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Investment in innovation

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A biofuel with local and global benefits



Products withdrawn from the market thanks to research results



Parking lots save OMR 8000 annually



A new product from date pits

Investment in innovation

The progress of any society can only be achieved through the establishment of overall development plans in different areas, particularly research and sciences, because they involve innovative capabilities that meet the current and future needs of the society, and cope with the rapid global changes at the levels of innovation, production, industry and technology.

There has been much focus worldwide on supporting researchers and creating a stimulating environment for conducting studies that address exiting challenges and problems. However, attention has now been shifted towards prioritizing scientific innovation in a way that would translate ideas into products and applications.

No doubt, innovative achievements will not necessarily yield immediate positive outcomes. Therefore, it is important to see how other countries have successfully invested in innovation and try to draw from them some lessons which could help in putting in place a national strategy in this regard. It is also necessary to develop some indicators for regularly measuring such policies in terms of proper execution, application, and success. Being a leading research institution in the Sultanate, SQU has paid special attention to promoting innovation. This is evident through the creation of a department in the Deanship of Research that is in charge of innovation. The department has, as its goals, to attend to all aspects of innovation at the University. This includes encouraging students and staff to develop innovative products and take part in local and external events as well as to submit their patent applications at local and international patent registration offices.

The University's efforts, in this regard, have culminated in the establishment of a new research center called the Center for Innovation and Technology Transfer, with a specific set of objectives to be achieved. There will be an affiliated factory in the University which will offer interesting opportunities for the students and employees to have access to advanced technologies and facilities. For a small fee, anyone from outside the University can use the facilities of the factory.

This edition of Tawasul sheds light on the University's approach to encouraging investment in innovation. One interview is focused on the new research center, while another highlights a new innovative product by a student company to sustain the livestock in the Sultanate. This is, of course, in addition to other studies and news reports.



A frankincense tree

Frankincense and medicinal plants in an SQU conference

SQU will host the First International Conference on Frankincense and Medicinal Plants: Recent Advances in Research and Industry between 30 October – 1 November, 2018. The event is very important as it will highlight the recent advances in this area, address a growing interest in discovering new drugs from medicinal plants in general, and from frankincense in particular, and fulfil the need to better link academia with industry.

This conference has as its main goals, the promotion of an

exchange of knowledge and information about medicinal plants and frankincense and the establishment of links between producers and consumers of natural products worldwide. It also offers an opportunity to introduce delegates to new developments and breakthroughs in many disciplines related to these areas. The conference further aims to contribute to increased production, emphasize the industrial and environmental value of Oman's natural products, and highlight recent medical and scientific dis-

coveries.

The conference is focused on two tracks: 1. Traditional Use, Taxonomy, Horticulture, Conservation, Harvesting; 2. Chemistry, Biology, Health Aspects. There will be a variety of activities including an exhibition that offers interested companies the opportunity to showcase their services and products and meet a target audience of scientists, researchers, laboratory managers, business people, and decision makers. There will also be posters highlighting recent medical and scientific discover-

ies in such fields.

The event is organized by SQU's Office of Deputy Vice Chancellor for Postgraduate Studies & Research, Agricultural and Marine Sciences College, Nizwa University, Oman Animal & Plant Genetic Resources Center and the Qur'anic Botanic Garden, a member of the Qatar Foundation. The conference will be supported by the Ministry of Agriculture and Fisheries, the Oman Botanic Garden and the Environmental Society of Oman, as its strategic partners, as well as Oman LNG and Qatar University.

SQU hosts a world event on research management

SQU will hold an international conference on research management from 21 to 22 October, 2019.

In press remarks, the Chairman of the organizing committee, Yahya Al-Wuhaibi, said that the conference, initiated by the Deanship of Research, would focus on the best professional practices in research management and administration at the regional and global levels, and how to overcome the challenges encountered in research management.

He added that the conference would also provide a forum for concerned professionals, researchers and educators from across the world to share ideas, discuss issues and challenges currently facing research management, identify collaborative venues for addressing relevant issues, and explore international approaches to quantify and monitor the quality and impact of research.

Four themes will be addressed in the conference: Quality and Efficiency of Research Manage-

ment; Competitiveness and Research Funding; Research Capacity Building; and Research Impact and Effectiveness. Other topics to be addressed are competitiveness for obtaining funding, sources of external research funding and how to apply for funding. In addition, researchers will be encouraged to compete for external research funding, and research collaboration and partnerships will be promoted.

... and launches its second Student Research Conference

SQU will, next year, hold the second Student Research Conference, which will include all institutions of higher education in the Sultanate. The conference comes as part of the University's efforts to bring into focus its research and academic capabilities and achievements, which could help develop society at all levels.

The conference, due to be held in April 2019, will address such top-

ics as energy and environment, education, economic diversification and sustainable development. It will bring to focus the students' academic and research potentials as well as their scientific achievements so as to prepare them to become the society's leaders in the future.

The event will seek to promote a culture of research and innovation among the students in all colleges by creating an environment that stimulates and encourages their participation in their research work, leading to innovations. It is hoped that their work will be utilized by both the private and public sectors for the welfare of society. Furthermore, some companies and agencies might show an interest in their innovations and research projects. The event could also be an excellent platform to market the students' innovations locally and globally.

The student conference looks forward to promoting the culture of scientific research, creativity and innovation among university students, thus devel-

oping their abilities to become prominent researchers in the Sultanate. It also aims to strengthen their research potential, build scientific collaborations among them to contribute to the development of society, develop their academic and personal skills, and underscore the values of academic cooperation, competitiveness, and integrity.

In addition to the objectives mentioned above, the event hopes to ensure the proactive participation of students from various disciplines, provide them with the opportunity to keep abreast of current advances in science and technology, and enrich their academic life with innovative and creative accomplishments.

The conference will feature research papers, innovations, graduation projects, and Master's and Doctoral dissertations by undergraduate and post-graduate students majoring in the natural and social sciences.

The conclusion of the 1st Student Research Conference





A new Centre for Innovation & Technology Transfer

Dr. Rahma Al-Mahrooqi: It will become a national leader

With innovation being a goal and policy, many countries have taken rapid steps to transform research findings into products in order to contribute to their GDPs. Therefore, countries have considered innovation as a culture that should be consolidated and disseminated among young people so that it grows with them from an early age. In this respect, SQU has been keen to keep abreast of the ongoing developments in innovation and entrepreneurship, producing knowledge and providing an incubator for Omani youth.

Recently, SQU's Council has approved a proposal to establish a new research centre called the Innovation and Technology Transfer Centre. Its concept, goals and mechanism will be highlighted in the following interview with Dr. Rahma Al-Mahrooqi, Deputy Vice-Chancellor for Postgraduate Studies & Research.

What is the Innovation & Technology Transfer Centre?

