-MIRDC), the monument was made in just less than two months. This shows AMCen's potential to produce world-class products in less time and to develop disaster resilient materials and structures using 3D-printing technology.

The project also showcased the capability of our local engineers in creating a complex structure using Additive Manufacturing Technology (AMT). The technology involves the process of building an object layer by layer from a digital model.

Thus, the first 3D-printed monument of Rizal plays an important role in introducing this technology and increasing our country's

competitiveness by engaging with global players to maximize opportunities brought about by the so-called Fourth Industrial Revolution.

Rizal: Man of Science for all Time

As a man of science himself, DOST Secretary Fortunato T. de la Peña believes that the Dr. Jose P. Rizal: The Filipino Scientist monument will highlight the significant contributions of our national hero in the field of science and inspire others to use science and technology in improving the lives of many Filipinos.

Secretary de la Peña also trusts that the establishment of the 3D-printed monument of Dr. Rizal will immortalize his patriotic deeds and symbolize how science, history, and arts can work together to produce meaningful products for the benefit of every Filipino.

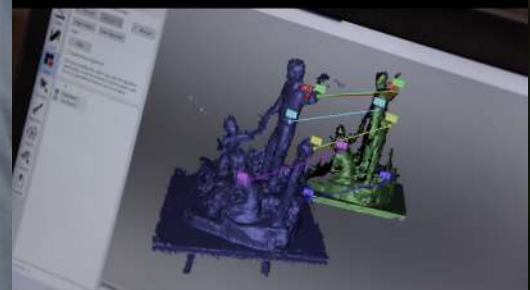
With this 3D monument, Dr. Rizal's legacy as a scientist will live forever and his laudable deeds etched in every Filipino's heart and mind. His life as a hero scientist will keep the fire burning for the next generations to reach greater heights.



The Artist behind the Scientist

By Jil Danielle M. Caro

“Dr. Jose P. Rizal uses his right hand to give a book to a child, depicting the passing on of knowledge to future generations. Meanwhile, his left-hand points to an empty space, which represents all the possibilities that science and technology can bring.”



That is how Professor Jose Manuel “Manolo” Sicat, renowned artist and sculptor, described the “Dr. Jose P. Rizal: The Filipino Scientist” statue, the country’s first 3D-scanned and 3D-printed monument of the hero. It was unveiled to the public on 30 December 2021, in commemoration of Dr. Rizal’s 125th anniversary of martyrdom.

The design was inspired by studies and works of scientists, historians, and artists of the DOST-National Research Council of the Philippines (NRCP), which portrays Dr. Rizal as a medical scientist, engineer-surveyor, agriculturist, and naturalist-environmentalist.

“Through this statue, I want to show Dr. Rizal’s human side,” said Prof. Sicat. “Yes, Dr. Rizal’s scientific contributions are important. But it is also essential to look into the reasons behind these achievements. He wanted to use science and technology to uplift the lives of the people, which is similar to the aspirations of the Department of Science and Technology,” he added.

The initiative to create a 3D-printed monument is in line with the DOST’s thrust to pursue the development of innovative products and services using additive manufacturing technology and specialized materials as the Philippines aspires to be at par with other countries in the world amid the Fourth Industrial Revolution.

“Dr. Jose P. Rizal: The Filipino Scientist” was not the first masterpiece of Prof. Sicat for the DOST. He designed DOST-NRCP’s sculpture “*Malayang Isip*” unveiled on 9 March 2021, in celebration of the agency’s 85th founding anniversary.

Similar to the Rizal monument, “*Malayang Isip*” pays tribute to the wisdom, talent, and creativity of the country’s scientists, researchers, and artists, past, present, and future.

Prof. Sicat is the chair of the Department of Visual Communication, College of Fine Arts, University of the Philippines Diliman.



Remembering Rizal as a Filipino Farmer

By *Jasmin Joyce P. Sevilla*



(Snippet from the presentation of Euphemio Agbayani III during his virtual presentation for the “Rizal, the Agriculturist: Honoring and Remembering Him @ 125” on 13 December 2021)

“Turn your eyes to the farmer burnt by the sun tilling the stubborn earth and burying a seed. He too contributes through his modest but useful work to the glory of the nation.”

These were the very own words of our national hero, Dr. Jose P. Rizal, from his first published work titled *El Amor Patrio* in June 1882, translated by Fr. Raul J. Bonoan, S.J.

Rizal, who regarded farmers in high esteem, also wore many hats in his lifetime as a world-renowned writer, an accomplished ophthalmologist, a talented artist, and a passionate educator. But more than his accolades in the many ventures he took on, Rizal was first and foremost engaged in probably the most significant sector in the country—agriculture.

Rizal’s Green Thumb

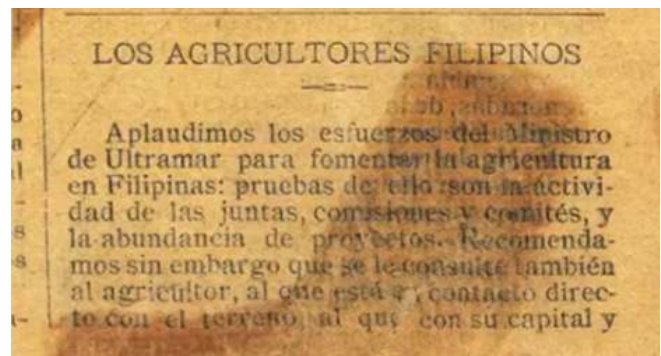
It appears that the hands of our national hero were not only tainted with ink but also with mud and soil as he himself planted fruit trees in the months that he was exiled in Dapitan, during the time of his exile in Dapitan, Zamboanga del Norte that began on 17 July 1892. In one of his letters to his family, Rizal said he had planted “1,400 coffee seeds, 200 cacao.” He also planted pineapple and corn, according to his descendants. Aside from tending his plants and crops, he also kept himself busy with his ducks, pigs, and chickens, which he starts to feed at 5:00 in the morning, based on his letter to Ferdinand Blumentritt on 19 December 1893.

His keen interest in agriculture did not blossom on a whim. In fact, a decade prior to his exile or when he was still studying abroad to become an ophthalmologist, he already mentioned to his parents that he wanted to study Agriculture. Rizal even expressed his dismay that only one Filipino, Mariano Cunanan from Pampanga, was studying agriculture during their time. In his own words, he said that “Here the agriculturist is much wiser perhaps than many bishops and many lawyers there.”

Agonies in Agriculture: A Recurring Theme in Rizal’s Published Works

Rizal was not oblivious to the painful realities of agricultural farming in the country, especially during the Spanish era when there were many reported stories of abuse between the landlord and the tenant farmers. While written as fiction, some of the stories he mentioned in *El Filibusterismo* somehow captured the tragedies that most Filipino farmers experienced that time—like the story of *Cabesang Tales* who turned into a bandit or *tulisan* when he lost his land and his own family in his efforts to convert a wooded place into a farm.

In an article in *La Solidaridad*, Rizal described in great detail the “sorry state of Filipino farmers.” Rizal also talked about the many concerns and challenges that Filipino farmers dealt with under the hands of the Spaniards. On 15 March 1889, he wrote the article *Los Agricultores Filipino*, discussing not just the scientific aspect of farming but also its social and economic repercussions to the farmers.



First few sentences of *Los Agricultores Filipinos* as it appeared on the cover of *La Solidaridad*, 15 March 1889 (Photo from NHCP Museo ni Marcelo H. del Pilar; snippet from the presentation of Euphemio Agbayani III during his virtual presentation for the “Rizal, the Agriculturist: Honoring and Remembering Him @ 125” on 13 December 2021)

Rizal’s Other Agricultural Ventures



Mariano Hamoy (Photo from NHCP Diosdado Capino Collection; snippet from the presentation of Euphemio Agbayani III during his virtual presentation for the “Rizal, the Agriculturist: Honoring and Remembering Him @ 125” on 13 December 2021)

While expanding his plantation of trees and crops, Rizal also invested in agriculture-related ventures. He helped build an internal water system for his farm comprised of a dam and a water tank (no longer extant) to water his crops.

More than a year after he arrived in Dapitan, Rizal discovered abaca's potential to become profitable. Because of this, he entered into a partnership with Mariano Hamoy, a businessman in Dapitan, for its cultivation. Rizal was right—the business of abaca had become so profitable that in August 1894, he organized an association of abaca planters and harvesters. Rizal also did not forget about the fishermen. He partnered with a Spaniard named Antonio Miranda for the improvement of the fishing industry in the area.

Rizal indeed made the most of his years in exile and his efforts as an agriculturist in Dapitan were fruitful. When he left the estate on 31 July 1896, Spanish officials recovered the following properties:

1. two parcels of land in the sitio of Daanlungsod, of the town of Lubungan, with an approximate area of 35 hectares, with a stand of 2,000 abaca plants;
2. a piece of hilly and stony land with an area of about eighteen hectares;
3. a light material house of bamboo and palm-leaf thatch with wooden posts and plank flooring, measuring 10 meters and 5 centimeters long and 11 meters and 40 centimeters wide;
4. a light material shed of bamboo and palm-leaf thatch with wooden posts and plank flooring, measuring 15 meters long and 7 meters and 10 centimeters wide;
5. 31 coconut trees;
6. 10 bamboo trees and a number of fruit trees; and
7. a vessel of the kind called vilus, unfinished, measuring 19 meters 85 centimeters from stern to stern, 1.65 meters breadth of beam, and 1.30 meters depth of hold, and two masts.

Rizal, the Agriculturist: Honoring and Remembering Him @ 125

The list of the properties Rizal left behind is a testament to his brief but bounteous stint in agriculture. One could only imagine how much more he could have produced and developed given more time.

To immortalize his deeds and to commemorate Rizal's contributions in the development of agriculture in the 19th century Philippines, the DOST-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) kicked off of the webinar series honoring our late national hero with "Jose Rizal, the Agriculturist: Honoring and Remembering Him @ 125" on 13 December 2021.

