



MOATE COMMUNITY SCHOOL

# SCIENCE

FEBRUARY 2021

*Supplement*

## AWARDS ACHIEVED AT BTYSE 2021

National Association of Principals and  
Deputy Principals (NAPD) -  
Best School in the Republic of Ireland  
**Moate Community School**

Perrigo Educator of Excellence Award  
**Ms Mairéad Cusack**

Best Overall Group 2021 in BTYSE and  
Perrigo Best Project in the Biological  
and Ecological Sciences

**Chloe Murphy, Abby Mullins and  
Megan Carroll**

First Place in Intermediate Group,  
Technology Category  
**Daragh Lowry and Conall Mandal**

First Place in Intermediate Group,  
Biological and Ecological Category  
**Áine Maxwell, Joyce Conway and  
Laura Conlon**

First Place in Junior Group,  
Biological and Ecological Category  
**Reuben Guinan and Kian Brady**

Second Place in Junior Group,  
Biological and Ecological Category  
**Shana Brady, Lauren Finan  
and Áine Broderick**

Highly Commended in Biological  
and Ecological Category  
**Ava Hallissy, Leah Hallissy  
and Annie Duffy**

## MCS scoops Best School and record number of Awards at BTYSE 2021



BEST GROUP & PERRIGO AWARD: *Megan Carroll, Chloe Murphy and Abby Mullins.*

It has been an historic year for MCS at the BT Young Scientist and Technology competition, where the school scooped a massive nine awards. The competition is open to all second level students from Ireland, north and south. Projects and entries to the competition were at an all-time high this year, where 1,500 projects were submitted nationwide. All entries were screened selecting just 550 to go to the exhibition, which is the final stage of the competition. A total of 11 were selected from MCS to exhibit in the final, which was an all-virtual event this year. MCS swept the boards in the competition and was awarded Best

School in the Republic, Best Group Project, Major Category and Highly Commended Awards, as well as Educator of Excellence Award. It clearly demonstrates the commitment of our staff and our students. Such a competition allows students to acquire a wide variety of knowledge and skills, nurturing the talent of our future scientists and engineers. Huge congratulations are extended to the budding young MCS scientists and technologists, and to their teachers on this superb success. It is indeed a very proud time for MCS and is a huge achievement for all those involved and for our school.

*Tom Lowry, Principal*







*Daragh Lowry and Conall Mandal.*

### AN APP TO CO-ORDINATE YOUR AWARENESS AND KNOWLEDGE OF YOUR LOCALITY

*Daragh Lowry and Conall Mandal took first place in the Intermediate Group of the Technology Category for this project.*

For our project, we designed an app, 'Moate Guide' which shows information on Moate. The app shows significant places with pictures, sounds and narrations, along with quizzes and orienteering activities to target a younger audience. We developed the 'Moate Guide' in the programming language Java using Google supports. We carried out surveys to identify features that users would like to see included in the app. We have introduced a prototype of the Moate Guide to our fellow students at MCS who found it user friendly and interesting. We plan to increase awareness of the knowledge, history, sites, amenities, etc in our locality by making the app available to locals and visitors to the town.

### STOP MILK SPOILAGE; START SEEING CHANGES

*Áine Maxwell, Joyce Conway and Laura Conlon were awarded First place in the Intermediate group of Biological and Ecological category.*

The group initially examined the changes in milk pH, sensory properties and titratable acidity when milk was stored at different temperatures. They also tested the effectiveness of food-based indicators (turmeric, red cabbage, radish) at indicating milk spoilage by producing a vivid colour change. Using their findings, they designed a milk carton, using a blue colour to minimise heat absorption and including smiley face motifs with thermochromic dyes, as a visual reminder to consumers to return milk to the fridge when the carton temperature increases. Their prototype carton also included a natural pH indicator to allow the consumer to test whether the milk had gone off. The girls now plan to 3D print their prototype and carry out market research with students to raise awareness of milk wastage.