The proposal for establishing the Innovation & Technology Transfer Centre was approved by SQU's University Council on June 11. The Innovation & Technology Transfer Centre at SQU will, as the name suggests, operate as a centre for promoting innovation and technology transfer in the university and across the country. It will become a national leader in promoting and facilitating a culture of innovation and entrepreneurship, and will encourage the adoption of best practices in supporting the translation of research into value-added services and products. It will also expand services and product availability in Omani society and, in doing so, will enhance the country's economic development and innovative output.

How can the Centre achieve such goals?

The Centre will offer programs and services to SQU students and staff across five sections – Training, Mentoring and Outreach; Industry Linkages and Licencing; Incubation; Intellectual Property; and Innovation and Technology Transfer Studies. In addition to these sections, the Centre will also contain an Innovation Factory, which will operate under a manager who reports to the Centre's director, and the director will also be responsible for managing SQU's Innovation Fund.

Why is it important for SQU to establish this centre now?

SQU's Strategic Plan for 2016-2040 explicitly calls for the development of the university's

Innovation and Entrepreneurship Department, or IED, into a fully-fledged centre over the coming years. Not only will the Centre build upon the excellent work that the IED has achieved in supporting innovation and entrepreneurship throughout the university, but it will also benefit greatly from the work

SQU will make a good host for the Centre for several reasons

that the Academic Innovation Assistance Program (AIAP), which was jointly developed by the Research Council and SQU, has done to enhance innovation among SQU's academic community.

Along with the realization that this aspect of the Strategic Plan was a guiding principle, we were also mindful, in the planning stage, of the nation-wide push to help Oman achieve economic diversification and sustainability as outlined in Oman Vision 2040. We believed that the university could directly contribute to this by developing young Omanis' 21st century skills in areas of strategic importance, connecting training and instruction with local and global developments, increasing national productivity and competitiveness, thereby ensuring that Oman is ready to reap the benefits of the 4th industrial revolution.

Why will SQU make a good host for the Centre?

SQU is the logical choice for hosting a Centre devoted to innovation and technology transfer for a large number of reasons. For

example, the university is the main source of academic output in the country, as can be seen in the number of SQU-affiliated research papers, books, and conference presentations appearing in Scopus and Web of Science indices every year. Around two-thirds of this academic output is concerned with the applied sci-

ences. This offers a high potential for engaging in innovative activities, for registering patents, commercialization and so on. Also, SQU is in many ways at the centre of Oman's innovation eco-system due to its large number of staff and students, its formal and informal connections with organizations within the Sultanate and around the world, and the fact that its core mission explicitly encompasses promoting research, innovation, and creativity. All these factors mean that the Centre will benefit from, while also making an important contribution to, SQU's engagement with innovation.

How does the new Centre relate to Oman's existing innovation landscape?

Oman is, of course, fortunate to have high-levels of support for a variety of innovation-focused initiatives. The Centre will complement and support those

organizations and initiatives currently operating in the country's innovation eco-system, while also helping bridge the gap between the research outputs and the requirements of sustainable development. As a result, we believe that the Centre has the potential to be one of the main enablers of innovation not only in Oman, but also across the entire region. With the contribution of its Innovation Factory and Innovation Fund, the Centre will be a sustainable feature of the already impressive innovation infrastructures of SQU and Oman, and will help the country to achieve its ambitious innovation objectives of being ranked in the top 20 of the Global Innovation Index and International Innovation Index by 2040.

Could you give more details about the Innovation Factory that will be attached to the Centre?

Yes, the Innovation Factory will be an integral part of the Centre's operations. The Innovation Factory at SQU will be supervised by a manager who reports to the Centre director. It will give the university's staff and students access to a wide range of advanced digital manufacturing technologies and materials in an easily accessible and supportive environment. These services will also be available to members of the general public for a standard fee. The level of equipment,

The Centre has the potential to be one of the main enablers of innovation in both Oman and the entire region

It will deliver services that ensure financial sustainability

materials and services available will not only complement the work conducted by the Centre's five sections, but will also provide the means to transform ideas and concepts into reality. In this way, the factory will support the final prototype development for inventions as products ready for the market.

And how will the Innovation Fund contribute to the Centre's operations?

The SQU Innovation Fund was formed to allow the university to support projects in areas of strategic importance for the country that involve the enhancement of existing, and the production of new, technologies. The overarching objective of the fund is to support innovation that allows Oman to move towards a technologically-based, knowledge-driven economy. In this way, the fund will support the work of the Centre itself while

simultaneously contributing to Oman's global competitiveness. The nature of this support for innovation at SQU and across Oman will have a positive long-term impact on the country's sustainable development across all industries. This will naturally bring a large number of benefits to Oman and its people, including job creation, economic growth, diversification and so on.

Are there any other benefits that Oman can expect to gain from the establishment of the Centre?

Well, as you no doubt know, Oman is engaged in a number of important efforts to help achieve the transition to an efficiency-driven, knowledge-based economy that is associated with sustainable and equitable development. Clearly, for this to happen, the country needs well-trained, highly-

skilled, talented and innovative people. The Centre will give young Omanis a way of keeping up-to-date with continuous changes in fields of knowledge across areas of strategic importance. They will also be able to engage in a hands-on way with the creation and dissemination of knowledge, while contribut-

SQU. The Centre will complement this by providing paid services through the Innovation Factory to members of the public, and will offer paid training courses and sessions about innovation and entrepreneurship to interested parties outside of SQU. In addition to these sources of revenue, the Centre

An integral part will be a factory that transforms ideas into reality

ing directly to its value-added applications. This will allow the Centre's users to draw a strong connection between training and instruction, and will result in innovative ideas and products being developed that have the potential to improve people's lives, both here in Oman and around the world.

Given its ambitious scope, what are the Centre's plans for achieving financial sustainability?

Initially, the Centre's budget will be the current existing budget of the IED, which is drawn from

will also generate equity from spin-offs and from start-ups that have been developed by SQU staff and students, while proceedings from the SQU Innovation Fund will also be used to help fund the Centre's continuing work. As I mentioned before, the Innovation Fund will receive contributions from various companies, and these will be invested in ways that generate income for further driving innovation.



A technology worth 145,000 OR is used in pharmaceutical quality assurance at SQU

SQU provides an integrated research environment that includes the equipment and technologies required for conducting research projects and experiments. This article sheds light on a device installed in the Unit of Applied Analysis at the College of Science.

The device

Liquid chromatography–mass spectrometry (LC-MS, or alternatively, HPLC-MS) is an analytical

chemistry technique that combines the physical separation capabilities of liquid chromatography (or HPLC) with the mass analysis capabilities of mass spectrometry (MS).

Applications

LC-MS is a powerful technique that has very high sensitivity and selectivity and, therefore, is useful in many applications. Its application is oriented towards the separation, general detection, and poten-

tial identification of chemicals of particular masses in the presence of other chemicals (i.e., in complex mixtures). For example, natural products can be separated from natural-product extracts, and pure substances from mixtures of chemical intermediates. In CAARU – the instrument serves a wide range of applications both within and outside SQU.