DOST Secretary Fortunato T. de la Peña said the agency hopes to instill and revive nationalism among Filipinos through the Rizal webinar series.

"Nais nating buhayin sa puso ng bawat isa ang kahalagahan ng pagiging Pilipino...Nais naming itaas ang inyong kamalayan at kaalaman tungkol sa papel ni Jose Rizal at ng kaniyang pamilya sa paghubog sa agrikultura ng bansa," de la Peña said.

The webinar gathered experts from the University of the Philippines (UP) Diliman, UP Los Baños, and the National Historical Commission of the Philippines (NHCP) to share their knowledge and expertise on the life of Rizal as an agriculturist, extensionist, and defender of farmers' rights.

Dr. Kerby C. Alvarez, Assistant Professor at UP Diliman's Department of History, talked about Rizal's perspectives on science and the era of institutionalization of modern agricultural sciences in the late 19th century. According to Alvarez, Rizal's innovative ideas played an important role in the development of science as a discipline during his time, which he applied in agriculture.

On the other hand, UP Los Baños' Department of Social Sciences Assistant Professor Rhina A. Bonconan discussed the history of Hacienda de Calamba and the agriculture sector's situation during Rizal's time. Bonconan said that one of Rizal's greatest contributions to agriculture was to shed more light on the plight of farmers including landlessness under the Spanish colonial rule.

Lastly, NHCP Historic Sites Development Officer Eufemio O. Agbayani III dwelled on Rizal's experience as a farmer during his exile in Dapitan. For Agbayani, Rizal's interest in farming could influence our modern-day farmers and agriculturists to think like an entrepreneur and explore more opportunities in the sector.

Aside from the three experts, Ester Azurin, a descendant of Rizal from his older brother Paciano, was also present during the event. She shared how important farming is for her family as influenced by their ancestor Rizal. Azurin, an agri-entrepreneur herself, said farming and agriculture are noble pursuits because, if not for them, there would be no food on our tables.

The "Jose Rizal, the Agriculturist: Honoring and Remembering Him @ 125" webinar was part of the activities that preceded the unveiling of "Dr. Jose P. Rizal: The Filipino Scientist" statue on 30 December 2021. *(With information from Jil Danielle M. Caro and NHCP Historian Eufemio Agbayani III)*



Rizal monument on his Lubungan farm (Photo from Alberto Vincent F. Baretto; snippet from the presentation of Eufemio Agbayani III during his virtual presentation for the "Rizal, the Agriculturist: Honoring and Remembering Him @ 125" on 13 December 2021)

A white statue of a young boy, likely representing a child of Dr. Jose P. Rizal, is the central focus. The boy is depicted in a kneeling position on a large, grey, textured rock. He is looking upwards and to the right, with his hands raised in a gesture of awe or contemplation. The background is filled with dense, dark green foliage, with some branches and leaves visible against a bright, slightly cloudy sky. The overall scene is outdoors and well-lit.

Dr. Jose P. Rizal:
The Filipino Scientist
Monument



AGRIKULTOR

Joey A. Tabula

Tomad la vista á otra parte; un hombre tostado por el sol rompe la ingrata tierra para depositar una simiente: es un labrador. – Jose Rizal

Hindi na lamang ito bastang pagtatanim—
Oo't kapag tinabunan ng lupa at dinilig
Ang mga binhi ng mais, pinya, kape, kakaw
Ay tutubo ang mais, kape, pinya, kakaw
Ngunit lumuluwang ang sikmura ng bayan
At nanganganak ng bibig ang mga bibig.
Hindi na sasapat ang bastang pagtatanim.

Hindi na lamang ito bastang pagbabanat ng masel—
Kundi pag-unawa sa kislap at kiwal ng silahis
Ng araw ng yumuyukod na kawayan at palay.
Kung papaanong minsang pinipili nilang mamatay.
May batas ang agwat ng mga ugat ng halaman
At kahit sila'y marunong magtampo at magalit.
Hindi na sasapat ang bastang pagbabanat ng masel.

Hindi na lamang ito bastang pag-ani sa aanihin—
Oo nga't ang bulaklak at bunga sa puno ay hitik,
Ano'ng lilingunin nang makarating sa paroroonan?
Biyaya kung paanong pinahihintulutan ng lalamunan
Ang ruta ng pagkain patiyan nang di nabibilaukan.
Iligtas ang butil at lahat sa mundo'y napapanis.
Hindi na sasapat ang bastang pag-ani sa aanihin.

WALA TAYO SA LOLO NATIN

Manuel Ortega Abis

Wala tayo sa Lolo natin.

Maaga pa lamang ay kaniyang natuklasan
na ang poot at takot ay pawang mga impeksiyon lamang
ng isang sugatang paninindigan.

Kaya naman wala tayo sa kaniyang kalingkingan
kung ihahambing sa kaniya.

Kung mayroon man akong ipagdiriwang na petsa,
ito ay ang ika-17 ng Hulyo, 1892.

Ang araw ng pagdating ng Lolo natin sa Dapitan.

Wala tayo sa Lolo natin.

Maaga pa lamang ay gising na siya upang salubungin
ang mga hamon ng isang bagong yugto sa kaniyang buhay.

Sa isang liham niya kay Blumentritt, kaniyang inilarawan
na bumabangon siya tuwing ika-5 ng umaga
upang simulan ang isang araw ng pag-aalaga
sa kaniyang mga bungang-kahoy: lansones, mangga,
guyabano, baluno at nangka.

Maaga pa lamang ay nasa tabi na siya ng kaniyang mga alaga
na hayop: mga kuneho, mga aso't pusa.

Doon sa kaniyang manukan.

Ginamit niya bilang bakuna

laban sa poot at takot na pawang impeksiyon

ng isang sugatang paninindigan

ang kaniyang sariling

talino at galing.

Wala tayo sa Lolo natin.

Maaga pa lamang sa kaniyang paggising ay ginigising rin niya
ang buong Dapitan, ang budlay

ng isang Bayan na ngayo'y sinalinan niya ng kaniyang sariling
dugong buhay.

Bago pa mag-ika-7 ng umaga

ay nakapag-agahan na siya ng tsaa at mga kakanin

na tanging sa Dapitan lamang matatagpuan.

Kung paano nagsibling lakas sa kaniyang mga paniniwalang-Bayan
ang kaniyang kapuwa, gayundin ang kaniyang isinalin sa Dapitan.

Wala tayo sa Lolo natin.

Sa kaniyang buong kapanahunan sa Dapitan ay mistulang isang hardin
ng lokal na fauna ang kaniyang itinala't pinag-aralan:

mga ibon, mga ahas, mga kulisap, isang kabayong dagat,
dalawang iskorpyo, isang boa constrictor, isang malaking pagong,
ang ulo ng isang ilahas na usa, ang balat at kalansay ng isang tingaog
na isang uri ng pusang mala-tungaw.

Mula sa kaniyang naging koleksiyon ay masisilayan natin

ang 346 na species ng mga kabibe at sari-saring mga paroparo.

Natuklasan niya ang apat na bagong species:

isang lumilipad na butiki,

isang palaka

at dalawang uwang

na bilang pagkilala sa kaniyang pagkakatuks ay sa ating Lolo ipinangalan.

Walang-wala tayo sa Lolo natin.

Maaga pa lamang sa Dapitan ay nagkapanahunan pa siyang magsulat:

mga tula, isang artikulo tungkol sa kulam,

isang bagong ortograpiya ng wikang Tagalog,

at, mantakin natin,

nagbalak pa si Lolo na maglimbag

ng isang diksiyonaryo ng mga wikang Filipino

na may salin sa Ingles.

Saan pa tayo?

Tayong wala sa Lolo natin.

Ngunit, marahil pa sa marahil,

kung nabubuhay lamang siya ngayon

(maaga pa lamang nang siya'y binawian ng buhay

upang mabuhay ang isang umaga para sa ating Bayan!).

iisa't isa lamang ang mamumutawi sa kaniyang mga labi,

"Ang poot at takot ay pawang mga impeksiyon lamang

ng isang sugatang paninindigan.

Gamitin ang angking talino't galing

upang maghilom hindi lamang ang isang tao, kundi ang isang buong Bayan."

The life and lessons from Dr. Rizal's Love for Nature and Biodiversity

By Allan Mauro V. Marfal

Dr. Jose P. Rizal or Pepe as he is fondly called by his family, was destined for greatness due to his remarkable academic performance admired worldwide. Being modeled by an equally nurturing and challenging environment, healthy family relations, and well-rounded education, Rizal's foundation was made solid that led to many of his contributions across multiple fields from literature to medicine.

Looking back, Pepe's childhood in Calamba was influenced by his curiosity and empathy for nature and natural landscape to which he was exposed to at an early age. By spending time observing birds such as sunbirds and flowerpeckers, our national hero's interest in plants, animals, and science in general was developed through the years that led him to pursue studies in Mineralogy, Botany, and Zoology, among others.

The Mercado-Alonzo residence in Calamba was once surrounded by orchards and farmlands, a pathway to explore nature for little Pepe, and a far cry from the current Metropolitan City which is now surrounded by expansive urban landscapes encroaching on both the lake and the mountain.

"Pepe was known to explore the foothills and slopes of Mt. Makiling on horseback accompanied by his dog Usman. Sometimes, hugging up the mountain builds his curiosity for nature by appreciating birds and insects," as told by Dr. Juan Carlos T. Gonzales, a curator of birds from the University of the Philippines- Los Baños - Museum of Natural History (UPLB-MNH) during the "Jose Rizal, the Naturalist: Honoring and Remembering Him @ 125" webinar.

In 1864, Pepe was known to have observed birds frequenting the fruit trees and gardens around their home, often viewed from the window of their two-story Spanish colonial house or from under the shade of trees in their small neighborhood, as shared by Dr. Gonzales.

