

PUBLISCIENCE

A RESEARCH JOURNAL OF HIGH SCHOOL RESEARCH

VOLUME 3 ISSUE 1
JUNE 2020

ISSN: 2619-7359



EDITORIAL BOARD

Cheril B. Triol
Leonard Vincent A. Majaducon
Editors-in-Chief

Josua James Angelo Y. Galotera
Treasure Babe M. Horlador
JV C. Galan
JP P. Superficial
Caryl Jane B. Masculino
Mary Yshabelle M. Flores
Cyrus Jehu R. Barrera
Bassy Leiah V. Ibarreta
Editors

Rajo Christian G. Cadorna
Illustrator

Aris C. Larroder
Catherine Joy A. Medodia
Ramon Angelo N. Sinco
Advisers

DISCLAIMER

Publiscience (ISSN: 2619-7359) is published annually by the Research Unit of Philippine Science High School – Western Visayas Campus, Brgy. Bito-on, Jaro, Iloilo City spearheaded by the Editorial Board composed of Batch 2020 students.

Please address all matters regarding exchange of publications to the Editors-in-Chief of the Publiscience Editorial Board of Philippine Science High School – Western Visayas Campus, Brgy. Bito-on, Jaro, Iloilo City, Philippines.

Mail: The Editors-in-Chief
Publiscience
Philippine Science High School
Western Visayas Campus
Brgy Bito-on, Jaro, Iloilo City
5000 Philippines

Trunklines: *Director's Office Direct Line*
+63-33-3295644

Registrar's Office Direct Line
+63-33-3290501

+63-33-5014335
+63-33-5014133

E-mail: publiscience@wvc.pshs.edu.ph

The views and opinions expressed by the authors in their articles do not reflect the views and opinions of the Editorial Board, the academic unit, the institution, and the agency. The articles have been rigorously reviewed by their fellow scholars, respective advisers, the research teachers, the Research Academic Unit Head, a three-person defense panel, the Editorial Board, and the external reviewer; nonetheless, readers must exercise caution in citing the articles herein. The journal is more tolerant in publishing articles. Published here are studies performed by high school students. Please refer to the review process in the Research Program page.



You may visit the website for the softcopy of the journal and previous issue via the QR code or by visiting: <http://publiscience.org/>

© 2020 by the Philippine Science High School – Western Visayas Campus. All Rights Reserved.

ABOUT THE COVER



The cover features the ethanolic plant extract of *Euphorbia hirta* (tawa-tawa) in a rotating flask of the rotary evaporator. The rotary evaporator is used to separate the crude sample extracts from the solvents. It rotates the rotating flask continuously until the process is done. Indeed, while research seems to just be rotating and going around a single circle, like the rotary evaporator, the result at the end is worthwhile. It teaches us to never give up and keep on trying and waiting because it will all be worth it in the end. All our hardships will pay off and our efforts will be realized.

About PSHS

MISSION



The Philippine Science High School, operating under one System of Governance and Management, provides scholarship to students with high aptitude in science and mathematics.

The PSHS System offers an education that is humanistic in spirit, global in perspective, and patriotic in orientation. It is based on a curriculum that emphasizes science and mathematics and the development of well-rounded individuals.

The PSHS System prepares its students for careers in Science and Technology and contributes to nation building by helping the country attain a critical mass of professionals and leaders in Science and Technology.

VISION



We are the leading science high school in the Asia Pacific Region preparing our scholars to become globally competitive Filipino scientists equipped with 21st century skills and imbued with the core values of truth, excellence, and service to nation.

MANDATE



The Philippine Science High School System is a service institute of the Department of Science and Technology (DOST) whose mandate is to offer scholarship in secondary education with special emphasis on subjects pertaining to the sciences to prepare its students for a science career (R.A. 3661). Its primary function is to administer the country's scholarship program in special science secondary education.

Be a PSHS Scholar today!