*Áine Maxwell, Laura Conlon and Joyce Conway.*

'From working on our project, I have learned lots of skills including teamwork, IT, communication, research and presentation skills. I have also learned about report writing and analysing data because this was a huge element in our project especially as it turned out to be a virtual competition.'

*Laura Conlon*

'BTYSE was a very fun experience and I learned new skills, I learned how to carry out all the experiments, communication skills and how to manage deadlines. It was very exciting when on the 8th of January while watching the BT Awards Ceremony, we won 2nd place in the Junior Ecology and Biology.'

*Lauren Finan*

'I thought that the judging process was done very well as we got started on time and finished on time and everything overall went very smoothly so it was less stress to know everything was sorted out so it would go well.'

*Sarah McCormack*







Chloe Murphy, Megan Carroll and Abby Mullins.

### WOOL SAVIOUR OF THE SEA

*Chloe Murphy, Abby Mullins and Megan Carroll, Best Overall Group 2021 in BTYSE and Perrigo Best Project in the Biological and Ecological Sciences.*

The aim of our project was to develop a wool blanket which allows the timely and thorough removal of oil slicks following oil spills. The idea stemmed from a major oil spill the group had seen on the news last year in the Arctic Circle. We collected wool with the help of local farmers from 13 breeds of sheep. We studied the oil absorption capacity of each fleece and examined the role of brushing, surface area and felting on oil absorption. We also measured the density and tensile strength of each fleece to determine whether the oil-soaked wool could be easily collected from saltwater habitats. The results of our investigations show that all wool breeds effectively absorbed oil, with Fine Bred Grey, a crossbreed being most effective in its natural form. The absorption of oil by sheep wool is attributed to the presence of a natural waxy oil (lanolin) and hydrophobic epicuticle of each wool fibre. Since completing BT Young Scientist, we have presented the findings to the Oireachtas and the Irish Coast Guard to highlight the effectiveness of wool as a sorbent material and potential for its use in oil spill clean-up in Irish waters.

### THE FUTURE IS BRIGHT: TURNING ORGANIC WASTE INTO BIOFUEL

*Ava Hallissy, Leah Hallissy and Annie Duffy were Highly Commended in the Biological and Ecological category.*

With the knowledge of fossil fuels being phased out, in conjunction with the amount of compost waste the average Irish household produces, we aimed to create a sustainable biofuel to replace traditional fuels. Compost produced from organic household waste was combined with other natural resources such as sawdust using vegetable oil to form our biofuel pellets. We measured the heat of combustion of our pellets in a Combustion Chamber in the school laboratory and using a Bomb Calorimeter at the AIT with the support of Dr Sean Reidy and Christy Hopkins. Overall the project was a success, our biofuel performed well when compared to turf and timber as it released a similar level of heat while having a smaller carbon footprint.



Ava Hallissy, Annie Duffy and Leah Hallissy.

### THE EFFECT OF MUSIC ON THE ADDICTIVENESS OF VIDEO GAMES

*Rachel Bermingham and Caitlin Blom.*

In our project, we investigated the contribution of music to student enjoyment of video games. Initially, we conducted a study among MCS students to determine how regularly they play video games and the most popular game genres. Following this, we designed a simple game using Scratch. We investigated the impact of different types of music on student performance and enjoyment of playing our video game with the help of our computer classes. The results showed that students preferred playing games when listening to upbeat music. We believe these results could be used to develop a programme to reduce prolonged playing of computer games by children.



Caitlin Blom and Rachel Bermingham.





Labhaoise Foley, Émer Killian and Kaytlin Flynn.

## THE BIRD FEEDER INFECTION PROBLEM

Labhaoise Foley, Émer Killian and Kaytlin Flynn.