He also said that when Pepe was in Dapitan, he explored the area's wilderness. He went on to sketch and collect samples of plants, reptiles, birds,

insects, bugs, crustaceans, and seashells that he found. He collaborated with foremost scientists from Europe to study these specimens. One of them was Adolf B. Meyer of Dresden Museum in Germany, an ornithologist, entomologist, and herpetologist.

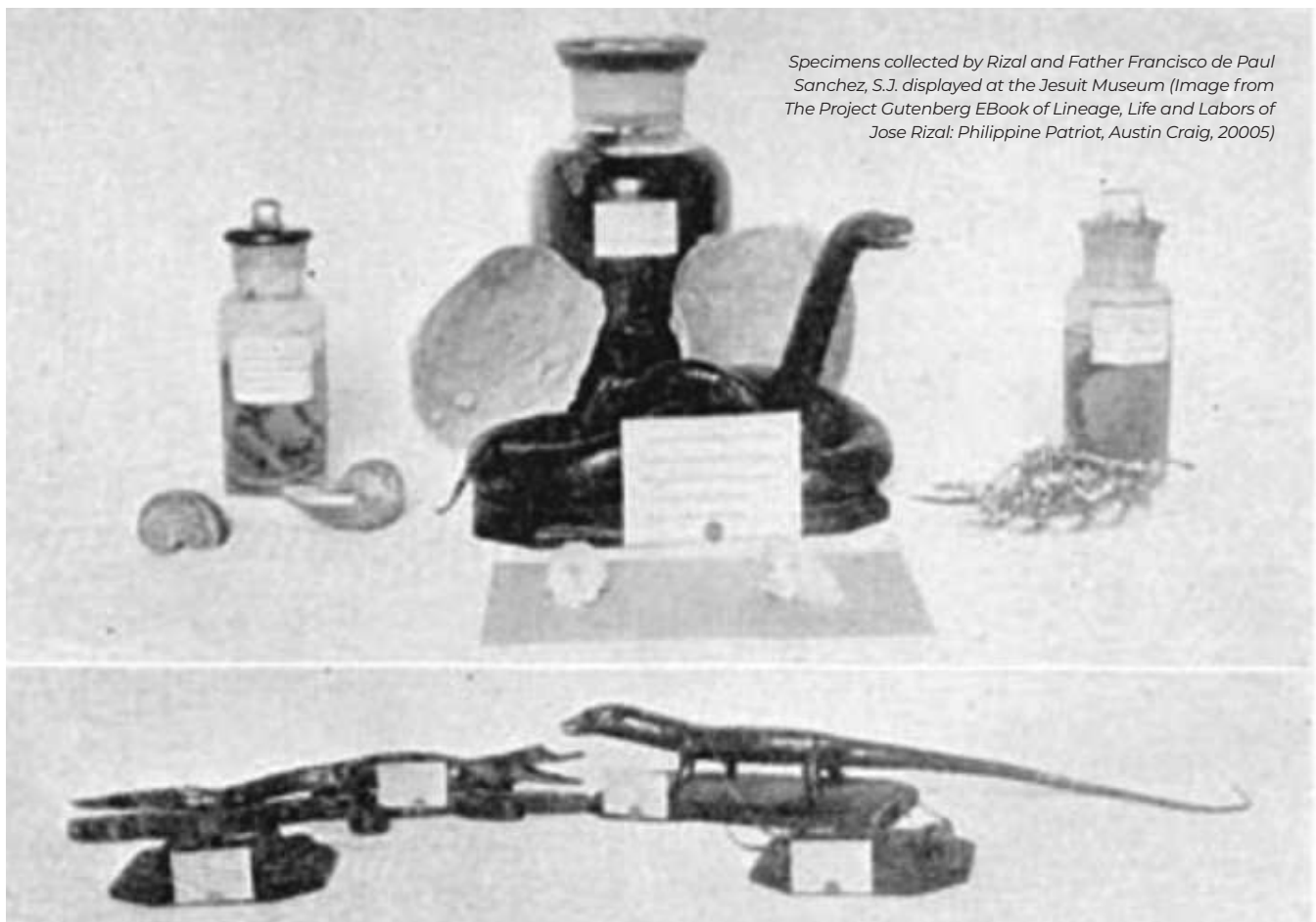
Eventually, some of these animal specimens were named after Dr. Rizal. They were *Rhacophorus rizali*, a rare kind of frog; *Draco rizali*, also known as flying lizard, a new species of its kind; and *Apogonia rizali*, a peculiar type of beetle.

Dr. Gonzales explained that sharing the stories of Pepe as a naturalist has relevance and significance especially for the young Filipinos.

"[Dr. Jose Rizal] was able to collect specimens that may be used to study climate change. Specimens



Three species discovered by Rizal and named after him (Image from The Project Gutenberg EBook of Lineage, Life and Labors of Jose Rizal: Philippine Patriot, Austin Craig, 2005)



Specimens collected by Rizal and Father Francisco de Paul Sanchez, S.J. displayed at the Jesuit Museum (Image from The Project Gutenberg EBook of Lineage, Life and Labors of Jose Rizal: Philippine Patriot, Austin Craig, 20005)

are historical accounts. You can get isotopes from shells and determine *ano* impact ng changes in oxygen levels or carbon dioxide levels. *Maraming puwedeng aralin.* These specimens are important. Sadly, a lot of them are lost but still, a lot of them are there. *‘Yun ang importante:* to keep heritage collections alive, not just Jose Rizal’s collections but all heritage collections,” Dr. Gonzales added.

A hero and an inspiration to modern scientists

In the same webinar, DOST Undersecretary for Research and Development Rowena Cristina L. Guevara said that Rizal’s efforts to conserve the different types of species of insects, plants, and animals serve as an inspiration for the current researchers, scientists, and civil servants.

For DOST Secretary Fortunato T. de la Peña, Dr. Rizal’s significant contributions to the advancement of science and technology in the country inspired numerous individuals and groups to follow in his footsteps and make their own mark in the scientific community.

“Hindi maitatwa na ang kahusayan na ipinamalas ni Dr. Rizal ay mababanaag natin sa mga nagdaan at kasalukuyang siyentistang Pilipino. Ang kanyang galing at pagmamahal sa bayan ay sumasalin sa ating mga siyentistang patuloy na tumutuklas ng mga bagong kaalaman para sa ikauunlad ng buhay ng kanilang kapwa Pilipino. Patunay ito ng makabagong uri ng kabayanihan: ang paglilingkod sa bayan,” Secretary de la Peña added.

Deep diving to the life of Dr. Rizal and learning the other facets of his character, especially those usually not discussed in a mainstream level, would start or create societal impact for us right now. Knowing the narratives about his curiosity and eagerness to make a difference in conserving our biodiversity will give us an idea that all of us can be naturalists just like Dr. Rizal. In the end, each of us can truly contribute significantly to explore and maximize the benefits provided to us by our natural resources despite not having a title of a biologist, zoologist, or a taxonomist. *(With information from Jil Danielle Caro)*

ANG MGA WALANG PANGALANG KULISAP NI PEPE

Romel G. Samson

Palaging balisa ang kaniyang magdamag sa Dapitan.
Ang mga alaala ng usapan ng pagbabalik

ay nalulunod na sa mga huni ng kulisap.
Sa libot ng durungawan,

ang mga kalat na tunog sa dayuhang dilim
ang nagpipiit sa matinding kalungkutan

at pagmamahal niya sa bayang nabibingi
sa ingay ng kasinungalingan. Naglipana ang hayop

sa paligid at nakikiniig sa nakahawla niyang buhay.
Mga kaulayaw, na tulad niyang itinaon,

ay walang pangalan. Alaala ng dinanas
na kalapastanganan ang munting dragong

lumilipad, lumilipat sa panig ng kalaban
at siya'y munting uwang sa kaliitan

at pangmamaliit pa ng nangangamkam.
Tila triburon ang kahayupan ng dayuhan,

itong kababaya'y mga hamak na kuming
kumakapit na lamang sa kaya nilang panghawakan.

Ang bawat araw ay pinulot na kabibe
sa dalampasigan ng dalamhati.

Tatlongdaan apatnapu't anim at higit pang
tila mga luha sa kaniyang sawing palad.

Mga mumunting buhay na tinitipon,
ipinadadala sa kaibigan sa ibang bansa,

bago pa nakilala sa sariling bayan.



PAGI

(Batay sa guhit ni Jose Rizal)

Enrique S. Villasis

Diablo del mar. Ang una niyang pagkakakilala sa nilalang na
Naaninaw sa sanktuwaryo-dagat sa Singapore. Banayad
Ang pagaspas ng tila kinaliskisang bagwis habang nangangapa

Ang sungay at bibig nito ng makakain sa ilalim ng buhangin.
Napapanatag ang tetanadong buntot nito sa huwad na lalim
Ng kinalalagyan. Salaysay sa kanya ni Lopez-Jaena, sapat

Ang isang latay upang umimpis ang pinatabang kabayo; isang
Guhit sa hangin upang magpabahag ng buntot sa nakaangil na aso
At mapatupi sa sindak ang mga wakwak. Itong buntot-pagi

Ang sagisag panakot ng mga prayle. Laging may kawikaan
Matapos humalik ng hapdi sa dibdib ng kanilang mga alipin.
Hijodeputa. Liham ni San Pablo sa mga taga-Roma.

Kaya hindi maalís sa kanyang isip ang fray botod na nakalublob
Sa payapang dagat: lumalapat ang abito sa tubig, naghuhugis-
Pagi sa saliw ng tabsing. Ngunit bilang biolohista, batid niya

Ang amo ng pinatuturingang halimaw. Kaya naging guryon ito
Kasama ng mga ulap sa Calamba: kiyapo sa palad ni Leonor:
O kapares ng tsinelas na pinaanod sa ilog ng kanyang kabataan.