CAARU is equipped with the Agilent 6460 Triple Quad-

rupole LC/MS systems. The system has Agilent Jet Stream Technology, which utilizes a super-heated sheath of gas to collimate the nebulizer spray, which dramatically increases the number of ions that enter the mass spectrometer.

The main part of the equipment:

- 1- Mobile phase reservoir
- 2- Pump (solvent delivery system): It is a quaternary pump,



having the flexibility to use up to four different solvents for gradient composition. With power range up to 1200 bar, it can deploy any particle type, any column dimensions, or any mobile or stationary phase.

3- Sample injector: With an injection range of 0.1 µl to 20 µl, the instrument can use both vials and well plates. It has a sample viscosity range 0.2-5cp.

4- Column: Since the pressure range is up to 1200 bar, a column with particle size of 1.8µm can be used.

5- Detector: The system has two detectors, a Diode Array Detector (DAD) and Mass Spectroscopy Detector (MSD). The DAD is based on the Agilent Max-Light cartridge cell with optofluidic waveguides that improve light transmission to near 100% efficiency without sacrificing

resolution caused by cell dispersions effects. The MSD, with greater signal and reduced noise with Agilent Jet Stream technology, uses super-heated nitrogen to improve ion generation and desolvation – not sure what this word means.... Efficient analysis – fast MRM speeds allow for analysis of over 100 overlapping compounds in a given retention time window. Efficiency is also achieved by fast polarity switching for analysis of both positive and negative ions.

6- Control and data processor: MassHunter software is fast with automated tuning. The software imports worklists from spreadsheets, saving time. This allows for powerful yet simple data analysis with separate, specialized modules for instrument control and data acquisition,

qualitative identification of unknowns, and quantitation of target-compounds. This results in fast, flexible data reporting with preconfigured reports that simplify basic analyses, or generate completely customized reports.

The equipment covers the following applications:

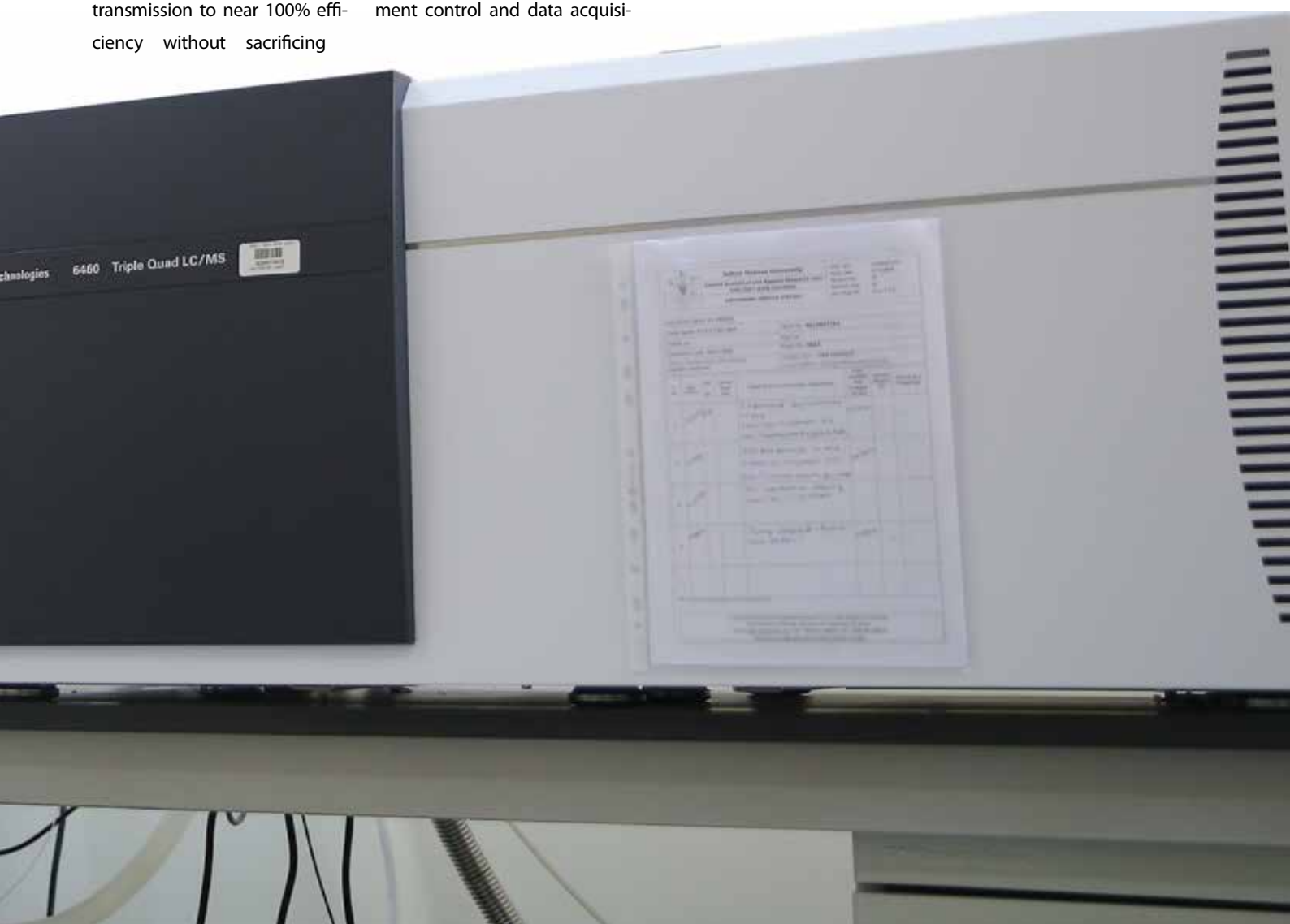
- **Pharmaceuticals like aspirin, ibuprofen, or acetaminophen (Tylenol)**
- **Salts like sodium chloride and potassium phosphate**
- **Proteins like egg white or blood protein**
- **Organic chemicals like polymers (e.g. polystyrene, polyethylene)**
- **Many natural products**

such as ginseng, herbal medicines, plant extracts

- **Thermally unstable compounds such as trinitrotoluene (TNT), enzymes**
- **Identification (ID) of individual compounds in the sample**
- **Molecular weight detection**

The instrument is operated by Omani & non-Omani experts. In addition to the analytical services, the Unit also offers training for students and researchers from SQU and other organizations.

The equipment costs around OMR 145,000.



Study

Researchers produce a biofuel from date pits

**Dr. Alaa Al-Muhtaseb – Department of Petroleum &
Chemical Engineering**



Scientists at SQU have developed an economical and competitive process for producing biofuels (ethanol, butanol and biogas) from biological and agricultural waste, such as date pits. Biofuel production from native algae and other microorganisms, isolated directly from different ecosystems in Oman, was successfully tested.