Requirements for Eligibility

grades of at least

85

in S&T subjects

certified Filipino
citizen



w/ no pending app.

must not be younger than

EXACTLY 12 Y.O.

at August 1 of the
incoming school year

have a satisfactory rating



or its equivalent in SY
2019-2020 report card

and most importantly,

HAVE NOT YET TAKEN THE NCE PREVIOUSLY

Application Requirements



Two (2) filled out
application forms



Two (2) identical
1x1 ID photos



non-refundable
test fee
public - free
private - P100



certified true
copy of report
card

Perks of Being a PSHS Scholar



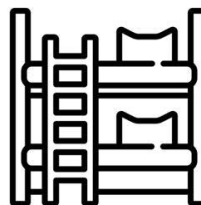
free
tuition



free
books



monthly
allowance
up to PHP 4000



dorm
lodging



uniform
transpo
living
allowance
for low income families

more info at: www.pshs.edu.ph

FOREWORD

The Philippine Science High School - Western Visayas Campus (PSHS - WVC) takes pride for this third Issue of Publiscience. PSHS - WVC is the very first and still is the only PSHS Campus that has successfully published all the Science and Technology Research works of its graduating scholars. Moreso, the publication just gets better every year. This is made possible by the efforts and desire of the students and whole Research Unit to embrace the value of “*Pagpasanyog*”, a Hiligaynon word which means to improve or become better. This is a testament of such positive spirit for continued growth and learning, and testimony of the hard work and perseverance of the students to pursue the untarnished truth using their knowledge and skills in science and technology; thereby contributing to the body of knowledge providing solutions to real-life problems. Kudos to Batch 2020!

SHENA FAITH M. GANELA

Campus Director III

* * *

Congratulations on this monumental triumph, Batch 2020! You have reached the ultimate desire of researchers that is to publish their own investigation.

For a high school researcher like you, this is an awe-inspiring phenomenon to many who wish to level-up with your achievement. This is a strong manifestation of your dedication, tenacity, and willingness to learn and unlearn ways of doing things as you embrace the process of research.

I know you went through a lot before reaching this very end. I feel proud of you for letting go of some of your joys to accommodate your research data gathering schedule. I appreciate you for managing your hurt in the midst of emotionally driven, chaotic schedules. And above all, I feel so proud of you for not giving up.

My heart brims with bliss and excitement to see and take hold of the fruit of your labor. Again, my warmest congratulations.

ROLANDO S. LIBUTAQUE

Curriculum Instruction Division Chief

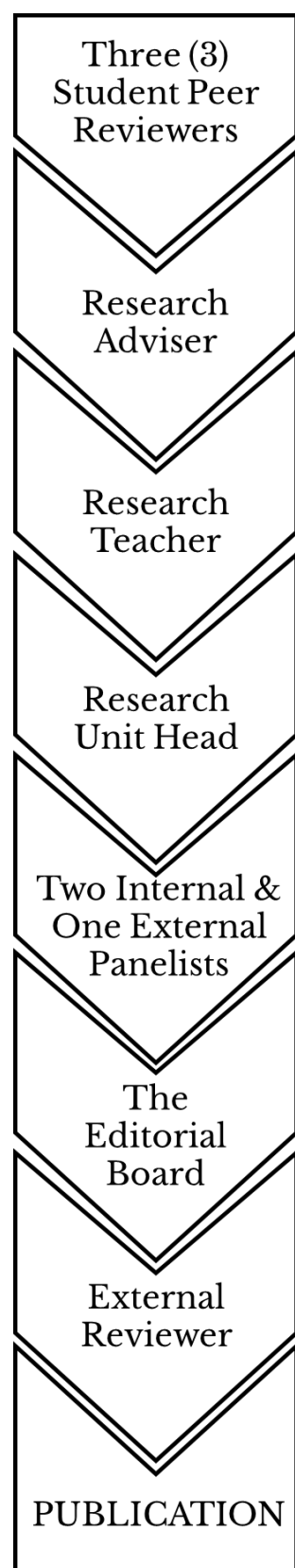
* * *

The COVID-19 pandemic, together with other global challenges we are facing, has highlighted the importance of science research. From understanding the problem and finding the possible solutions, research is the essential tool. PSHS - WVC has envisioned its alumni to be at the forefront of professionals who uses science and technology to address global problems. Thus, scholars are trained to acquire skills vital for them to be valuable researchers. This Publiscience is the manifestation of their research potentials.