Dr. Jose Rizal, an Ophthalmologist with a Clear Vision

By Mark Lavien R. Inocencio & Jasmin Joyce P. Sevilla

Perhaps the most prestigious title that Jose Rizal is known for, aside from a prolific writer and a national hero, is a medical doctor. One may wonder—why did Rizal enter the field of medicine, specifically ophthalmology? In fact, his recognitions as our national hero and as a doctor are rooted on a common ground—his deep love for his countrymen and for his own mother, who incidentally was his first patient.

He wrote the novels *Noli Me Tangere* and *El Filibusterismo*, among many others, primarily to open the eyes and minds of his beloved countrymen who were then under an oppressive rule of the Spaniards. On the other hand, he wanted his own mother, who had cataract on her left eye, not to lose her sight. Rizal wanted both of them healed—to bring vision to his fellow Filipinos with his writings and to save her mother's eyesight through his study of medicine.



Dr. Rizal is treating a European patient as a lady watches on.* (Photo from the Presidential Museum and Library)

*According to the Presidential Museum and Library, "Historians, however, debate the authenticity of this photograph; some assert that it is a still from a now-lost silent film on Rizal."

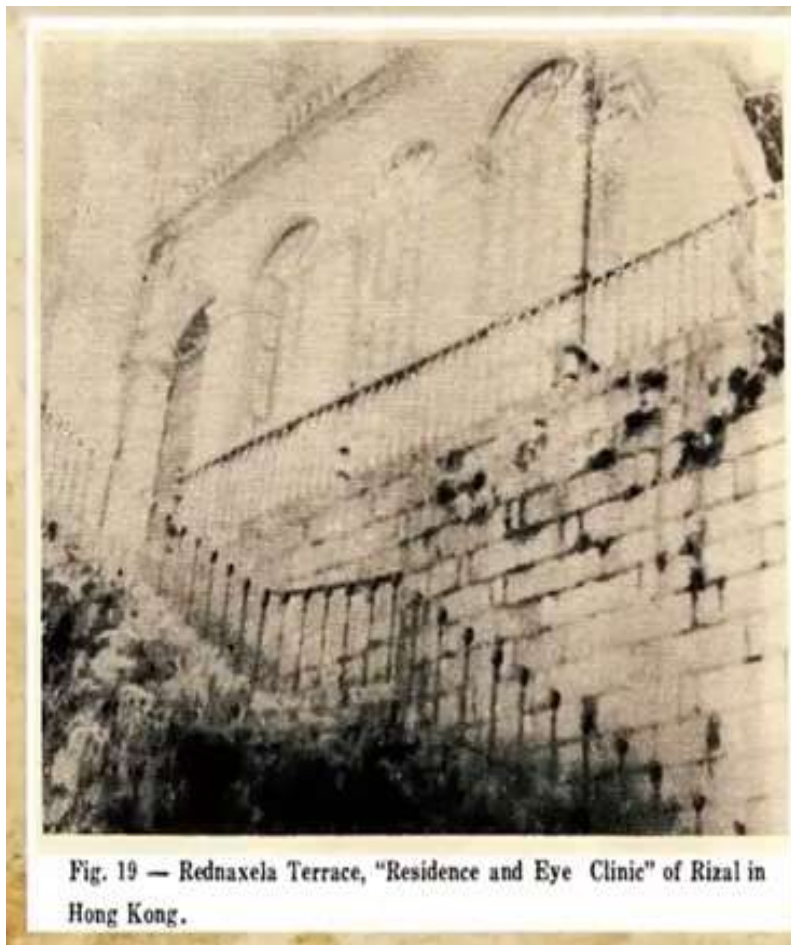
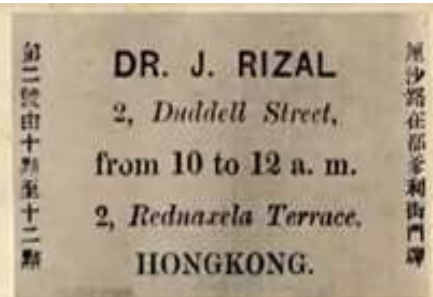


Fig. 19 — Rednaxela Terrace, "Residence and Eye Clinic" of Rizal in Hong Kong.



A photo of Rizal's eye clinic in Hongkong (left) and photos of his business cards as ophthalmologist (right) shown during the "Dr. Jose Rizal, a Medical Scientist" webinar

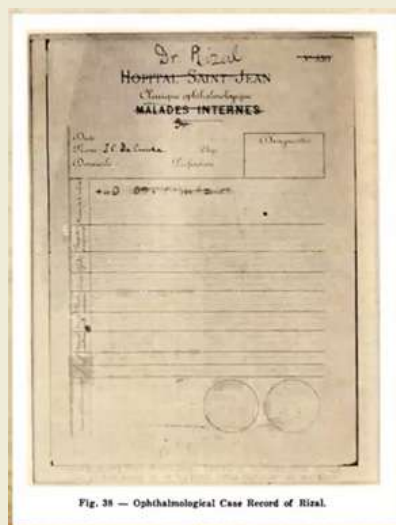


Fig. 28 — Ophthalmological Case Record of Rizal.

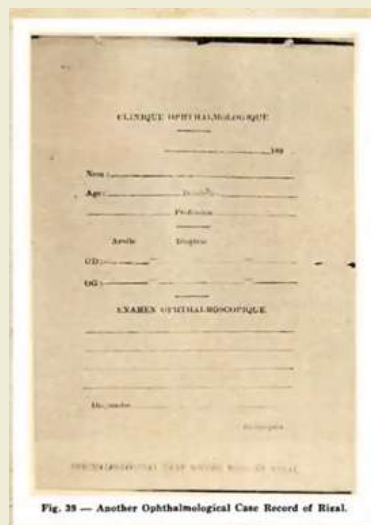


Fig. 29 — Another Ophthalmological Case Record of Rizal.

Rizal's case records as ophthalmologist (Snippet from the “Dr. Jose Rizal, a Medical Scientist” webinar)

Rizal, a Medical Scientist

Dr. Jose P. Rizal, as a freedom fighter, educator, and advocate of science, is widely celebrated for the inspiration he brings in the field of medicine to this day. While in Europe, he studied the science of eyes under the famous French ophthalmologist, Louis de Wecker. He also worked as an assistant to Otto Becker, a professor of ophthalmology at the University of Heidelberg in Germany.

With his medical training, Rizal finally fulfilled his dream of caring for his mother. He personally performed cataract surgery on his mother's left eye which became successful. The said operation was recognized as the first of its kind ever done during his time.

Like wildfire, his popularity as an eye doctor spread and he became famous for his brilliance. People from all over the country, even from China, came to him to be examined. This inspired Rizal to open a small clinic and provide free medical services particularly to those with fewer means.

Dr. George Aseniero, a native of Dapitan and a Rizal expert said that Rizal did not charge the poor and even offered his homestead to those who needed to be confined but cannot go home due to their medical condition.

He added that his grandfather, Jose Aseniero, was one of Rizal's students in Dapitan and was one of the 'lucky ones' to have had the best secondary education possible in the Philippines during that time when it was a privilege.

“The curriculum that he followed was very modern— an education that was supposed to train students to respond to the opportunities and challenges of the times, and so he emphasized the sciences, the mathematics, the languages...,”said Dr. Aseniero

in the “Dr. Jose Rizal, a Medical Scientist” webinar organized by the Department of Science and Technology – Philippine Council for Health Research and Development (DOST-PCHRD) on 25 January 2022.

Meanwhile, Leticia de Ocampo Elegado, daughter of National Scientist Geminiano de Ocampo who studied the life and works of Jose Rizal, said that her father's learnings and experience were inspired by the mission of the national hero.

“My father, Dr. de Ocampo, had an early admiration for Dr. Rizal. His choice of career was all because of his idol. Both Rizal and my father had the same mission in life, which was to make the eyes of their mothers clear and see better. What my father did was to follow the life of Rizal and read his life and everything that he did. That's why he [became] an ophthalmologist,” she said.

In the same webinar, DOST Secretary Fortunato T. de la Peña trumpeted Dr. Rizal's valued characteristics as a hero, scientist, and doctor.

“While his contributions in fighting for our country's independence are undeniable and well known, his career in science also proves to be an admirable example for aspiring scientists, researchers, and medical practitioners. Parallel to our mission at the Department of Science and Technology, Dr. Rizal pursued Science For The People,” de la Peña said.

For his part, Dr. Jaime C. Montoya, Executive Director of DOST-PCHRD, honored Rizal for his contributions to science and medicine. He also recognized all frontliners and medical practitioners who are leading the fight against COVID-19. *(With information from the Philippine Journal of Ophthalmology)*

CASA REDONDA
Natalie Pardo Labang

Saksi ang walong sulok
sa pagtanggap ng katarata
sa mata ng iyong ina
*(ang pinakauna at matagumpay
na operasyon sa mata),*

sa mga pasasalamat
ng lahat ng taong
naibsan mo ang karamdaman.

sa pag-ambag
ng dunong at asal
sa iyong mga mag-aaral,

sa pagsiyasat
sa iba't ibang organismo,
sa lumilipad na butiki,
salagubang, at palaka,

sa iyong mga naisulat at natuklasan.

Munti man itong kubol,
malawak ang karunungan
dito ay iyong pinaalingawngaw:
karunungan nagsulong at nagpalaya.

**Ang Casa Redonda ay isang munting kubol na
nagsilbing klinika ni Rizal sa Dapitan at espasyo
para sa kaniyang agham, sining, at pagtuturo.
Ito ay may walong sulok.*

Ang Ambisyosong Istetoskop

Kuwento ni: Luis P. Gatmaitan, M.D.