According to the research team, increasing concerns about global warming and dwindling oil supplies have shifted attention to green processes that use sustainable and environmentally friendly feedstocks to produce renewable energy such as biofuel. Biofuels, also called "green gold" fuels, are renewable and theoretically carbon-neutral resources, and thus offer the promise of energy security and reduced greenhouse gas emissions. The researchers stressed that Oman, like other countries,

needs to identify and to exploit all available resources in the context of national sustainable development.

The team was led by Dr. Alaa Al-Muhtaseb, from the Department of Petroleum and Chemical Engineering, and included Dr. Mohab Al-Hinai, Dr. Raeid

Abed and Dr. Lamyia Al-Haj. Their work involved optimizing the production process under laboratory conditions in order to maximize the biofuel yield and minimize production costs. Genetic engineering tools were used to genetically manipulate key microorganisms in order to increase their physiological activities and improve their survival during the fermentation process.

Large amounts of algae feedstock were produced by growing it in outdoor ponds, which is very cost-effective given the available sunlight throughout the year in Oman. The team suggested that the outcome of their research would lay the foundation for a biofuel indus-

try in Oman. Although the study employed local biological feedstocks, the product will be of global interest and will come under the umbrella of global efforts to find alternative energy sources and to reduce greenhouse gases. A biofuel industry in Oman could also create jobs and promote economic diversification, especially in rural areas. The overall conclusion of the research work was to valorize

waste date pits, which are abundantly available in Oman. All aspects were considered, so that the oil extracted was subjected to the production of biofuels such as biodiesel and green diesel and jet fuel fractions. Moreover, biodiesel was produced in the presence of heterogeneous bimetallic catalysts, which help to overcome issues related to usage of conventional homogeneous catalysts. The synthesized catalyst was highly active and reusable, which makes biodiesel production very economical. Moreover, the waste date pits powder post oil extraction was not wasted but was utilized to synthesize two types of catalysts; one used for the hydrodeoxygenation (HDO) of oil and the other for alkylation of phenol, and it was highly efficient in both these applications. Further, the by-product obtained from biodiesel production was

Al-Muhtaseb: The project will be of great benefit to Oman

upgraded as well to a fuel additive. This suggests that waste date pits are highly valuable and have the potential to form valuable products.

The project will yield the following benefits to Oman:

1- Producing a sustainable alternative energy source in Oman, which will replenish any future shortage in available fossil fuels and will be commensurate with the demand of the continuously increasing population and expansion of the infrastructure in the country

2- Further development of this field will eventually lead to building up a facility of biofuels production in Oman based on bio-renewable resources. This will open a completely new industry in the country that makes use of the priceless feedstock available in the country.

3- By blending biofuels with fos-

sil fuels, Oman will contribute to the global efforts in the reduction of emission of greenhouse gases, as do the EU countries.

4- Biomass energy will support the agricultural and forest industries.

5- Acquiring a Clean Development Mechanism (CDM) project certificate will enhance the country's reputation in the international environmental arena. Successful projects for biofuels production from renewable resources will reflect the country's contribution to the Kyoto protocol agreement and implementation of CDM project.

6- It will lead to the creation of more jobs.

7- The project will help in capacity building and training of under- and post-graduate students in microbiology, biotechnology and engineering related to biofuels production.



Alzheimer's Disease Starts During Childhood in Air Polluted Environments

Dr. Jumana Saleh - Biochemistry Department

The brain damage that leads to Alzheimer's disease may begin far earlier than we thought. A new study published in the journal *Environmental Research*, in March 2018 found surprising evidence suggesting that Alzheimer's disease can begin during childhood, with babies younger than one year old showing symptoms! In large metropolitan cities with high levels of air pollution, hallmarks of the disease are evolving relentlessly in young residents, including infants, children and young adults. The study examined autopsies of bodies of children and young adults who lived in a highly air polluted environment ranging in age from 11 months to 40 years old, compared to age, gender and socioeconomic status matched low air pollution residents. 99.5 percent of the subjects examined from the air polluted environments displayed heightened levels in the brain of two abnormal proteins linked to Alzheimer's disease: hyperphosphorylated tau and beta amyloid. In this study, early signs of Alzheimer's disease, and early stages of the disease were identified in the brainstems of babies as young as 11 months.

The study linked the heightened abnormal protein levels in the brains of young children living in highly polluted areas to the breathing in of small particles of polluted air that enter the blood, and are subsequently carried to the brain. However, the nature of particles causing the damage and the quantity needed before real health problems develop are not yet identified. The lead researcher Dr. Lilian Calderón-Garcidueñas, a professor in the department of biomedical and pharmaceutical sciences at the University of Montana, said that children exposed to cleaner air performed better in various categories, including cognitive performance. While this study cannot prove that air pollution directly leads to brain damage, it adds to an increasing body of evidence suggesting such a correlation. Researchers strongly suggested that the first two decades of life are critical for brain damage associated to environmental pollutant exposures.

Surprisingly, there was a striking effect of the gene APOE4. Study subjects with this gene, who were also exposed to air pollution, had accelerated progression of Alzheimer's disease and increased risk of suicide, compared to those with the same exposure who did not have the gene. This is important as this gene is carried by many. In the USA, 13 to 20 percent of the population carry the APOE4 gene. While some disease risk factors, such as genetic disposition, are not modifiable, exposure to air pollution may be controlled. The results of this study emphasize that earlier intervention during childhood may be necessary to prevent the disease. Neuroprotection ought to start very early, including during the prenatal period. Preventive effective measures ought to be implemented early, as opposed to merely reactionary useless actions decades later when the damage has already taken place.

**Call for
research
papers**



2nd Students Research Conference

15 -16 April 2019

Themes



Education



**Economic diversification
and Sustainable development**



**Energy and
environment**

Participation* is now open to all students from colleges and universities in the Sultanate of Oman until 30 October 2018

*The application form is available online and the terms and conditions apply

For more details

<http://conferences.squ.edu.om/src>
email: src@squ.edu.om, src_squ@gmail.com
Tel: 2414(5940)

Herbal products contain pharmaceutical drugs: A blend of honey and Viagra

Thanks to research findings, fake herbal
products have been pulled out of the
market



Dr. Haider Al-Lawati - College of Science

Since ancient times, mankind has sought to benefit from different herbs in fighting life-threatening diseases. As scientific development became an integral part of human life, addressing almost every aspect includ-

this type of study it was necessary to conduct an accurate and effective analysis, so we formed a research team specialized in chemical analysis, consisting of myself as the principal investigator, Profs. Fakhruddin

most effective methods of conducting this sort of investigation. We came to the conclusion that, in order to do this research on a permanent basis, a device known as the HPLC-MS/MS device must be in place, which is quite expensive. So, a research proposal was submitted to the Research Council (TRC) in which we explained the importance of the study, its objectives, how it will be carried out, and the equipment needed for this project. TRC approved the proposal with a budget of OR 170000 for three years as of September 2014."