HAROLD P. MEDIODIA

Research Academic Unit Head

REVIEW PROCESS



THE RESEARCH PROGRAM

The research program is a three-year undertaking that aims to inculcate the scholars with the quality and skills becoming of a world-class Filipino scientist. Each year starting from Grade 10 focuses on an aspect of research paramount to the growth of scholars in becoming leading figures in their respective fields.

RESEARCH 1

Research as a subject is introduced in Grade 10. It is the formative year for the budding researcher with in-depth discussions on the Scientific Method, and the Research Process. Particularly, it introduces scholars in topic selection, literature search, research design, and paper presentation. Scholars were also taught the basics of writing a proposal, and a research paper – both in instruction, and in practice. Each group or work unit is composed of at most five members with general topics provided by the Research 1 teachers. Research 1 culminates with the paper presentation of the Grade 10 scholars in *Pagsugidadon*.

RESEARCH 2

Research 2 is the reinforcement year in Grade 11. The writing of the proposal, and the research paper are further scrutinized in this year. Each section of a standard research paper: abstract, introduction, method, results, discussion, and conclusion are more pronounced in the syllabus. Research 2 is performed in work units of, at most, three. Scholars are allowed to select any topic in alignment with their science options and/or elective under the supervision of their advisers, propose and defend their proposal to a panel, develop and/or enhance skills related to the study, perform the method outlined in their proposal, and report their findings in a full-fledged research paper. Research 2 concludes with the presentation of the results in the final defense.

RESEARCH 3

Research 3 is the culminating year of the research curriculum. It is reserved for Grade 12 scholars who organize activities and events that share their respective study's findings, including but not limited to: research presentation (*Pagbantala*), poster presentation (*Pagbalandra*), seminar-workshop (*Pahisayod*), and community science conference (*Pagwaragwag*) with more events described at the end of this journal. This very journal is a fruit of the previous two batches' research experience. Research 3 focuses on finalizing the study and networking the results. It focuses on community-oriented approach in making science more accessible. This is evident in the oral and poster presentations for students and professionals, workshops and seminars for high school students, and gamification of each study for elementary students during the aforementioned events. Each study is given the opportunity to be published in this journal, provided that they have accomplished the review process outlined at the left.

THE RESEARCH COMMITTEE

The Research Committee is tasked with ensuring the quality of all research projects produced by the Batch 2020 scholars, performed from the 10th to the 12th grade. It is headed by the Research Unit Head who oversees and approves all research work, and composed of the research teachers who handle the Research class for a specific school year and grade level and the research advisers who provide guidance, insight, and assistance in a consulting capacity in their fields of expertise. The Science Research Assistants (SRA) manage the different labs, apparatuses, equipment, and reagents for the use of the scholars in the conduct of their respective studies.