Guhit ni: John Carlo F. Rustia

Mahigit nang sandaang taon mula nang likhain si Istet, isang mamahaling istetoskop na yari sa pinakamahuhusay na materyales sa Europa. Nang panahong 'yon, ang mga istetoskop ang itinuturing na pinakabagong imbensyon sa daigdig ng panggagamot. Sila ay ginawa upang mapakinggan ng mga doktor ang mga nangyayari sa loob ng katawan ng pasyente. Si Istet ay kakaiba sa lahat. May pagkasuplado siya sapagkat ayon sa kaniya, "ako ay gawa sa bayan ng mga Kastila."

Ambisyoso si Istet.

Gusto niyang sumikat at makilala sa buong daigdig.

Isang araw, may dayuhang doktor na nagkagustong bumili sa kaniya. Pero halos magkubli siya sa likuran ng mga kasamahang istetoskop sa estante.

"E, paano, tingnan mo naman ang medikong bumibili sa akin," reklamo ni Istet. "Maliit ang tindig at kayumanggi ang balat!"

"Doktor din naman siya a!" pagtatanggol ng kasamahang istetoskop.

"A, basta! Hindi siya ang gusto kong magmay-ari sa akin. Gusto ko'y kagaya rin nating Espanyol! Kung sa kanya ako didikit, paano ako sisikat?" Iwinagayway pa niya ang munting tarhetang nakasabit sa leeg niya na may nakasulat na 'Hecho en Espana.'



Walang nagawa si Istet nang bitbitin na siya ng medikong kung tawagin ay Pepe. Ayaw na kasi siya nitong bitawan. Abot-tainga ang ngiti nito nang siya'y mahawakan.

Inis na inis naman si Istet. Bilang ganti, madalas ay nagbibingi-bingihan siya kapag itinututok na siya sa dibdib at likod ng mga pasyente nito.

Masinop ang kayumangging doktor. Maingat niyang inilalagay si Istet sa kanyang bag na itim, kung saan ay nandoon din ang iba pa niyang gamit-panggamot. Agad niyang pinupunasan si Istet matapos gamitin. May espesyal pa nga siyang lalagyan para kay Istet sa loob ng bag na itim.

Isang gabi, narinig ni Istet ang kuwentuhan ng mga kasamahan tungkol kay Pepe.

"M a h u s a y manggamot ang kayumangging doktor!" pahayag ni Popoy Porsep.

"Kahit ang mga walang pera ay ginagamot din niya!" sabi naman ni Gringga Heringgilya.

"Hindi siya agad-agad napapagalit ng makukulit na pasyente," sabi ni Teroy Termomiter.

"At magaling din siyang manunulat!" tugon ni Iska Iskalpel.

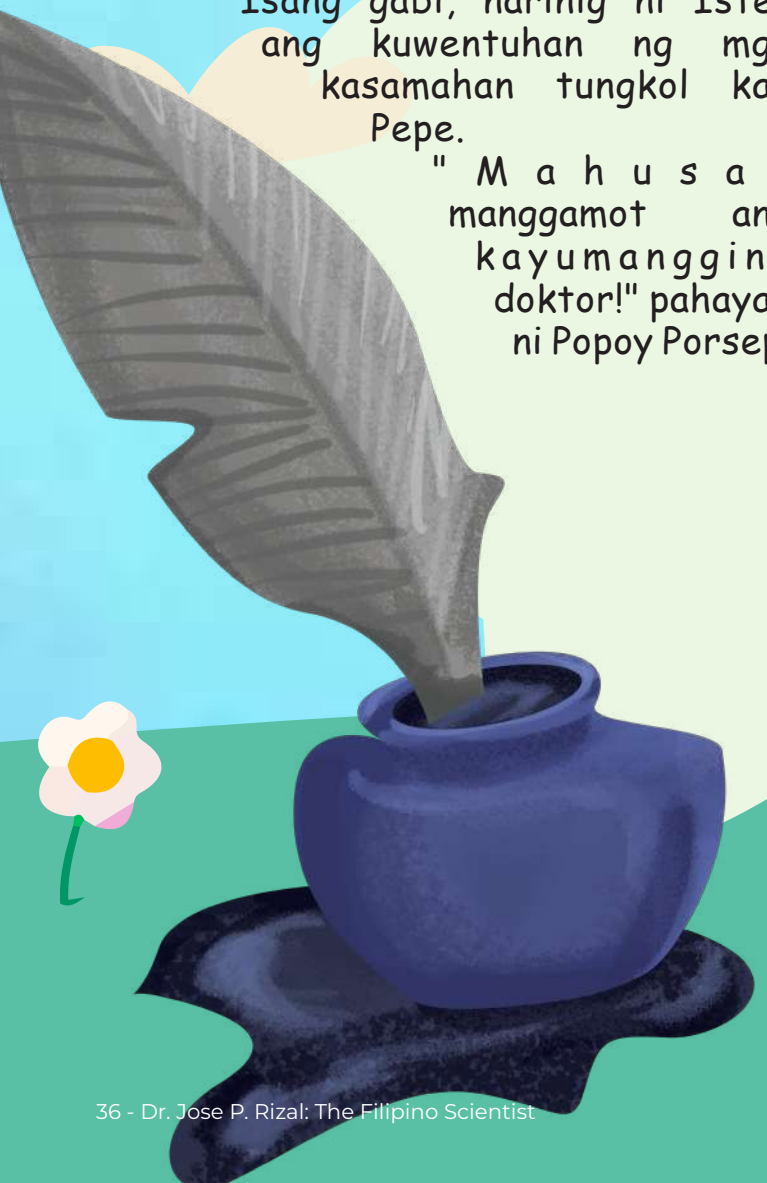
Biglang sumingit si Istet sa usapan. "Si Pepe, manunulat?"

Nagpaliwanag ang isang lumang pluma na kanina pa pala nakikinig. "Istet, matagal na akong kasama ni Pepe kaya kilalang-kilala ko na siya," pagpapakilala ni Pen-Pen Panulat. "Oo, tama ang narinig mo. Si Pepe ay isa ring manunulat."

Natuwa si Istet sa narinig. "Kung totoo ngang magaling na manunulat si Pepe, bukod sa doktor pa siya, may pag-asa ngang matupad ang mga pangarap ko," sabi ni Istet. "Kapag sumikat si Pepe, siyempre, pati ako!" Yumukod pa si Istet sa mga kasamahan, akala mo'y sikat na sikat na.

Nayabangan kay Istet ang mga instrumento sa loob ng bag na itim. Pinaligiran nila ang ambisyosong istetoskop at sabay-sabay sinabing

*Ang pagsikat di dapat hangarin
Kusa itong dumarating
Ano ang dapat gawin?
Aba, trabaho'y paghusayin!*



"Naku, bago pa lang si Istet dito. Pagpasensiyahan n'yo na!" pagtatanggol ni Pen-Pen Panulat.

Isang umaga, nagtaka si Istet nang hindi siya binitbit ni Pepe. Akala niya'y wala lang itong pasok sa klinika. Ngunit kinabukasan, at nang sumunod pang mga araw, hindi pa rin siya ginagamit ni Pepe. Sumilip siya mula sa bag na itim at laking-gulat niya nang makitang si Pen-Pen Panulat ang hawak-hawak ni Pepe. Seryoso ang mukha ni Pepe habang isinasawsaw nito si Pen-Pen Panulat sa munting sisidlan ng tinta at pagkatapos ay waring ikakaskas ito sa papel. Pumasok ang matinding selos at inggit sa puso ni Istet.

"May bago nang paborito si Pepe," bulong niya.

Dahil dito, lakas-loob niyang kinausap si Pen-Pen. "Bakit mo inaagaw si Pepe sa akin?"

Mahinahong nagpaliwanag si Pen-Pen, "Istet, huwag ka nang magtampo. Balangaraw, maiintindihan mo rin kung bakit kami sumusulat ng aklat. Halika, ipakikilala kita kina *Aklat Noli* at *Aklat Fili*."

"Hmmmpp!" Umismid lang si Istet.

"Hay naku, Istet, hindi mabuti para sa iyo ang lagi kang bugnutin," pahabol pa ni Iska Iskalpel.

Pinagdududahan pa rin ni Istet si Pen-Pen. Kaya isang gabi, habang nahihimbing si Pepe, sinubukan niyang silipin kung ano ang nilalaman ng aklat na pinagkakaabalang sulatin ni Pepe at ng kasabwat nitong si Pen-Pen.

"Aba, masasama pala ang ugali ng mga frayleng Kastila!"

"Sino itong mga binabanggit na indio?"

"Aping-api naman ang mga kababayan ni Ibarra..."

"Magkakatuluyan kaya sina Ibarra at Maria Clara?"

Marami pa siyang natuklasan sa aklat na 'yon. Mula noon, kapag tulog na ang lahat, dahan-dahan siyang bumabangon upang buklatin ang aklat at subaybayan ang nangyayari sa mga tauhan ni Pepe. Hangang-hanga siya kay Ibarra. Ngitngit na ngitngit naman siya kay Padre Damaso.



Hindi nagtagal at nagbalik si Pepe sa kanyang bayan at dito'y nakaharap ni Istet ang mga taong kakulay ng balat ni Pepe. Noong una'y umiral ang selan niya. Amoy-pawis at amoy-araw kasi ang karamihan sa kanila. Pero naisip niyang ito marahil ang tinutukoy na mga aping tauhan sa aklat ni Pepe. Kaya pinaghusay niya ang pakikinig sa mga tunog, tibok, at hinga ng mga kababayan ni Pepe.

"Magaling ang doktor na galing sa Madrid!" sabi ng mga taong nagpapagamot.

Pero napansin ni Istet na minsa'y may mga taong nagpapakonsulta pero hindi tungkol sa karamdaman nila. May iba silang binabanggit bukod sa lagnat, sakit ng ulo, at sakit ng tiyan.

Nagrereklamo ang mga ito sa pagmamalabis ng mga Espanyol. Narinig din ni Istet na nagagalit daw ang mga Kastila kay Pepe. Bigla niyang naalala sina *Aklat Noli* at *Aklat Fili*.