He went on: "We got the device. Later,

Dr. Al-Lawati: Cheaters seek quick profits ... we call for coordinating efforts

ing medicine, the pharmaceutical industry made a great leap forward and became a science in its own right. Drugs, that possess certain pharmaceutical ingredients, were produced, and, thus, the industry expanded and pharmaceuticals became accessible to all. However, traditional medicines still exist and many people continue to resort to nature to seek treatment for various diseases. This could be attributed to the belief that natural herbs are considered safe and without harmful side effects.

The Sultanate has a long and rich heritage in herbal medicine, which should be extensively exploited, investigated and protected against manipulation and misuse. In this regard, Dr. Haider Al-Lawati, Associate Professor at the Department of Chemistry, has conducted a study on fraud in herbal remedies in the Sultanate.

Dr. Al-Lawati said: "There are some underhand people who unfortunately seek quick profits, even at the expense of the wellness of the general public. They are used to adding some pharmaceutical products known to have some pharmacological effects, to herbal materials in order to increase the efficiency of herbal remedies. This phenomenon has been observed in different countries, but it has never been investigated in the Sultanate. Getting in touch with the public agencies concerned, it turned out that they lack the scientific competencies necessary to study the problem. It is imperative that they get qualified staff and the expertise to address the issue."

Concerning the methodology of his study, the researcher said t: "In order to carry out

Sulaiman and Salma Al-Kindi from the College of Science, and pharmacist Mohamed Noor, from the General Directorate of Pharmacy and Drug Control. The team initially did an intensive study on the best and



Study

Idris Al-Busaidi, a Master's student, joined the team and made an important contribution. It should be noted that this type of study needs great efforts before analyzing herbal products available in the local market. The most important thing is to calibrate the device, as a first step, which means to make sure the device works well and that the results of the analysis are correct. The analytical method must be accurate and not time-consuming in order to analyze as many herbal products as possible in the local market. The method of analysis should be able to detect the quantities of pharmaceuticals manufactured, if any, and not only their type. The team was then joined by three students: Shaimaa Al-Balushi, a technician working in the Department on Herbal Medicines, Ministry of Health, who was granted a scholarship by TRC to get the training and do the job well; Maithaa Al-Ma'mari and Laila Al-Nabhani, both of whom received a scholarship funded by the research project. Once the lab and technicians were in place, we surveyed the local market and collected a large number of samples."

Dr. Al-Lawati went on to state that: "The Con-

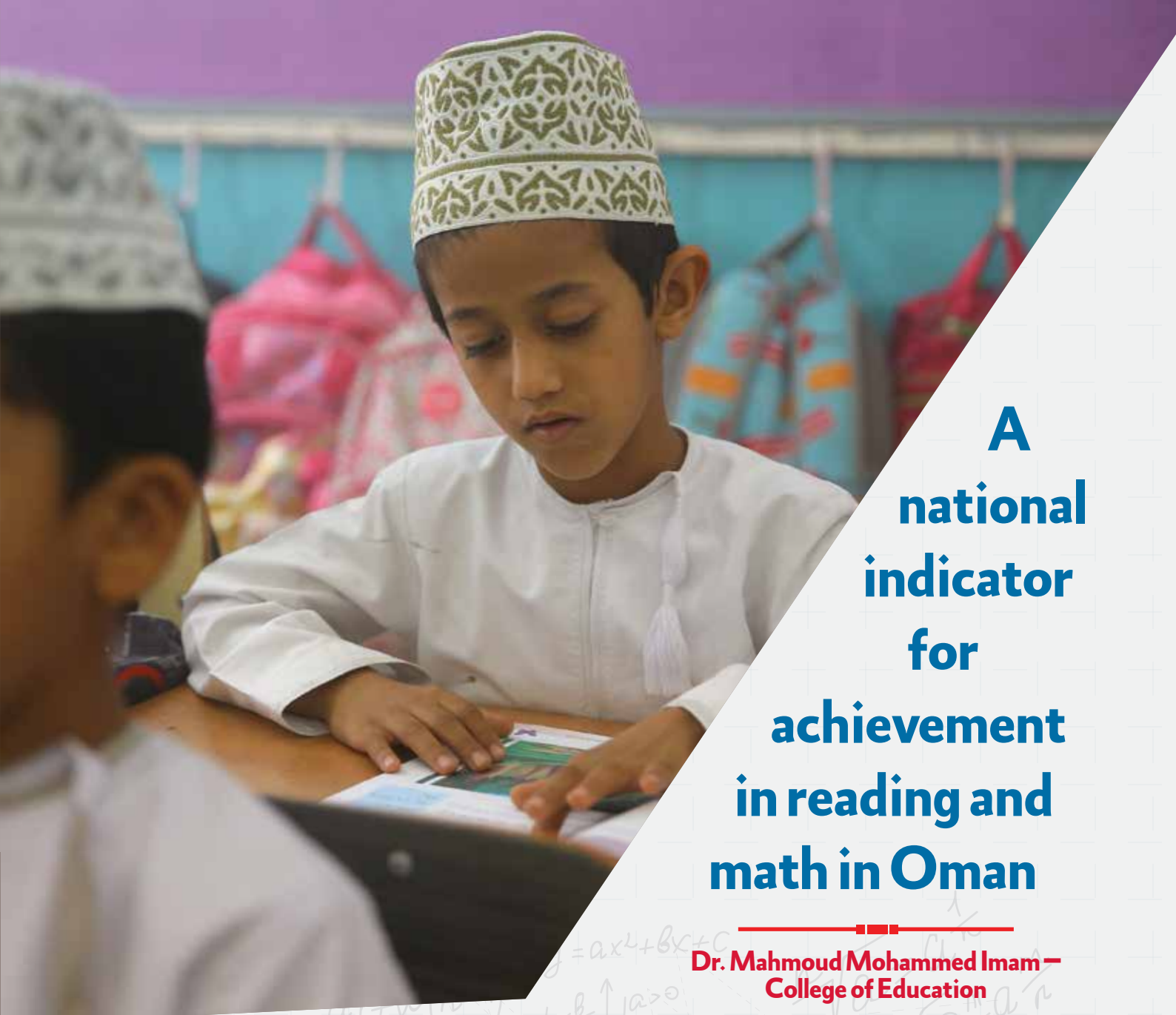
sumer Protection Authority, the Ministry of Health and SQU hospital have cooperated extensively and provided us with a number of suspicious specimens. We noted that they are available in different forms, both as medicinal products and herbs. We also observed that some of these products are marketed as food products, and others are mixed with food. For example, some kinds of tea and honey are mixed with certain herbal remedies. Another important observation is that none of these products mentions on their labels that manufactured pharmaceuticals have been added to the herbal product." As to the findings, he clarified that the results of the analysis indicated that a number of marketed herbal products contain pharmaceutical drugs with a certain pharmacological effect. "The herbal products that are manipulated, whether marketed as pharmaceutical, herbal or fortified food products, are about 15 per cent of the products analyzed. We also found that some of these products are prepared locally, such as honey mixed with herbal materials. Some samples of this kind of products are mixed with common drugs that are used as sex stimulants.