* * *

RESEARCH UNIT HEAD

Harold P. Mediodia

RESEARCH 3 TEACHERS SY 2019-2020

Aris C. Larroder

Catherine Joy A. Mediodia

Ramon Angelo N. Sinco

RESEARCH 2 TEACHERS SY 2018-2019

Athenes Joy Presno-Aban

Maria Milagrosa A. Nulla

Zennifer L. Oberio

RESEARCH 1 TEACHERS SY 2017-2018

Athenes Joy Presno-Aban

Julnafe B. Libo-on

Harold P. Mediodia

RESEARCH ADVISERS

BIOLOGICAL SCIENCES & MICROBIOLOGY

Andrea Lucyle M. Bela-ong

Oliver J. Fuentespina

Fernando Christian G. Jolito III

Catherine Joy A. Mediodia

Harold P. Mediodia

Virna Jane M. Navarro

Zennifer L. Oberio

Angelo P. Olvido

CHEMISTRY & INTEGRATED SCIENCE

Athenes Joy Presno-Aban

Mialo L. Bautista

Michael Patrick M. Padernal

Ramon Angelo N. Sinco

PHYSICS & ENGINEERING

Aris C. Larroder

Raphael Eric C. Yturralde

COMPUTER SCIENCE & TECHNOLOGY

Eisen Ed C. Briones

Maria Milagrosa A. Nulla

Gerald U. Salazar

STATISTICS TEACHERS

Charmaine D. Aguirre

Ma. Romy Alexis C. Consulta

Myrna B. Libutaque

SCIENCE RESEARCH ASSISTANT (SRA)

CHEMISTRY

Leilani C. Estilo

INSTRUMENTATION

Mark V. Rosales

Amafe B. Gavile

Michael Patrick M.

Padernal

MICROBIOLOGY

Rusty A. Balcoba

Cherry Rose D. Haro

PHYSICS

Gabriel Z. Bermejo

Rusty A. Balcoba

REVIEWERS AND PANELISTS

The research curriculum of PSHS - WVC is predominantly composed of highly immersive activities that develop the scholars' skills as researchers and scientific communicators. From Grade 10, the scholars experience the rigors of having to defend their proposals and, ultimately, their final paper.

PAGSUGUIDADON

PAGSUGUIDADON, from the Hiligaynon word *suguid* or "to report", is the culminating event for the Grade 10 Research curriculum. Scholars present and defend their paper to a three-person panel, composed of two invited panelists and a faculty member of PSHS-WVC. The papers are presented in five clusters, namely: Water Studies, Marine Science, Biology, Plant science, and Development, with each studies' overarching theme as the basis of grouping.

INVITED PANELISTS

Maria Robelyn Insik
JB FASTEST WATER TEST CO.

Catherine Erazo
OTON NATIONAL HIGH SCHOOL

Rowena Cadiz
UNIVERSITY OF THE PHILIPPINES - VISAYAS

Kenneth Anabo
LO-ONG NATIONAL HIGH SCHOOL

Fernando Christian Jolito III
UNIVERSITY OF SAN AGUSTIN

Andrea Libo-on
BACOLOD NATIONAL HIGH SCHOOL

Justin Brian Chiongson
UNIVERSITY OF SAN AGUSTIN

Louinne Grace Insular
LEGANES CENTRAL ELEMENTARY SCHOOL

Zenith Montel
PHARMA GALENX INNOVATIONS, INC.

Joven Llabore
ASSUMPTION ILOILO

PSHS-WV FACULTY

Erika Eunice Salvador
WATER STUDIES

Lovie Grace Aguaras
MARINE SCIENCE

Joseph Simon Madriñan
BIOLOGY

Ramon Angelo Sinco
PLANT SCIENCE

Xavier Romy Braña
DEVELOPMENT

PAGBANTALA

PAGBANTALA, from the Hiligaynon word *bantala* or “to inform”, is the oral presentation of the scholars’ studies to a panel of experts composed of an invited panelist, an alumni, and a faculty member of PSHS - WVC. For SY 2019-2020, the studies were presented in 8 clusters namely: Wastewater Remediation, Antibacterial Studies, Health and Toxicity, Agriculture, Aquatic and Natural Resources, Industry, Energy, and Emerging Technology, Material Science, and Computer Science (ordered below left to right, top to bottom).