"Alam mo Istet, may sakit ang ating lipunan," sabi ni Pen-Pen. "Kaya lang, ang sakit na ito ay di simpleng ubo, sipon, tigdás, TB, at pagtatae lamang. Gustong gamutin ni Pepe ang sakit na ito kaya nagagalit ang mga Kastila."

Kasabay nang pagkamulat ay nasabi ni Istet, "Pen-Pen, kahanga-hanga pala talaga si Pepe..."

Hindi sukat-akalain ni Istet na dahil lamang sa mga sinulat na aklat ni Pepe ay ipinadakip ito ng mga Kastila. Napadpad tuloy sila sa Dapitan, isang bayang malayong-malayong-malayo sa Maynila.

Umuusok na tambutso si Istet. "Wala na sa katwiran ang mga Kastila! Sobra na'ng pakikialam nila!" reklamo niya kay Gringga Heringgilya na agad namang sumang-ayon at nagsabing, "Hayaan mo't tutusukin ko sila!"

Sa harap nina Pen-Pen, Popoy, Teroy, Gringga at Iska ay hiyanghiya si Istet. Halos itatwa niya na siya ay gawa sa Espanya.

"K-Kayo ba'y nagagalit sa akin?"

Umiling ang mga kasamahang gamit-paggamot ni Pepe. "Bakit mo naisip 'yan, Istet?"



"Kasi, di ba't Kastila rin ako? Di ba't sa Espanya ako nilikha?" Maluha-luha na si Istet. "Hiyang-hiya ako kay Pepe at sa kaniyang mga kababayan." Ilang saglit pa at pinunit na ni Istet ang munting tarhetang nakasabit sa kanyang leeg na nagsasabing siya'y 'Hecho en Espana.'

"Wala kang kasalanan, Istet. Hindi naman ang lahing Kastila ang inaayawan ni Pepe kundi ang pamamalakad nila sa ating bayan," paliwanag ni Pen-Pen. "Wala nang mas marangal pa kaysa sa mga taong nagmamahal sa sarili niyang bayan."

"A, basta, tutusukin ko sila!" sabad ulit ni Gringga Heringgilya.

"Ako, hihiwain ko sila!" segunda ni Iska Iskalpel.

"Iipitin ko sila!" banta ni Popoy Porsep.

Kalmadong namagitan si Teroy Termomiter. "Huminahon tayo. Huwag daanin sa init ng ulo ang mga bagay-bagay..."

Dahil sa mga nangyari, lalong napalapit ang loob ni Istet kay Pepe. Hinangaan niya ang doktor na dati-rati'y di niya pinapansin. Mali ang pagkakahusga niya kay Pepe. Wala pala sa lahi at kulay ang ikinagagaling ng isang tao. Nakalimutan na ng supladong istetoskop ang kaniyang pinapangarap na pagsikat.

Isang umaga, hindi na nagisnan ni Istet sina Pepe, Pen-Pen, at Gringga. Hinanap din niya sina Popoy, Teroy, at Iska. Ipinagtanong-tanong. Subalit walang makapagsabi kung nasaan sila. Labis ang pagtataka niya sa biglang pagkawala ng mga kaibigan.

"Siguro'y nakakita na ng bagong istetoskop si Pepe. Mas bago, mas makintab, at siguro'y mas malakas ang pandinig," hinaing ni Istet. "Iniwanan na niya ako..."



Isang malalim na buntong-hininga ang pinakawalan ni Istet.

Lumipas ang maraming taon. Isang araw, may mga panauhing dumating sa lumang klinika ni Pepe sa Dapitan. Bagama't luma na si Istet at puno na ng alikabok, malinaw pa rin niyang naririnig ang usap-usapan ng mga lalaking ito. Binabanggit nila si Pepe. Ipinasusundo na ba siya? Dadalhin sa Maynila?

Saan na naman kaya kami maglilibot ni Pepe?

Kasama kaya niya sina Pen-Pen at Gringga?

Ano'ng nangyari kina Teroy, Popoy, at Iska?

Nakatulugan na niya ang pag-iisip.

Idinuyan siya sa pagkakaidlip ng mahabang paglalakbay.

Nagulat si Istet nang magmulat ang kanyang mga mata.

"Aba, nasaan ako? Sino kayo?" ang kaniyang tanong sa maraming pares ng matang nakatunghay sa kaniya doon sa kuwadradong sisidlan na napaliligiran ng salamin. Ngunit parang walang nakarinig kay Istet.

Noong una'y natakot siya at nabahala. Pero

nang titigan niya ang mga mata nito, ang nakita niya roon ay paghanga.

"Tek, teka... ano itong naririnig ko? Ako raw ang pinakasikat na istetoskop sa balat ng lupa dahil inari raw ako ni Pepe?" naguguluhang tanong ni Istet. "Aba'y bakit? Ano ba'ng nangyari kay Pepe?"

Iginala niya ang kaniyang paningin.

Sa isang sulok ay nakita niya sina Pen-Pen Panulat, pati na sina Gringga, Popoy, Teroy, at Iska, na nakahiga rin sa kamang katulad ng sa kaniya. Marami ring mata ang nakasilip doon. Hindi sinasadya'y napatingala si Istet sa katapat na dingding. Doo'y nakita niya ang isang malaking kuwadro ni Pepe. Nakaharap ito sa direksyon niya. At nakangiti.

Noon lamang napagtanto ni Istet na ang dayuhang muntik na niyang isnabin sa Espanya ang hinirang na pinakadakilang bayani ng bansang Filipinas.

Natupad pa rin ang pangarap ni Istet.

Ngunit para sa kanya, sikat man o hindi, ang higit na mahalaga'y magkasama na silang muli ng kaniyang kaibigan...

Doon sa museo.

Ang Ambisyosong Istetoskop (The Ambitious Stethoscope) ay likha ni Luis P. Gatmaitan, MD. Ito ay inilimbag ng Adarna House Inc. noong 2000.

Rizal's Aspiration: Innovating Essential Public Services for Public Good

By Mark Lavien R. Inocencio

"Man is not an animal nor a machine. His goal in life is not to work for people but to discover his happiness and development as a human being."

Jose P. Rizal

Over the years, a child's awareness of his or her environment flourishes and undergoes constant awakening and reawakening. Emerging as it is, it pierces their mind that is full of ideas and curiosity. Eventually, in their spirit their dreams form that will guide their growth and personal development.

Early in his life, the young Jose Rizal had already shown his talent and wisdom. Even at a young age, Rizal was very curious about the different things around him. Alongside his thirst for knowledge, he also showed assertive humor in various areas of learning and excelled in academics.

Along with the development of his knowledge, dreams and innovation, Rizal's mind became like a sponge that could absorb much in a collective manner. He studied Philosophy, Arts, Land Surveying and Assessment, and Medicine, and later on applied all the knowledge to support and develop various innovations that had greatly helped his fellow Filipinos during his time.

Rizal's Prolific Dapitan Exile

How is it that our national hero was also an innovator and engineer who developed concepts and ideas that had a big impact? And why would we call him an innovator?

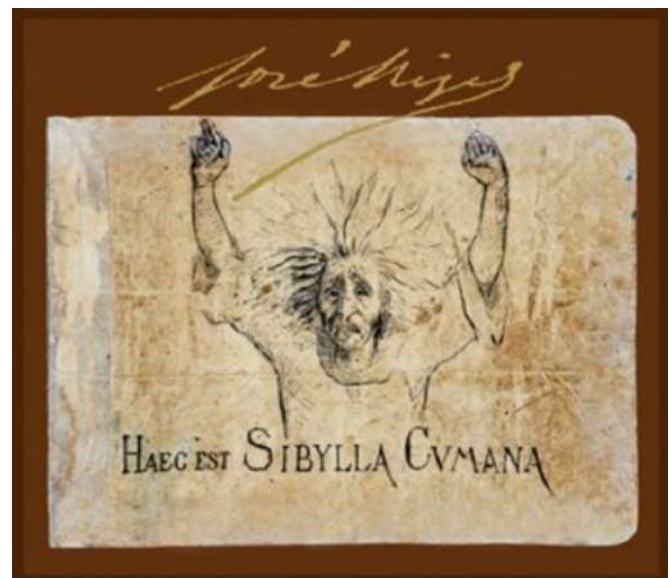
We can say that everything that is new to us—methods, ideas, and products—are innovation, something that has become possible from the impossible, an invention, a modification, or modernization of something that has been done before. In Dapitan, where he was exiled, Rizal created useful things that were not there before. The situation in the community spurred Rizal's creative mind to apply his learnings from his studies and travels and come up with his own innovations.

While in Dapitan from 1892 to 1896, Rizal became quite detached from his revolutionary persona and took on a more scholarly pursuit. He focused on studying the environment and conducted research in the areas of public health, livelihood, and public works, among others, that later proved to be helpful to many people in Dapitan.

Rizal immersed himself in the community and discovered scientific solutions that benefited the people. Having a natural inclination for agriculture, he introduced an improved fishing net called pukutan that helped increase fish yield, which he learned from fisherfolks in his hometown of Calamba.