Our project aimed to use a multi-faceted approach to design a bird feeder and bird feed to reduce the spread of disease among wild bird populations at garden feeders. Due to overcrowding and interspecific mixing, diseases such as trichomoniasis, aspergillosis, and avian pox are commonly spread at garden feeders. We studied the ability of natural substances (propolis) and UV light to inhibit bacterial growth. Using the results of our investigations, we designed a feeder to reduce bacterial and fungal spoilage of bird feed. We learned that simple changes such as adding one perch for birds would help with the prevention of diseases among birds at feeders.

## EXAMINING THE IMPACT OF LOCKDOWN ON THE IRISH DIET

Niamh Kelly, Sarah McCormack and Skyla Looney.

We investigated the impact of the Covid-19 lockdowns on the Irish diet. For our investigation, we collected 3 receipts from 10 local families. We studied the number of servings of each food group consumed by each family over three time periods: pre-lockdown, during lockdown and after lockdown. We also did a survey to see what people thought their diets were like over lockdown. Ninety six families from our school community took part in this survey. Overall, we found that the Irish diet disimproved over the lockdown. Our recommendation would be to make colour coded packaging more visible, so people are aware of the nutritional content of the products in their shopping basket.



Skyla Looney, Sarah McCormack and Niamh Kelly.



Aine Egan and Tara Hamilton.

## A STATISTICAL ANALYSIS OF THE EFFECT FROM HOME ON GENDER STEREOTYPING DURING LOCKDOWN

Tara Hamilton and Aine Egan.

Our project was a statistical analysis on stereotyping in chores while working at home. We chose this topic as we know that there are many people now working from home due to Covid-19 and wanted to do research on people to help in any way we could. We learned many new things while working on our project and overall, we found it to be a very beneficial experience. We were able to adapt well to the virtual aspect of the competition. It was great to be able to work with so many other amazing projects.

2021

'Before the judging I was nervous and I felt that the task of presenting our project to the judges was quite daunting. I had prepared a lot with my team and my teachers and after the first round of judging I felt more relaxed and confident with what we had to do. The judges were really lovely and had a great interest in our project.'

Aine Maxwell

'From the project I learned a bit of coding as well as a lot of communication skills as we needed to contact a lot of people for this app to work. I thought the judging process was different but good and I thought there was less stress because it was online. Overall, I felt this was a very good experience and I enjoyed it very much.'

Daragh Lowry





Reuben Guinan and Kian Brady.

### SUPERFOODS AND THEIR EFFECTS ON DIABETES

*Reuben Guinan and Kian Brady won first prize in the Junior Group of the Biological and Ecological category.*

We analysed the Vitamin C, sugars and fibre content of various fruits and vegetables. We found that Vitamin C and sugar content varied greatly for all fruits and vegetables analysed, red onions and peppers having the highest Vitamin C. We noted that fibre is important for people with diabetes, keeping their sugars levels low. We found when blending fruits like blueberries, the level of fibre is reduced, indicating smoothies may not be the best for diabetics. Fruit or vegetables containing the highest vitamin C and fibre levels and the lowest sugar concentration are most suitable for the diet of people with diabetes.

### IRONING OUT THE WATER QUALITY ISSUES ON PIG FARMS

*Áine Macken and Mia Shellam.*

We investigated whether phytoremediation using common pond plants could substantially reduce the metal ion concentration of water in drinking troughs on Irish pig farms. We examined the change on conductivity in solutions of iron oxide when samples of Elodea, Preslia and Water Fern plants were placed in solution at 20°C. The results of our investigations have shown that common pond plant (Elodea, Water Fern and Preslia) species can reduce the metal ion concentration of standard solutions as an immediate decrease in conductivity was observed in samples containing each plant compared to the control. Preslia was particularly effective. This is likely since Preslia are rhizomatous plants with increased surface area which aids absorption.



Áine Macken and Mia Shellam.