INVITED PANELISTS

Felix Ojario
CENTRAL PHILIPPINE UNIVERSITY

Leopoldo Ayukil III
UP HIGH SCHOOL ILOILO

Matthew Tubola
UNIVERSITY OF SAN AGUSTIN

Rhoda Erdao
OTON NATIONAL HIGH SCHOOL

Stephen Sabinay
WESTERN VISAYAS STATE UNIVERSITY – ILS

Sharon Nuñal
UNIVERSITY OF THE PHILIPPINES - VISAYAS

Raul Sampani
INTERNATIONAL BUILDERS CORPORATION

Mark Joseph Solidarios
WESTERN VISAYAS STATE UNIVERSITY

PSHS-WV ALUMNI

Lurylee Olarte
GLOBAL BUSINESS POWER
CORPORATION

Ardee Caro
JOSE MONFORT NATIONAL SCIENCE HIGH
SCHOOL

Jeriel Rose Solis
PAVIA NATIONAL HIGH SCHOOL

Excalibur Seterra
ILOILO PROVINCIAL AGRICULTURE OFFICE

Mary Camille Samson
PSHS-WV BATCH 2012

Jonalyn Peconcillo Mateo
UNIVERSITY OF THE PHILIPPINES - VISAYAS

Ian John Galupar
PAVIA NATIONAL HIGH SCHOOL

Rommel Jun Payba
CENTRAL PHILIPPINE UNIVERSITY

PSHS-WVC FACULTY

Erika Eunice Salvador
WASTEWATER REMEDIATION

Era delos Reyes
ANTIBACTERIAL STUDIES

Cherry Rose Haro
HEALTH AND TOXICITY

Oliver Fuentespina
AGRICULTURE

Julnafe Libo-on
AQUATIC AND
NATURAL RESOURCES

David Bryan Lao
INDUSTRY, ENERGY, AND
EMERGING TECHNOLOGY

Mark Rosales
MATERIAL SCIENCE

Rubie Anne Bito-on
COMPUTER SCIENCE

THE FINAL DEFENSE

THE FINAL DEFENSE is the final step towards the end of the research curriculum. The scholars invite one external expert and two PSHS - WVC faculty to compose a three-person panel to assess the merits and validity of their findings. The final defense panel recommends revisions to the study's manuscript as well as continually review the same until approval.

INVITED PANELISTS

Cathrina Bagarinao **Angel Queene Dequito** **Arnold Gaje** **Jean Pierre Montecillo**
UNIVERSITY OF THE PHILIPPINES - VISAYAS

Eric Justin Blancaflor **Socorro Leong-on** **Ramon Salanio**
UNIVERSITY OF SAN AGUSTIN

Virginia Agreda **Arla Arenga** **Julius De Luna Limjoco**
DEPARTMENT OF AGRICULTURE – WESTERN VISAYAS AGRICULTURAL RESEARCH CENTER

Joeben Gubatanga **Roxzien Sesbreño**
DEPARTMENT OF SCIENCE AND TECHNOLOGY – REGION VI

Arjun Marven Calvo **Raul Lorilla**
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