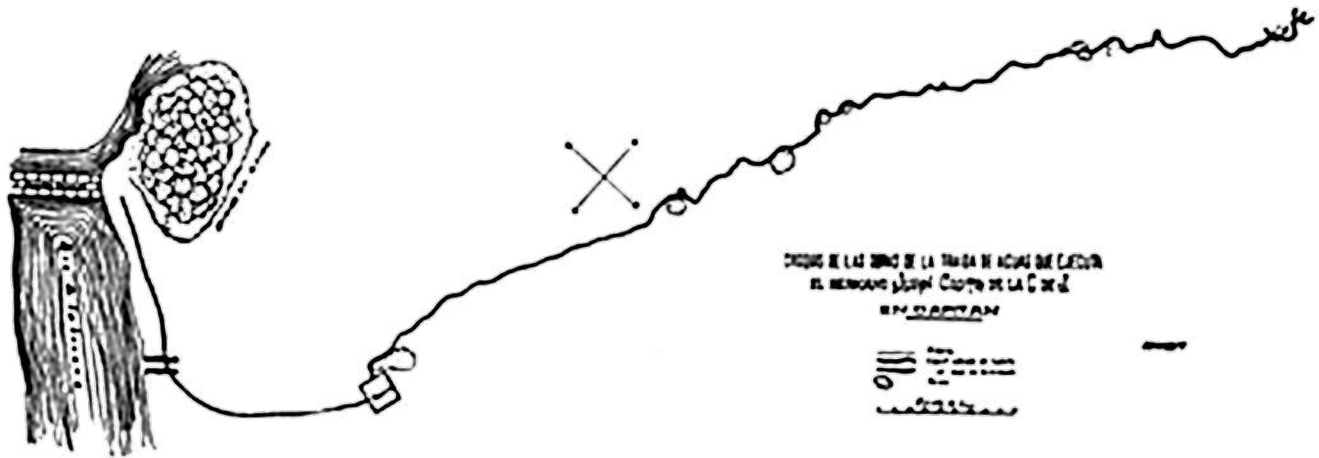
To further help the small farmers, Rizal imported farm machinery and implements from the United States at his own expense.

His continued subscription to various scientific magazines such as the Scientific American kept him updated with the latest developments in the global scientific community. Finding much value in the information he received, he invented the first brick-making machine that could produce 6,000 bricks a day based on his estimate.



An image of a reproduced La Sibylla Cumana board game (Source: Haec est Sibylla Cumana by Jose Rizal Facebook page)

Even in his leisure time, Rizal never stopped creating. He invented a fortune-telling board game he called La Sibylla Cumana. According to an article of Randy David for Inquirer.net, the mechanics of the game are simple. Players will take turns in choosing from a list of 52 questions dealing with personal issues. A player will be asked to remember the question's number while the wooden top with eight sides is spun. The Roman numeral that appears face up indicates the number of the answer. That player will then consult the table containing 52 rows and 8 columns. The number in the box where the first and second numbers meet will reveal the page number in the book where the answer to the question can be found. It is also believed that the board game holds some mysteries such as a possible secret message derived from the selection and arrangement of numbers on the game that has not been decoded.



Plan of the waterworks for Dapitan constructed by Dr. Rizal and the Jesuit lay brother Juan Costa. Rizal's name was omitted for political reasons.

Sketch of Linao waterworks drawn by Jose Rizal from Austin Craig's *Lineage, Life and Labors of Jose Rizal, Philippine Patriot*, 1913 (Source: National Historical Commission of the Philippines)

Innovation and Shared Discoveries

Rizal's innovations stemmed from his education, encounters, and experiences during his many travels in Europe and in other places, which he brought to communities like Dapitan.

Rizal showed his passion for agriculture when he formed the abaca planter and harvester's association in Dapitan to which he personally wrote the by-laws. He wanted the planters to improve their products, effectively market the abaca, and establish a cooperative store that would sell their outputs at a moderate price.

As *Perito Agrimensor* or land surveyor, Rizal helped mark Dapitan's streets, which are still being used to this day. His introduction on the use of streetlights using coconut oil benefited the community that had no such light source for a long time.

He is also credited for his works in the Linao waterworks, a system that allowed water to flow from the hills down to the towns of Talisay and Poblacion through gravitational force. Some parts of the waterways remain intact to this day although they are no longer being used.

He also advocated for the improvement of public health in the community to prevent the spread of mosquito-borne diseases and other disease-carrying parasites by pumping out and sanitizing swamp water.

As a medical doctor, his research on freshwater snails led him to the discovery of the parasite that caused Schistosomiasis disease. The disease, according to Rizal, could infect the urinary tract or the intestines and would cause symptoms such

as abdominal pain, diarrhea, bloody stool, or blood in the urine. It was believed then that those infected for a long time could experience liver damage, kidney failure, infertility, or bladder cancer. Rizal also surmised that this could result in poor growth and learning difficulty for children.

Moreover, Rizal conducted medical missions in far-flung areas to attend to the sick who had no means or access to medical care.

Streaming Legacy of Innovation

Perhaps we can say that some of Rizal's innovations were applications of ideas that originated elsewhere or from the more advanced places he had visited. However, for the communities he helped, these were instruments to improve their lives.

In Rizal's short life, he demonstrated skill and ingenuity in his creations. We can only conclude that Rizal probably enjoyed the fruits of his labor or passion, especially when he knew that his works made the people around him content and pleased.

His notable deeds had inspired our people to seek knowledge and excellence and to share them to others for the greater good.

Thus, the legacy of our admired national hero remains rooted to this day and will continue to resonate from this generation to the next. Knowing more about Dr. Jose Rizal for who he was and who he is today goes beyond knowing our history; knowing Rizal up close will hopefully inflame a strong desire to follow his footsteps in using science for public good and to change the lives of Filipinos. *(With information from Joy M. Lazcano and Historian Eufemio Agbayani III)*

MAKULIT NA BATA ANG SIYENSIYA

Genesis Roy D. Historillo

Makulit na bata ang siyensiya na nang tumanda'y
Naging eseptiko. Ipinaglihi siya sa kuryosidad,
At mula nga nang magmulat ang muwang sa mundo,
Walang ibang bukambibig kundi ano, bakit, paano.
Likas na malikot ang kaniyang kamay na ang lunggati't
Libangan ay himayin ang lahat ng lawas ng umiiral.
Lahat ng mahawakan: laman, dahon, bato, tubig, bakal,
Pati hangin, tunog, liwanag kung masalat ay titistisin
Upang ilantad ang hibla ng kaalamang naghihintay
Tuklasin. Aliw na aliw siyang bigyan ng pamilya't
Pangalan ang anumang masukat ng kaniyang masid.
Kayâ, lálakí siyang baliw na baliw sa saliksik, ginagabi
Sa laboratoryo't ang tanging luho'y bagong aparato.

Kung madatnan ang siyensiyang tahimik o tulalang
Nakatanaw sa mga tala, hayaan lang at marahil
Naghahabi ng mga teorya tungkol sa orihen ng uniberso.
Alangan siyang manalig sa banal na Lumikha ng lahat,
At mas naniniwala sa nakikita. Bagaman yumuyukod
Siya sa matatandang alamat, tumataas naman ang kilay
Sa babala ng pamahiin, at umiiling sa kuwentong
Aswang, multo't lamanlupa. Pruweba pagkatapos
Ng pruweba kung ibunyag niya ang lihim sa likod
Ng bawat himala. Gayunman, kayhirap kilalaning kaaway
Ng paniniwala ang siyang nagmulat ng mata ng lipunan
Sa katotohanang bilog talaga ang daigdig,
Na hindi ito ang inaakalang sentro ng sansinukob.

Paglaon, makikilala ng siyensiya ang ina ng lahat
Ng imbensiyon na nasa matinding pangangailangan.
Tila tulak ng kalikasang tutugon ang siyensiya sa tulong
Ng karunungan nilikom sa mahabang panahon.
Mula sa pagadadaop ng dalawa isisilang ang marami't
Makabagong kasangkapang lingkod sa anumang
Kibo't layaw ng sumusulong na sibilisasyon.

ALAALA NG LAMPARA

Virgilio S. Almario

Pambansang Alagad ng Sining sa Panitikan

Retirado at ulyanin, tinubùan ng makapal na sápot
Ang dáting mabini niya't balikat na babasagin,
At may puntod ng mga bagwis na sunóg
Ang kulubot ng kaniyang marusing na bilbil.
Pinagtampuhan ng basáhan ang kaniyang katandaan
Lalo na nang dumating ang walang-usok na ilaw.
Ngayon, ginugulantang lang siyá sa sulok ng estante
Ng mga dabog ng naglalarông musmos at saragate;
Ikinayayamot niya ang walang-gálang na pusa
Pagsibad sa paghabol ng maliliksing dagâ
Lalo't ginugunita ang panahon ng paglalamay
At masiglang paglilingkod ng ningas.

May kuwento noon na isang batàng matalino
Ang nakapanood sa pagsugba sa kaniyang liwanag
Ng mga nasasabik at penitenteng gamugamo.
(Ay! Ang ritwal at sakripisyo ng mga kulisap!)
Diumano, ang batà'y naging bayani at martir
Dahil sa naghahanap ng ilaw sa gabí ng dilim.
At napagmunì niya:
"Sana'y isang batà pa ang aking matanglawan
Bago ako tuluyang mawalan ng kabuluhan..."
At lumalakas ang gayong kutob at pangangarap
Kapag may kamay na umapuhap nang maingat,
Mabilisang palinawin ang kaniyang kristal,
At ang upód nang mitsa'y piliting magliyab
Dahil pumapalya ang daloy ng elektrisidad.

Rizal in 3D: Evolution to the Fourth Industrial Revolution

By Joy M. Lazcano



Ginno Jaralve in his visit at Museo ni Jose Rizal Calamba, Laguna.

Ginno Jaralve has visited, to date, a total of 160 Jose Rizal monuments around the world. His passion in curating Rizal monuments started out as part of an experiment for his students when he asked them to read Nilo Ocampo's article "*Ang Bayani Sa Plaza.*"

The article mused primarily at how Rizal was depicted in many statues wearing an overcoat, a western traditional apparel instead of the native tapestries.

In an Esquire article, Jaralve shared that he asked his students to visit and compare each Rizal monument that they can see in Marikina and observe Ocampo's claims.

What he and his class discovered was that each monument is different from each other. "We learned that Jose Rizal's monuments would vary in each place it is found. Most of these are found within campus grounds or outside government buildings," explained Jaralve.