### AN INVESTIGATION ON THE IMPACT OF DIET ON THE PREVALENCE OF LAMINITIS AMONG CONNEMARA PONIES

*Shana Brady, Lauren Finan and Áine Broderick took second place in the Biological and Ecological category.*

Laminitis is a condition that causes the hoof to be inflamed making it extremely painful for the horse or pony to walk. Our project aimed to determine whether diet is linked to the condition among Connemara ponies. We carried out habitat studies at sites in Connemara and Westmeath. At each site, we studied the sugar content, dry matter content and stem-to-leaf ratio of the grasses present. We also carried out a survey among Connemara breeders to identify other factors which are linked to laminitis. We used our findings to recommend a better seeding mix for farmers to use in order to prevent laminitis.



Shana Brady, Lauren Finan and Áine Broderick.

'I would have loved to go to the RDS to present our project to the judges and to look at other people's projects but due to Covid restrictions we were unable but I found the experience just as good even if it was through a screen.'

Émer Killian

'BTYSE was a once in a lifetime achievement and we were so grateful to participate. Taking part in a virtual event may not have lived up to being there in person but it was just as beneficial and incredible. From completing the project, we learned many skills such as teamwork and time management. Overall, the experience was brilliant and we would highly recommend for everyone to participate.'

Abby Mullins

2021



## SCIFEST



RUNNER-UP BEST PROJECT AWARD (*Regional & National*)  
Sharon Seery and Emily Ray for  
*'Dispel the Smell of Goat's Milk'*



ENVIRONMENTAL AWARD  
Emma Keenan and Hannah Malone for  
*'Does Seaweed contain the Solution to Ireland's Fertiliser Run-off Problem?'*



ENVIRONMENTAL AWARD  
Cliona McCormack and Emily Korzeniewski for  
*'Effects of Dredging on the River Shannon'*



CHEMISTRY AWARD  
Aoife Murray and Megan Clinton for  
*'Can Biochars Derived from Farm Waste Reduce Greenhouse Emissions from Irish Soils?'*

**SciFest** is a one-day STEM (Science, Technology, Engineering and Maths) fair. 2020 was a remarkable year for MCS at the virtual Regional **SciFest**, with MCS students winning *Runner-Up Best Project*, *3 Special Awards* and *RSC School Chemistry*

*Award*. Emily Ray and Sharon Seery won the *Runner-Up Best Project Award* and subsequently presented their project at the virtual National Final where they were awarded an *Excellence in STEM Trophy* for their achievements.

## ROYAL SOCIETY OF CHEMISTRY SCHOOL ANALYST COMPETITION



Elaine Pidgeon, Julian Wisniewski and Aaron Keane.

The **Royal Society of Chemistry School Analyst Competition** is for Leaving Certificate Chemistry students. Teams of 5th Year Chemistry students are required to undertake a practical analytical determination based on problems relevant to industrial or social needs. They are judged for skill, understanding and accuracy and are intended to promote teamwork and safety in the laboratory. In 2020, the MCS team of Elaine Pidgeon, Julian Wisniewski and Aaron Keane achieved 2nd Place.



## ECO-UNESCO'S YOUNG ENVIRONMENTALIST AWARDS (YEA)



*YEA Sensory Garden.*

The **ECO-UNESCO's Young Environmentalist Awards (YEA)** is an All-Ireland environmental awards programme that recognises and rewards young people who raise environmental awareness and improve the environment. Students submit evidence of their ECO-Action based projects to YEA in February/March, and subsequently present their projects to ECO-Dens judges in April and qualifying projects present at the National Final in May, usually in the Mansion House, but took place online in 2020. In 2020, the Sensory Garden project was awarded the Further Growth Award at the National Final of YEA. MCS TY students have been participating in the Sensory Garden project each year since 2016. It links Biodiversity with Eco-Community activities in the further development of the Sensory Garden at Dún Na Sí Amenity Park along with the young adults of St Hilda's Services. In 2018, Brian Conlon and Emma Kelly won the 'Overall Sustainability Award' for their project, *'Ireland's Burning Problem'*.