For example, Viagra, which can only be taken with a prescription, has been detected in a large number of spurious herbal products."

He added: "We have made some progress in this regard. Based on our findings, some fake herbal products were withdrawn from the market and our study has appeared in a number of international journals and conferences. We have also managed to provide the Omani market with four Omani experts capable of doing the job. Another important achievement was that the student Idris Al-Busaidi won the award for the best Master's thesis in SQU in 2016."

Dr. Al-Lawati pointed out that the study came out with important recommendations related to funding research that has a direct impact on consumers' health. He underlined the importance of sustainably monitoring the local market to detect any fraud in such products, and bringing together the efforts of various competent authorities to alleviate such a phenomenon that threatens public health. Finally, the study called for raising public awareness about the risks of such fake products.





A national indicator for achievement in reading and math in Oman

**Dr. Mahmoud Mohammed Imam –
College of Education**

A team of educational researchers headed by Dr. Mahmoud Mohammed Imam, Head of the Evaluation and Technical Support Unit at the Department of Psychology, College of Education, are conducting a study aimed to develop a national indicator and decision-making model to measure the achievement of first-cycle pupils in the Sultanate in the subjects of reading and mathematics. Being among several indicators introduced by the Ministry of Education for performance assessment, the indicator, which will concern the 1-4 grades in

the basic education stage, is intended to replace the one being currently used. It will provide a framework for teachers to assess reading and math skills of their pupils and monitor their teaching and the learning outcomes. It will also involve designing a model for decision making based on data in order to improve the learning outcomes. To achieve its objectives, the study will follow a qualitative and quantitative approach which will include a formative assessment of reading and math skills, identification of teachers'

reading and numeracy assessment practices, and interviews with teachers and headmasters to formulate a reading model based on national standards for reading and mathematics. The study sample will consist of 50 per cent of the students in the first cycle of basic education in the Sultanate to implement the project's strategic tools. The research is expected to produce important results such as: providing teachers with assessment tools which could be used in monitoring the performance of students in order identify those who don't meet the

national standards and benchmarks in reading and mathematics in the first cycle of basic education; streamlining the formative assessment of standards in reading and mathematics; helping headmasters to use the results to make decisions that would improve the students' learning outcomes in the first cycle; and enabling curriculum planners and educational policy makers to develop solutions to improve the learning outcomes for students.



Solar powered parking lots

Parking lots produce electricity on campus They save OMR 8000 annually

Renewable energy is one of the most important resources that countries use nowadays to produce electricity. It is clean, environmentally friendly, sustainable, significantly contributing to cost cuts, and could have financial returns if properly used. Solar cell systems, which can safely produce electricity in public or private buildings or even in parking lots, stand as a good example of clean and renewable energy.

SQU has paid special attention

to renewable energy, both in teaching and in installing power generating systems on campus. This includes the construction of solar parking shades at the College of Engineering, funded by Jacobs International and implemented by Nafath Renewable Energy Company.

Tawasul has interviewed the project supervisor and Nafath's CEO, who talked about the logistical and technical aspects of the project.

The beginning

Reflecting on the role of the University in developing the project, Dr. Rashid Saeed Al-Abri – Assistant Professor at the Department of Electrical and Computer Engineering, College of Engineering – said: "This is one of the major renewable energy projects delivered on campus by the University. It will help enhance research and practical teaching skills in the field of solar energy at the University."

He added: "The idea of the pro-

ject was put forward by the College of Engineering and its former Dean, Professor Abdullah Hamad Al-Badi, in collaboration with the renewable energy research team of the College. They proposed the establishment of a strategic centre for solar energy which could be a think tank for the Sultanate. The Dean managed to get funding for the project from JACOBS company."

The project was designed by Dr. Rashid Said Al-Abri and Dr.



During training

Mohammed Hamdan Al-Badi, under the supervision of Prof. Abdullah Hamad Al-Badi, Al-Abri said, adding that the College nominated Dr. Rashid Al-

Abri to monitor the developmental stages of the project, the implementation of the suggested designs, and the

follow up of the security and safety system during the implementation phase. Dr. Al-Abri pointed out that the project falls into two phases. In the first phase, 49 solar parking lots were constructed at the College of Engineering parking area with a capacity of 84 kw from four panels each having a capacity of 20 kw. In this phase, the annual energy production is expected to be more than 110 Mwh.

Dr. Al-Abri underlined: "This project is of great importance to the

College of Engineering in particular, and to the University in general. It will help the College sustain capacity building, produce qualified graduates, and meet the needs of the country for clean energy technology. The University, on the other hand, will expand the project to cover various facilities on campus, and thus reduce electric power consumption and costs. The University offered employees in the public and private sectors two training courses on designing photovoltaic cell projects and related calculations."

The academician added that the University would deliver, during the next academic year, training courses covering the applications of the solar energy shades and environment-friendly houses. The University will also implement the second phase of the project, under the supervision of the Dean of the College of Engineering, whereby

51 solar-energy parking lots will be built in the College. He stated that the College has a strategic outlook to enhancing research, and there are ongoing plans to examine other types of photovoltaic cells for use in the second phase; this could help develop research in the College.

Omani Youth delivered

In this context, Nafath Renewable Energy Company CEO, Abdullah Nassir Al-Saidi, an SQU graduate, said that the project, a collaboration between the University and JACOB Company, was intended to extend the solar energy technology across the Sultanate. He pointed out that his company, which consists of recent SQU graduates, had carried out the project at the University.

He referred to the two stages of the project, including the construction of many solar energy parking lots, being in line with the architecture of the campus.

He emphasised the significance of the project, given the fact that it is done for the University, adding that his company has also installed solar panels on different buildings.

He called for extending the idea of the solar energy shades to cover other facilities in the Sultanate, such as other parking areas on campus, malls, hospitals, schools, universities, and public buildings. In this way, the country will enjoy sustainable clean energy that could constitute 50 percent of the total electric power.

Details on the project

Location: College of Engineering

Composition: 675 photovoltaic cells

Annual output: 290 Mwh

Estimated cost: OMR 216000

Expected return: reduction in electricity cost by OMR 8000 a year.

Evaluation of artificial reefs projects for fisheries enhancement

Dr. Alyssa Marshall – Department of Marine Science and Fisheries

A team from the College of Agricultural and Marine Sciences, led by Dr. Alyssa Marshall, is conducting an assessment study of artificial reefs in Al Batinah region to understand their effectiveness on fisheries productivity. The study aims to limit the risks of the project by undertaking scientific research and implementing sound management systems to enhance the needed production of the fisheries industry in addition to the conservation of the area's valuable marine resources for future generations. The study will evaluate the development of

artificial reef projects known as "Aquafarms". The project is approved by the Ministry of Agriculture & Fisheries with the cooperation of the Tanfeedh unit and the Fisheries labs that were conducted between September 17 and October 26, 2017.