Queenie Carbaquel
BUREAU OF PLANT INDUSTRY –
NSQCS VI

Excalibur Seterra
ILOILO PROVINCIAL
AGRICULTURE OFFICE

Jaya Lavalles Sitjar
NATIONAL CHENG KUNG
UNIVERSITY, TAIWAN

Carlo Nolan Carado
PHILIPPINE RED CROSS –ILOILO
CHAPTER

Annie Franco
SOUTHEAST ASIAN FISHERIES
DEVELOPMENT CENTER

Eldy Barrientos
ST. ANTHONY COLLEGE
HOSPITAL

Ma. Beth Concepcion
WESTERN VISAYAS STATE
UNIVERSITY

PSHS-WVC FACULTY

Fernando Christian Jolito III
Catherine Joy Mediodia

Ma. Deanna Jolito
Virna Jane Navarro
BIOLOGICAL SCIENCES UNIT

Julnafe Libo-on
Angelo Olvido

Athenes Joy Presno-Aban
Erika Eunice Salvador

Michael Patrick Padernal
CHEMISTRY AND INTEGRATED SCIENCES UNIT

Mark Rosales
Ramon Angelo Sinco

Ranel Abellar

Xavier Romy Braña
PHYSICAL SCIENCES UNIT

Oliver Fuentespina

Rubie Anne Bito-on **Eisen Ed Briones**
COMPUTER SCIENCE AND TECHNOLOGY UNIT

David Bryan Lao **Zennifer Oberio**
MATHEMATICS UNIT

THE EXTERNAL REVIEWERS

THE EXTERNAL REVIEWERS are PSHS - WVC alumni recommended by the Research Unit and invited by the Editorial Board to assess the merit and substance of each of the published papers. These individuals serve as the final reviewers prior to an article's publication. Before the publication of this section, their identities are anonymous to the authors.

Bee Gee Belle Agustin
INSTRUCTOR
AKLAN STATE UNIVERSITY, PH

John Rafael Ambag
BS MOLECULAR BIOLOGY AND BIOTECHNOLOGY
UNIVERSITY OF THE PHILIPPINES - DILIMAN, PH

Justin Enrique Banusing
BS INFORMATICS AND ENTREPRENEURSHIP
UNIVERSITY OF WASHINGTON, USA

Regine Bastareche
INTARMED
UNIVERSITY OF THE PHILIPPINES - MANILA, PH

Cris Jericho Cruz
BS CHEMICAL ENGINEERING
KOREA ADVANCED INSTITUTE OF SCIENCE, SK

John Jewish Dominguez
RESEARCHER
AUSTRALIAN NATIONAL CENTRE, AUS

Emil Emmanuel Estilo
STUDENT RESEARCHER
HIROSHIMA UNIVERSITY, JAPAN

Ina de la Fuente
GRADUATE TEACHING ASST. AND INSTRUCTOR
UNIVERSITY OF CONNECTICUT, USA AND
UNIVERSITY OF THE PHILIPPINES - DILIMAN, PH

Angelo Jamerlan
MOLECULAR NEUROBIOLOGIST
GACHON UNIVERSITY, SK

Marmelou Popes
RESEARCHER
UNIVERSITY OF THE PHILIPPINES –
MARINE SCIENCE INSTITUTE, PH

Alexandria Marie Sombiro
BS INDUSTRIAL ENGINEERING
UNIVERSITY OF THE PHILIPPINES -
DILIMAN, PH

John Noel Viana
RESEARCHER
AUSTRALIAN NATIONAL CENTRE, AUS

Aldrean Paul Alogon
PROSPECTIVE ECONOMICS MAJOR IN PHYSICS
WESLEYAN UNIVERSITY, USA

Kate Mariene Baldonado
BS COMPUTER ENGINEERING
UNIVERSITY OF THE PHILIPPINES - DILIMAN, PH

Juan Paolo Lorenzo Gerardo Barrios
BS PHYSICS
DURHAM UNIVERSITY, UK

Jared Billena
CHAIRPERSON OF DEPT OF LABORATORY
AND DEPT OF PATHOLOGY
THE MEDICAL CITY ILOILO AND
ILOILO DOCTORS' COLLEGE OF MEDICINE, PH

Christian Deo Deguit
RESEARCHER
UNIVERSITY OF THE PHILIPPINES –
NATIONAL INSTITUTE OF HEALTH, PH

Yevgeny Aster Dulla
RESEARCHER
INTRALINK JAPAN, JAPAN

Philip Caesar Flores
STUDENT RESEARCHER
UNIVERSITY OF THE PHILIPPINES –
NATIONAL INSTITUTE OF PHYSICS, PH

Riel Carlo Ingeniero
STUDENT RESEARCHER
GEOMER HELHOLTZ CENTRE FOR OCEAN
RESEARCH, GER