## IRISH ANGUS BEEF

In 2018, MCS TY students Sarah Murray, Lorna Eagney, Christopher Kerrigan and Conor O'Brien were the overall winners of the Irish Angus Producer Group Schools competition. They promoted the benefits of Irish Angus cattle to producers and consumers. They progressed through three rounds of selections to the final in Croke Park. As winners of this competition, the students received five Irish Angus calves at the National Ploughing Championship.



*Lorna Eagney, Conor O'Brien, Sarah Murray and Christopher Kerrigan.*

## IRISH SCIENCE TEACHER'S ASSOCIATION SENIOR SCIENCE QUIZ



*ISTA 3rd Place - Brian Conlon, Julian Wisniewski and Aaron Keane.*

The **Irish Science Teacher's Association Senior Science Quiz** is for Leaving Cert students studying Science. Questions cover a range of topics including Chemistry, Physics, Biology as well as topical science issues. In 2019, Brian Conlon, Julian Wisniewski and Aaron Keane won 3rd Place in the Regional Final in Athlone Institute of Technology. Ronan Murphy, Fiona Broderick and Nathan Farrelly won 1st Place in the Regional Final in 2018.

## IRISH CHEMISTRY OLYMPIAD

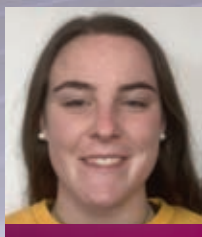


*Johnny Horan & Charlamae Flores (in front).*

Well done to Johnny Horan and Charlamae Flores who represented the school in Round 1A of the Irish Chemistry Olympiad on the 30th of January. Both students completed a challenging multiple-choice exam on key Chemistry concepts remotely on 30th Jan. Congratulations and best of luck to Charlamae who has reached the final round which will take place in early March.



## EMMA KELLY



Along with my classmate Brian Conlon, I competed in the 2018 BTYSE with our project *"Ireland's Burning Problem"*. Our project involved a qualitative and quantitative study on the effects that wildfires had on bogland habitats.

Brian and I spent our summer collecting peat samples, identifying plant species and examining all aspects of bog life. We earned a display award for our efforts. We later entered our project in SciFest and were awarded 'Runner-up' in the Regional Final and we won The Abbott Ireland Life Sciences Award in the National SciFest Final. The following year, we re-entered BTYSE with a project *'Solution to Ireland's Burning Problem'* which aimed to design a pellet to promote the re-generation of peatlands following wildfires. We were delighted to earn a 'Highly Commended' award from the judges. I am currently studying Biomedical Engineering in UCD and have found the skills I learned through the Young Scientist competition an invaluable advantage. One of the very first lectures I had (albeit from the comfort of my own home), was on how to properly reference articles and existing research in our own college assignments. I was able to sit back and relax for that hour, as I had already mastered this skill through Young Scientists. Entering a project in BTYSE is the best experience any secondary school student can sign themselves up for and was undoubtedly one of the best decisions I have ever made.

## RACHEL DOLAN



I would like to congratulate all the students and staff on their fantastic achievements in this year's BTYSE. I participated in BTYSE (2013) when I was in TY and it was a highlight of my time at MCS. The support and encouragement

I received from the school made it a memorable experience which motivated me to pursue a career in the sciences. My BTYSE project *Radiation: The Truth* sparked my interest in radiobiology and ultimately led to my career in Radiography. Radiography was the perfect choice for me, it combined my love of biology, a subject in which I won Student of the Year and my curiosity in radiobiology. In 2020, I graduated from Robert Gordon University in Aberdeen with a first class honours degree in Diagnostic Radiography and began my career in an orthopaedic specialist hospital in Aberdeen.