Fisheries is one of five promising sectors for enhancing economic diversification and non-oil revenue that has been chosen by the National Program for Economic Diversification. This is an action-oriented program derived from the 9th Five-Year Development Plan (2016 – 2020). Oman's

fisheries sector provides direct jobs for over 50,000 citizens, and also plays a pivotal role in enhancing food security by providing a sustainable source of healthy and nutritious food. Through government efforts to strengthen and develop the role of this sector, total fish production has increased significantly by 59% from 2010 to 2016, with an average annual growth rate of ~10% over this period. In 2016, it was worth OMR 201 million.



The DAPO's latest publications

It suggests new policies for finance investment in Islamic Banks

Dr. Jaber Shuaib Al-Ismail – Economics and Political Science College

The book "Policies for Finance Investment in Islamic Banks" by Dr. Jaber Shuaib Al-Ismail, Assistant Professor at the Economics and Political Science College, is one of the latest publications by the Department of Academic Publication and Outreach (DAPO) in the Deanship of Research, SQU.

Its theme

The book talks about Islamic banking, which has become a worldwide phenomenon, an important need, and a major component of the banking system at the international level.

This is because it is based on comprehensive principles and objectives, as well as certain financing and investment policies that seek to help achieve overall economic development plans in society.

Objectives

The book introduces an applied study on the policies of finance investment in Islamic banks, and attempts to develop a set of basic concepts to make this possible. According to the author, this is a promising alternative that should be promoted and expanded. It is a way of life and

an effective tool that emanates from the traditional Islamic economic system, which will dominate the world in the years to come, according to him.

Recommendations

The author calls for the need to restructure the policies of finance investment in Islamic banks, and to address the competition they are facing from traditional banks. A possible solution, he suggests, could be to establish a union between several Islamic banks as a first step towards an emerging Islamic holding consortium commit-

ted to expanding various development activities. Another way is to grant special privileges to the investment authorities in those Islamic banks, so that they become a safe haven for a fundamental change in Islamic investment policies and development.

Author:

Dr. Jaber Shuaib Al-Ismail, PhD in Economics and Finance / Faculty member at the Public Administration Institute in Oman



Radio emissions from cell towers within safety limits: **SQU** researchers confirm



Professor Bourdoucen Hadj – College of Engineering

One of the distinctive features of the 21st century is the dominant impact of technology on everyday life. One example is the mobile phone, which has become an integral part of our lives. However, electromagnetic radiation from towers can prove harmful if it exceeds a certain threshold. In some cases, it can cause cancer, so the International Commission on Non-ionizing Radiation Protection (ICNIRP) maintains the electrical limits, and works with the World Health Organization (WHO) to

ensure that the providers do not go beyond a certain threshold. If they put more power in these towers, they may have increased coverage and, of course, greater radiation, which is bad for the human body. This issue has prompted a research team, led by Professor Bourdoucen Hadj – College of Engineering – to investigate the level of emissions from cell towers across the nation and ensure that all towers follow the standards set by the ICNIRP and WHO. Measurements were taken

across 2G, 3G and 4G frequencies to ensure that adequate safety standards are being met. The study has come up with promising results. The researchers and telecommunications operators have agreed that the readings of the cell towers in nine locations at SQU conform to international standards, and the emissions are within the safety limits and thus, not harmful to public health. Meanwhile, the Ministry of Environment and Climate Affairs has issued the ministerial decision

No. 25/2015 on environmental regulations and guidelines for establishing, installing or operating base stations for mobile communications towers and antennas. The Telecommunications Regulation Authority (TRA), on the other hand, has been keen on meeting global standards through checking the quality of service provided by companies and making sure they adhere to the regulations with regard to the emissions from the cell towers.



Scientists identify a severe form of sickle cell disease

Prof. Yasser Wali – Child Health Department

Sickle cell hemoglobin (HbS)-Oman is a severe variant of sickle hemoglobinopathies that results from two simultaneous mutations in the same beta globin gene. The disease entity has not been adequately described in the literature and there are many devastating consequences of a delay in diagnosing either heterozygotes or the compound heterozygotes. Therefore, a research team has conducted a study at the College of Medicine and Health Sciences to identify the magnitude of the problem in Oman, classify the disease, and explain its genetics and its phenotype modifiers.

Oman has a high prevalence of inherited hemoglobinopathies, in particular sickle cell disease, which is so widespread as to be of considerable national concern. In recent years, quite a number of HbS-Oman patients were observed in hematology clinics presenting severe forms of the sickle cell disease. However, there is lack of data regarding the exact incidence of HbS-Oman.

The principal investigator, Professor Yasser Wali, has stated that the disease entity has not

been adequately described in the literature and only six cases of HbS-Oman have been identified. He added that the research project had helped to understand and fully report on this Oman-specific disease to the world.

Highlighting the study results, Professor Wali said: "The project studied six families having the hemoglobin variant HbS-Oman,

and tried to explain the disease in more patients having the same genotype and diverse phenotype. The study characterized the genetic background of the disease by investigating the beta globin gene and the role of sickle cell genetic modifiers in modifying the severity of HbS-Oman. The results confirmed the presence of HbS-Oman double mutations in the beta globin gene, but found no

other mutations in the entire gene that could be associated with the disease. The study was the first to investigate the type of S-haplotypes associated with HbS-Oman."

He pointed out that there were no differences between the compound heterozygous and the severe HbS-Oman trait in the blood parameters, although the two groups expressed different clinical manifestation.

Genetic modifiers known to

modify the severity of the sickle cell disease, the presence of alpha thalassemia and levels of HbF, as well as other possible modifiers played no role in modifying the severity of HbS-Oman, Wali disclosed. He said that more samples need to be included in order to establish a powerful correlation, and more factors need to be encountered to explain the different levels of severity associated with HbS-Oman.



Conference presentation on the social isolation of visually impaired students

Dr. Mohammed Al-Sherbini – College of Arts and Social Sciences

Dr. Mohammed Al-Sherbini, from the College of Arts and Social Sciences, participated in the 5th International Conference for Disability and Rehabilitation, held from 1-2 April 2018 in Riyadh, Saudi Arabia.

Al-Sherbini presented a paper on the effectiveness of using the mentoring programme of Big Brother and Big Sister (BBBS) to help visually impaired students. The study aimed at identifying the effectiveness of using such a programme in the Gulf region

and, specifically, in the Sultanate.

According to the researcher, the programme includes such aspects as personal interviews, traditional mentoring, exchanged mentoring through e-mail, telephone conversations, e-environment or e-mentoring, the latter being a recent tool in which the mentoring relationship between the mentor and the one being mentored is carried out through various chat programmes.

The study also sought to verify the main hypothesis that professional interventions using the BBBS mentoring programme may help reduce the fear of others and improve the social participation of blind students.

The methodology of the study included a pre- and post-test design in which a control group and experiment group participated.

The findings have supported the primary premise of the study, as well as the secondary assump-

tions, namely the relationship with colleagues and professors, participation in university activities, tendency to study, time management and memorizing techniques improved with this programme. This suggests that the mentoring programme, being a form of professional intervention, was very effective with blind students in terms of alleviating social isolation.