This simple activity led Jaralve to his own journey and started him off to visit as many Rizal monuments as he could. He revealed that more than the sculpture, his travels to different Rizal monuments advocated the true ideals that Rizal espoused.

"I want people to appreciate how Rizal transcends cultures and people as evidenced by the presence of his monuments in many places around the world," said Jaralve. "He is a greatly admired figure not only in the Philippines but also around the world."

Although at present, there is still no official count of the number of Rizal monuments built here and abroad as the list continues to grow. But it is safe to surmise that Rizal has captured the hearts of the world in more ways than one.

In fact, there were other monuments that associated their design on Rizal's profession, expertise, and capabilities such as the one in Sta. Cruz, Laguna, officially considered as the biggest in the country.

The 26-ft tall monument depicted Rizal as a sportsman—sculpted in a fencing stance and holding an epee on his right hand—built by the provincial government ahead of the *Palarong Pambansa* which it hosted in 2014.

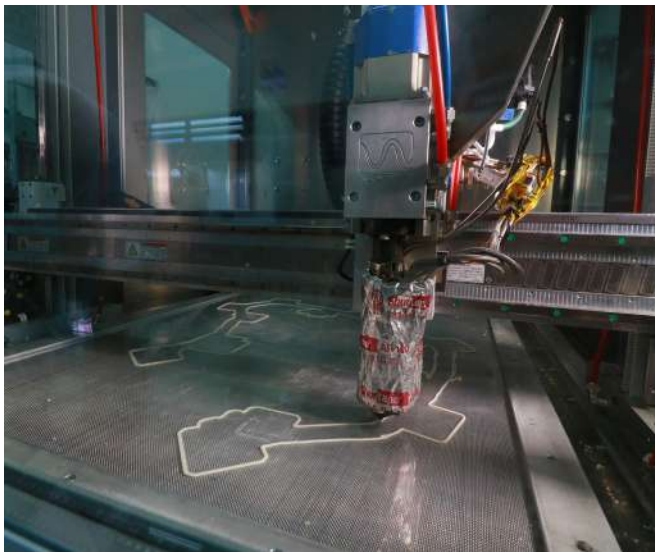
And in commemoration of Rizal's 125th year of martyrdom in 2021, another monument was built in his honor.



The Advanced Manufacturing Center (AMCen) of the Department of Science and Technology-Metals Industry Research and Development Center

3D-printing brings life to a hero scientist

Dubbed as Dr. Jose P. Rizal: The Filipino Scientist, the 12.5-ft high monument was built using 3D-printing technology—the emerging state-of-the-art technology used in manufacturing as a tool



for rapid prototyping. This aims to revolutionize the modern needs of the global manufacturing industry and showcase the country's capability in using technologies and sustainable materials in creating complex structures, a fitting tribute to Rizal who is also a scientist and innovator.

The statue does not only showcase Rizal's inclinations and contributions in science but also redirects the attention of our people to the country's technological resurgence in the form of additive manufacturing technology.

The Advanced Manufacturing Center

In line with the government's medium-term goals to achieve a globally competitive manufacturing sector, the country would need to create a manufacturing innovation ecosystem that is capable of creating high value products through a combination of institutional actors, enhanced skill sets, technological capacities, hardwares and resource supply chain.

For that matter, the Advanced Manufacturing Center or AMCent of the DOST-Metals Industry Research and Development Center, the state-of-the-art manufacturing research and development hub that is responsible for the development of the 3D-printed Rizal monument, was inaugurated in June last year. AMCent presents itself as an innovation hub for advanced manufacturing and offer industrial design, development, and rapid prototyping.

The center is poised to put a new face to Philippine manufacturing by offering a top-of-the-line facility for prototyping that would improve the sector's competitiveness. It will help elevate the local manufacturing sector's technological readiness, business sophistication, and innovative capacity.

Recognizing AMCent's contribution in upskilling engineers and future industrial designers, the Department of Trade and Industry Region VII pursued the creation of 30 fabrication laboratories located in select universities in the country that will be complemented by capacity building on 3D-printing, design, and testing, with the assistance of AMCENT personnel.

Additive manufacturing

During the launch of the 3D-printed statue, DOST Undersecretary for Research and Development Rowena Cristina L. Guevara said additive manufacturing (AM) promotes the use of cheap but sustainable additive materials that can withstand different climate-related disasters.

In his message, DOST Secretary Fortunato T. de la Peña quipped that the 3D-printed statue could last another "50 or more years" attributing it to the advancements in additive materials.

According to Wohler's Report 2014, additive manufacturing first emerged in 1987 with stereolithography (SL) from 3D Systems, a process

that solidifies thin layers of ultraviolet (UV) light-sensitive liquid polymer using a laser. The SLA-1, the first commercially available AM system in the world, was the precursor of the once popular SLA 250 machine.

Consequently, 3D-printing became a buzzword due to its easy-to-understand functionality and novelty. It made its way to the country in 2013 when mobile technology was incrementally developing into a multifunctional device and social media was on the rise. However, its adoption has become a bit of a slow burn from there with only a handful of low to mid-level 3D-printing services offering limited functionality of creating toy models and accessories.

But AM's purported potential and benefits encouraged local manufacturing companies to adapt the technology.

Simply described as adding materials "layer-by-layer," AM can complement the traditional subtractive manufacturing, where blocks of solid metal or plastic are shaped through cutting, boring, drilling, and grinding. This could mean more higher savings as manufacturers and designers are enabled to develop more complex designs at a shorter, cost-effective way.

AMCent has made a headway in introducing additive technology to the industry as it partnered with various stakeholders and contributed to several initiatives such as the STAMINA4Space program, which designed and developed the prototype parts for the country's cube satellites under the PHL-50 project, which is considered a milestone for the center.

Under this project, AMCent was tasked to develop the microsatellite bus system containing electronic and structural parts. It also collaborated in developing metal enclosures, frames for cube satellites, and camera baffles.

Dr. Marc Caesar Talampas, project leader of STAMINA4Space PHL-50, recognized AMCen's big role in the rapid development of the said parts.

In another initiative, the Philippine Army's Research and Development Center has tapped AMCen in developing the prototype for the Improvised Explosive Device Distractor, a device that disarms explosive devices by enabling it to explode inside its contraptions without destroying the IED's parts and circuitries.

The project was a success as it was able to develop the materials that can "protect the soldiers from direct contact with the IED," said RDC Director Lt. Col. Crisanto Prado.

The facility is poised to capacitate the industries in increasing its value propositions and gain strong foothold in the fields of aerospace, defense, health and medical services, biotechnology, automotive, and electronics and semi-conductors, among others.

Rizal as a scientist extraordinaire

If only Rizal is alive today, he would jump with excitement at the idea of creating new things using technologies like additive manufacturing. Imagine how he can move and inspire a generation of youth to be more productive through the use of such devices that can improve the lives of many Filipinos.

And while some may view the 3D Rizal monument as just an addition to the number of monuments edifying our national hero, Ginno and the engineers involved in its creation see this differently; it sends a very relevant message to a country that puts science at the backburner—that there will be no progress without adapting to change, keeping an open mind, and embracing science, technology, and innovation.





No place like Home: Rizal the Scientist Exhibit arrives in Calamba

By Allan Mauro V. Marfal

The Museo ni Rizal in Calamba, Laguna has added an attraction to its historical site, thanks to the Department of Science and Technology's (DOST) special exhibit showcasing the significant contributions and impact of Dr. Jose P. Rizal in various fields of science.

The DOST, in partnership with the National Historical Commission of the Philippines (NHCP), led the formal launch of the Dr. Jose P. Rizal: The Filipino Scientist Exhibit on 19 June 2022, coinciding with the 161st birth anniversary of the national hero.

A 2ft x 2ft replica of the 3D-printed monument of Dr. Jose P. Rizal located at the DOST complex serves as the main attraction of the exhibit. Information on the main accomplishments of Rizal as agriculturist, biologist, and medical doctor are also provided to the public.

"Dr. Rizal was an advocate of science and its use to improve the lives of Filipinos. With the many achievements he had, I have reasons to believe that "Pepe" as he was called during his younger days in Calamba, was way ahead of his time as he had already embraced DOST's mantra, "Science for the People," more than a century ago," said DOST Secretary Fortunato T. de la Peña.

NHCP Commissioner Emmanuel F. Calairo also underscored the importance of honoring Dr. Rizal, not only as a patriot, but also as a scientist that transcends time and space as he remains relevant to this day.

"This 3D-printed monument of Dr. Rizal as a scientist is very important to introduce to our youth that the past contributions of our national hero, especially in the fields of science, is not obsolete. He is timeless and we, in the modern generation, can also appreciate his works through various means



like 3D-printing technology,” said NHCP Commissioner Calairo.

The commissioner added that the NHCP is truly grateful to the DOST as the special exhibit is a good opportunity, especially for the young people, to have a better understanding on how technology can immortalize the accomplishments and contributions of Dr. Rizal.

“Kilala natin si Dr. Rizal bilang isang bayani. But he is also a scientist. Gusto rin nating ipamahagi at ipaalala sa kabataan na scientists are also heroes,” said Norly B. Villar, chief of the Communication Resources and Production Division of the DOST-Science and Technology Information Institute.

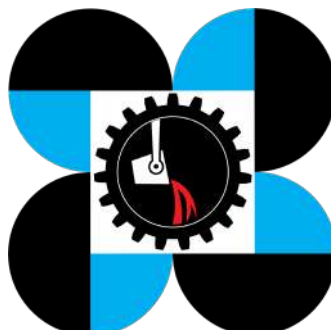
To further highlight the importance of the occasion, no less than National Artist for Literature Virgilio S. Almario paid tribute to our national hero by reciting a poem that he wrote for Dr. Rizal. Members of the Linangan sa Imahen, Retorika, at Anyo (LIRA) were also there to recite poems honoring the life and legacy of the hero.



PARTNERS



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