## SHANE SEERY



I am a past pupil of MCS, from Drumraney. I completed my Leaving Certificate in 2017. I am in my Third Year of studying Veterinary Medicine at Warsaw University of Life Sciences, Poland. During Transition Year at MCS,

Sean Pettit and I participated in the BT Young Scientist & Technology Exhibition with great success. We were awarded first place in the Chemical, Physical and Mathematical Sciences Category, as well as securing the Teagasc Special Award. Our project investigated the viability of spent mushroom compost as a fuel. I took up the opportunity to work at Oakpark Research Centre (Teagasc) which was a great experience. Studying veterinary medicine is keeping me busy during these difficult COVID times. I love the course and enjoy all the challenges that it brings. I have a huge interest in agriculture, particularly dairy farming. Taking part in the BTYSE was a great experience and I would highly recommend any student to get involved. Competing at BTYSE 2015 was one of the foundation blocks for deciding my career path, as well as connecting me to industry leaders in the field of science, business and medicine.

## EMMA BUCKLEY EDUCATOR OF EXCELLENCE AWARD



I am originally from Moyvoughley, and a past pupil of Mount Temple NS and Moate Community School. I then studied for four years at St. Angela's College, Co. Sligo, to become a Home Economics and Science/Biology teacher.

I then decided to move to Dublin. I am currently teaching in St. Andrew's College in Booterstown. I am ever so lucky to be teaching all three of my subjects. Since taking over the BT Young Scientists projects with students in my school, I am delighted to say that we have had great success. This year alone I had many students who were highly commended and some coming first in their categories. I am very proud of all involved. I too was thrilled to win an Educator of Excellence Award. It was a huge achievement and something I am very grateful to have won. Unfortunately, I never made it into the competition myself while a student in school, but am delighted that I can guide my students along the way now.

## MAIRÉAD CUSACK

### TEACHER PORTFOLIO & EDUCATOR AWARD



Mairéad is a native of Killinkere in Co. Cavan and a past pupil of Bailieborough Community School. She studied the BSc Science Education in Maynooth University and qualified as a Biology and Chemistry teacher in 2013.

She previously taught in Ormiston Rivers Academy in Essex and in Crescent College Comprehensive in Co. Limerick. She has been teaching Chemistry and Science in MCS since 2015. Mairéad mentors students for SciFest, BT Young Scientist, Salter's Festival of Chemistry, RSC School Analyst's Competition, the ISTA Senior Cycle Science Quiz and the Chemistry Olympiad. She was awarded the BTYS Perrigo Educator of Excellence Award. She is a truly inspirational science educator and a well-deserved recipient of this award.

## WHAT IS A BTYSE PROJECT & ITS TIMELINE?

### BEFORE SUMMER

Students brainstorm ideas with support of their teachers.

### SEPTEMBER

Students prepare a one-page proposal and application form outlining their investigation.

### LATE SEPTEMBER / EARLY OCTOBER

Proposals submitted to BTYSE judges. BTYSE receives approx. 1,500 proposals. 13 proposals were submitted from MCS this year.

### END OCTOBER / BEGINNING NOVEMBER

Students receive acknowledgement from BTYSE whether their project is accepted or not. BTYSE accepts 550 projects for the exhibition. 11 projects were accepted from MCS this year.

### SEPTEMBER - DECEMBER

Students carry out their investigations by preparing and distributing surveys, completing practical experiments and designing prototypes. Access to school laboratories is timetabled. Much of these activities are done outside school time.

### DECEMBER INCLUDING CHRISTMAS HOLIDAYS

Students prepare their presentations for the judges. Due to COVID restrictions this year a 3-minute video and Powerpoint presentation was required, as well as their project booklet.

### 4 DAYS IN FIRST WEEK OF JANUARY

BT Young Scientists & Technology Exhibition  
Students present their projects to BTYSE judges.

## MCS Senior Cycle Science Related Subjects

BIOLOGY • CHEMISTRY • PHYSICS •  
AGRICULTURAL SCIENCE • COMPUTER SCIENCE



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