Ma. Christina Jamerlan
LEAD AI ENGINEER
ABS-CBN CORPORATION, PH

Leo Albert Sala
RESEARCHER
CZECH ACADEMY OF SCIENCES, CZR

Liesel Tamon
RESEARCHER
MRC WETHERALL INSTITUTE
OF MOLECULAR MEDICINE, UK

Dominic Yap
BS MOLECULAR BIOLOGY AND
BIOTECHNOLOGY
UNIVERSITY OF THE PHILIPPINES - DILIMAN, PH

TABLE OF CONTENTS

i.	About the Cover	
ii.	About PSHS	
iii.	Foreword	
iv.	Research Program	
v.	Research Committee	
vi.	Panelists and Reviewers	
	Pagsuguidadon	
	Pagbantala	
	Final Defense	
	Publiscience External Reviewers	
vii.	Preface, Dedication	
I.	MUROPURO: WASTEWATER REMEDIATION	1
	Organo-mineral composites from the shells of <i>Crassostrea iredalei</i> (slipper cupped oyster), <i>Perna viridis</i> (green shell), and <i>Telescopium telescopium</i> (horned snail) in the removal of chromium (VI) from water.....	2
	Determination of the phosphate adsorption potential of biochar derived from <i>Ananas comosus</i> (pineapple) peels in aqueous solution.....	6
	Column adsorption of cadmium (II) and lead (II) using rice husks and mango peels.....	11
	The quantification of the correlation between water nitrogen level and the phosphorus uptake of <i>Chlorella sorokiniana</i> (freshwater green alga) in simulated nutrient-contaminated freshwater.....	16
II.	MAKAPTAN: ANTIBACTERIAL STUDIES	21
	Formulation of liquid soap incorporated with <i>Mangifera indica</i> (mango) leaf extracts and evaluation of its antibacterial activity against <i>Staphylococcus spp</i>	22
	Antibacterial activity of copper-chitosan complexes against zoonotic <i>Vibrio parahaemolyticus</i>	27
III.	MAGWAYEN: HEALTH AND TOXICITY	32
	The utilization of methanolic <i>Bixa orellana</i> (Annatto) seed extract as substitute for safranin in Gram staining	33
	Larvicidal activity of <i>Citrofortunella microcarpa</i> (calamansi) peel essential oil against third and early fourth instar <i>Aedes aegypti</i>	37
	The use of <i>Clitoria ternatea</i> (blue ternate) ethanolic extract as a potential stain for bacteria.....	42
	The effects of acetyl l-carnitine on the prevention of platelet storage lesions.....	48

IV.	LALAHON: AGRICULTURE	53
	Seed germination potential of different local varieties of <i>Oryza sativa</i> (rice) as affected by different seed priming methods.....	54
	The effect of salt stress on growth parameters of <i>Oryza sativa</i> (rice) variety NSIC Rc 442.....	59
	Potential antifeedant bioactivity of <i>Anethum graveolens</i> (dill) essential oil against <i>Cochlochila bullita</i> (lace bugs) on <i>Ocimum kilimandscharicum</i> (sweet basil).....	63
	Isolation, characterization, and screening of bacterial endophytes from <i>Zea mays L. var. rugosa</i> (sweet corn) Sugar King variety with biotechnological potential in agriculture	68
V.	SUMALONGSON: AQUATIC AND NATURAL RESOURCES	73
	Mapping mangrove forest land cover change in Jaro Floodway, Iloilo City using Google Earth imagery	74
	Monogenean and cestode infestation in the gills and intestines of <i>Clarias gariepinus</i> (African catfish) in Zarraga, Iloilo and <i>Chanos chanos</i> (Milkfish) in Dumangas, Iloilo	78
	Measurement of eye turbidity of formalin-treated <i>Chanos chanos</i> (milkfish) using image analysis.....	84
VI.	LIADLAW: INDUSTRY, ENERGY, AND EMERGING TECHNOLOGY	90
	Kinetic analysis of <i>Theobroma cacao</i> (UIT Variety) pod husks through gasification as an alternative to sub-bituminous coal	91
	A novel application of a double convex-hemispherical lens configuration for a III-V tandem InGaP/GaAs/Ge multi-junction solar cell.....	97
	Use of 1:7 rice bran wax to rice bran oil mixture as phase change material in increasing the efficiency of photovoltaic cells.....	101
VII.	YNAGUINID: MATERIAL SCIENCE	105
	The extraction and isolation of polyethylene-based plastic-degrading bacteria from Iloilo City Engineered Sanitary Landfill, Mandurriao, Iloilo City.....	106
	Optimization of reaction parameters for the synthesis of silver nanoparticles using ascorbic acid and trisodium citrate	111
	Evaluation of ultraviolet and visible light photocatalytic activity of undoped and nitrogen-doped titanium dioxide nanoparticles (N-TNPSs) against low-density polyethylene (LDPE)	117
	Microplastic occurrence in the coastal sediments of selected barangays of Anilao, Iloilo, Philippines	122