Dr. Yassine Charabi - Director, Center for Environmental Studies and Research (CESAR)

Oman, the first Arab country in Asia to win GCF funding

Climate change projects funded, thanks to SQU research efforts

The Sultanate has become the first Arab country in Asia to receive funding for climate change projects from the Green Climate Fund (GCF) and SQU is one of the first universities to be financially accredited to implement projects with the Fund, thanks to the efforts of an SQU research team, headed by Dr. Yassine Al-Charabi.

GCF

Dr. Charabi said the Fund is affiliated to the United Nations, and finances member states for environmental projects around the world. He added that the funding focuses on addressing the threats and challenges of climate change at the level of climate adaptation, and also the negative impacts on vital sectors such as agriculture, infrastructure, urbanization, tourism, fisheries and marine life.

Collaborating with GCF

He disclosed that the Sultanate had been working with the GCF since 2017 through two phases: the first is called "Readiness

and Preparation" that lasts about 6 months. Once the projects are approved and funding bodies are identified, the second phase, called "National Adaptation", will be initiated. It aims to enhance the potential for climate change adaptation to protect health, achieve food security, and enable communities and national institutions to efficiently manage water resources and other sectors.

What is the research role of SQU?

The CESAR has worked to attain environmental investments from the Fund, and after its continued efforts, the Sultanate has managed to obtain funding, being the first Arab country in Asia to do so, thanks to its status and role as a country deemed trustworthy by the United Nations to achieve cooperation in order to protect the Earth from environmental hazards.

What after the funding?

Dr. Charabi listed the following steps that should be taken after receiving the funding:

1. Establishing a basic system of regulations in Oman for financing environmental projects.

2. Identifying the environmental problems in the Sultanate and drawing up a future plan to address them, and specifying the names and locations of the projects according to scientific studies, how they are implemented, and what their operational and financial requirements are.

3. Obtaining additional investments from the Fund to finance new projects.

About the author

Dr. Yassine Charabi is Associate Professor and Director of the CESAR. He has been working at SQU for 15 years. He was named the Outstanding Scholar in 2010 and 2015, and in 2014, he received the National Prize for Research. He has supervised the National Climate Change and Adaptation Strategy. He is an international expert with the Intergovernmental Panel on Climate Change.





Students turn date pits into a product

Rahma Al-Kalbani: "Qoot" has many benefits for goats

SQU has succeeded in providing a stimulating environment for students to translate their ideas into concrete products that can be marketed locally and regionally. This has given rise to several startups established by students and aimed at commercializing such products. Important support has come from the Department of Innovation and Entrepreneurship, at the Deanship of Research, to help the students develop their companies.

In this edition of Tawasul, we shed light on Nawa, an SQU student startup, and see how they have managed to develop their product. We met with Rahma Al-Kalbani and this is what she said:

- Can you give us an idea about the company please?

The initial idea came from one member who suggested that we form a student team to take part in a competition. So, some students were interviewed and then shortlisted according to certain criteria.

- How many employees do you have?

There are thirteen employees from such varied backgrounds as nutrition sciences, finance, marketing, management, math and statistics, law, computer science, and chemistry.

- What was the first product of the company?

It is called "Qoot", which is supplementary feed moulds that compensate for feed lack of nutrients because they contain salts, carbohydrates, vitamins and 24 per cent of protein.

- Can you give more details,

please?

As I said earlier, the product takes the shape of feed moulds. They are easily transported and stored and help to reduce the wastage rate of the product, which is made of local raw materials that do not lose their nutritional value during the production process. It also contains no preservatives. A 100-ton hydraulic piston is used to form such moulds in order to prevent the formation of pores through which the air might infiltrate. This would prevent the growth of mould and bacteria.

- How useful is it for consumers?

The product has several benefits as it increases the fertility of does during the mating period, the number of births, the amount of milk produced after birth, and the weight of goats because it has a high protein content.

- Why did you develop this product specifically?

The idea came as a response to the increasing amount of agricultural waste (date pits) and its inefficient processing, as well as the growing demand for animal feed products. This led the company to think about making natural fodder from date pits and other local products of high quality and nutritional value that meet the needs of consumers.

- Are you now in the production stage?

The Company is currently engaged in continuous efforts to finalize the initial production processes to supply the market with an appropriate commercial quantity that meets the needs of consumers. We are considering a detailed production plan after calculating the costs and securing the required capital for the operational and marketing pro-

cesses.

- Is there any cooperation with competent authorities in the Sultanate?

The company has recently signed a technical cooperation agreement with the Directorate General for Agricultural and Livestock Research, Ministry of Agriculture and Fisheries, which will help increase the productive capacity of the company and provide it with the necessary tools for future expansion.

- Have you received support from SQU?

The University has played an important role in making the company a success through providing all the facilities for the founding students. We have received important advice from academics in terms of production, marketing and finance.



Research Management and Administration Conference

Sharing Best Practices

21st - 22nd October 2019

Sultan Qaboos University



Introduction:

Oman is identified as a regional hub of high quality research and innovation, an achievement that is largely underpinned by its highly skilled research management and administration specialists. These not only help to ensure that excellent standards of research are achieved, but that research is aligned with the needs of the government and industry and contributes to the socio-economic development of Oman and the region.

Sultan Qaboos University has a strong and highly skilled research management and administration structure/function. With a strong record of accomplishment of proven expertise in these areas, Sultan Qaboos University is well placed to host a conference on international best practices in research management and administration. The conference will provide a forum for research management and administration professionals, researchers and educators from across the world to share best practices in research management and administration, to discuss issues and challenges currently facing research management and to identify collaborative venues for addressing relevant issues.

Objectives:

- Share the best practices in research management and administration.
- Identify challenges and issues facing research management and administration.
- Provide a forum for an informed discussion of issues related to research culture, norms and values.
- Explore international approaches to quantify and monitor quality and impact of research.

Timeline

30 May 2018	Call for abstracts
15 October 2018	Deadline for Abstract submission
1 December 2018	Acceptance of Abstract Notification

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Themes:

Theme 1: Quality and Efficiency of Research Management

- Centralized vs. decentralized research project and program management, and how research management/administration specialists can support each model.
- Managing research program and project budgets (the risks and pitfalls).
- Responsible research (legal aspects, research ethics, compliance, etc.).

Theme 2: Competitiveness and Research Funding

- Identifying and processing external research funds.
- Supporting researchers in the competitive tendering process.
- Facilitating multi-disciplinary partnerships and collaborations.

Theme 3: Research Capacity Building

- Professional Development.
- Defining generic research competencies.

Theme 4: Research Impact and Effectiveness

- Developing a research vision and strategy for the organization.
- Measurement and evaluation of research quality and impact.
- Effective dissemination of research for maximum impact.
- Linking Researcher within industry for tangible, "real world" benefits.