VIII. SARAGNAYAN: COMPUTER SCIENCE.....127

Determining the maximum number of transaction records that the Apriori algorithm can scan in 90 seconds128

Research Events: *Pagbantala, Pagbalandra, Paghinun-anon, Pahisayod*

Research Events: *Pagwaragwag, Paindis-indis, Pagpabalhag, Pagsugidadon*

Research Conferences: Studies Participated

Keyword Index

Institutional Partners

PREFACE

We are honored to present the third volume of *Publiscience*, the homegrown journal of PSHS-WVC scholars. *Publiscience* contains the studies of first-time researchers, culminating their three-year research journey. Keeping true to the spirit of *Pagpasanyog* – a Hiligaynon word for ‘innovate’ - each batch continues to improve the journal in every volume from the establishment of the journal in 2018, to publication by a student-led Editorial Board in 2019. This year’s *pagpasanyog* focuses in improving reader experience. This includes the introduction of the external reviewer in the review process, linking of the published journal to its online counterpart via QR coding, citations in College of Science Editor (CSE) and American Psychological Association (APA), and the integration of cluster representatives.

This volume is a compilation of 25 Science and Technology (S&T) studies spanning different fields in Biology, Chemistry, Physics, and Engineering. The studies were grouped in eight (8) clusters, each of which are in cognizance with the Harmonized National Research and Development Agenda (HNRDA) of the Department of Science and Technology: under Agenda 1, National Integrated Basic Research Agenda (NIBRA), is wastewater remediation; Agenda 2, Health, is further subdivided into Antibacterial Studies, and Health and Toxicity; Agenda 3, Agriculture, Aquatic, and Natural Resources (AANR), is split into studies in Agriculture, and Aquatic and Natural Resources; and Agenda 4, Industry, Energy, and Emerging Technology (IEET), houses a section with the same name, Material Science, and Computer Science studies. The authors, the Editorial Board, and the Research Unit recognize the role of research in nation building, and so have organized the studies proximal to each agenda. With the HRNDA at the central framework of this journal, we hope that aside from affording scientific knowledge, the studies may also yield tangible social and economic benefits.

To emphasize the community-oriented stance of the journal, each cluster is represented by characters deeply ingrained in the Visayan culture. This is a reminder that research should begin in the community. To pursue national prosperity means uplifting its most basic foundations.

This volume is published during times of great uncertainty. In times like these, it becomes increasingly imperative to perform research, listen to its findings, and above all, scrutinize its merits. Pursuing the untarnished truth, after all, is a lifelong calling to ask. We hope that through these articles, we may be able to inspire the next generation of critical thinkers, global innovators, and world-class Filipino leaders in S&T.

THE EDITORIAL BOARD

* * *

DEDICATION

This journal is dedicated to every researcher in the field and the laboratory,
to every front liner that has battled the COVID-19 pandemic,
and to all those who continue to serve with passion and integrity.