

IAEA Briefs: new series for policymakers

The IAEA has launched a new publication series — IAEA Briefs — to inform decision makers about how they can best make use of its services to enhance capacity and support development. Launched in autumn 2016, IAEA Briefs cover a wide range of topics relating to the applications of nuclear science and technology and also offer recommendations for consideration to IAEA Member States.

The Briefs also cover region-specific issues. The IAEA Brief *Enhancing Patient Care In Africa Through Safe Medical Imaging* highlights the importance of having well-qualified medical physicists in Africa to handle high-tech medical imaging equipment such as multi-slice helical computed tomography (CT) scanners.

Another IAEA Brief, *Detecting and Treating Cervical Cancer Using Diagnostic Imaging Techniques and Radiotherapy*, focuses on the IAEA’s support to Member States in Latin America and the Caribbean, and how nuclear medicine and radiation therapy can offer rapid diagnosis and effective treatment for various types of cancer, including cervical cancer. The document details IAEA assistance

available to Member States to enhance their national cancer care programmes for cervical cancer through training, expert assistance, fellowships and the procurement of equipment.

The third in the IAEA Brief series, *Using Nuclear Techniques to Assess Breastfeeding Practices for Better Nutrition and Health*, draws attention to the use of stable isotope techniques to help evaluate activities to improve infant and young child feeding practices. The Brief provides information about various IAEA projects in Member States to help them acquire competencies in applying these techniques, which can provide accurate and objective data on breastfeeding practices.

The IAEA plans to continue adding to its collection of Briefs and Factsheets.

IAEA Factsheets

The IAEA is also updating its collection of factsheets and has included new information of interest. The factsheets highlight the IAEA’s multi-dimensional work in the peaceful applications of nuclear technology in energy, health, industry, food and agriculture, nuclear safety and security, and safeguards and



verification. For example, under the theme of nuclear safety and security, factsheets are available on a range of areas, including computer and information security, the Convention on the Physical Protection of Nuclear Material and its Amendment, and nuclear forensics.

Another factsheet explaining the IAEA’s support and activities to fight disease-transmitting mosquitoes can be found under the health theme, entitled: *The Zika Virus Mosquitoes: How can the sterile insect technique help?*

Access the IAEA Briefs and the collection of factsheets online, here: iaea.org/publications/factsheets

— By Aabha Dixit

New method advances research on controlling mosquitoes using nuclear techniques

A pioneering method unveiled in December 2016 for separating male and female mosquitoes could be a major step towards using the nuclear-based sterile insect technique (SIT) to control the insects that transmit diseases such as Zika, dengue and chikungunya.

SIT involves using ionizing radiation to sterilize mass-reared insects of the target pest and then releasing them into nature where they mate with wild insects, resulting in no offspring and, over time, reducing the overall insect population. SIT has been employed successfully in over 40 countries against agricultural pests such as fruit flies, tsetse flies, screwworm and moth pests, and research on its

application against Aedes mosquitoes has intensified in the wake of the Zika crisis last year. The IAEA, in partnership with the Food and Agriculture Organization of the United Nations (FAO), is spearheading global research in the development and application of SIT, including against Aedes mosquitoes.

The main challenge facing researchers in scaling up the use of SIT against various species of mosquitoes has been the lack of a reliable method to remove females from among the mosquitoes that are released. Eliminating females before release is crucial to the use of SIT against mosquitoes, because it is the bites by female mosquitoes that transfer diseases.



(Photo: D.Calma/IAEA)

In countries where the use of SIT against Aedes mosquitoes is being tested or where testing is planned, such as Brazil, China and Mexico, a manual method is used to separate males from females. Female pupae — in the lifecycle of the insect, this is the stage between larvae and adult — are larger than male pupae, offering a way to distinguish and remove females before release. However, this method is very labour-intensive and is therefore not practical for upscaling to the tens of

millions of mosquitoes that would be required in order to use SIT at the a larger scale needed to protect cities from disease transmission, said Rui Cardoso-Pereira, an SIT expert at the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture.

Finding alternative methods for what insiders call the ‘sexing’ of mosquitoes is the focus of an ongoing five-year coordinated research project that began in 2013 under the auspices of the Joint FAO/IAEA Division, with the participation of experts from 13 countries.

No optical illusion

Researchers at TRAGSA, the Spanish government’s institution focusing on environmental sciences and services, have now built the prototype of a device capable of differentiating male and

female mosquitoes using via artificial vision technology and then eliminating the females using laser beams. The device consists of a rotating disk to distribute the mass-reared pupae, which are then analysed using software that can distinguish the sexes based on size, explained Ignacio Plá Mora of TRAGSA’s Pest Control Department.

The preliminary results of the tests conducted have shown that 99.7% of the females were eliminated, while up to 80% of the males survived and could be released, Plá Mora said. “The results achieved are highly satisfactory compared to those obtained by the manual methods that are currently used,” he said.

While the prototype can process a million *Aedes* males a day, it still does not quite scale up to the level

of industrial production required at a regional scale. However, it will be satisfactory for projects targeting individual towns or villages, particularly in countries where the labour costs associated with manual sorting of mosquito pupae are prohibitive, said Cardoso-Pereira. Further research to perfect the method is ongoing, in order to eliminate fewer males and to scale it up further.

TRAGSA’s participation in the coordinated research project has helped it in the development of the new method. “When top experts in an area work together, everyone’s research accelerates,” Cardoso-Pereira said.

— *By Miklos Gaspar*

Armenia’s physics research legacy saved through pixels

More than 1000 destroyed research papers on high-energy physics and astrophysics have been recovered in Armenia thanks to digital copies saved at the IAEA’s International Nuclear Information System (INIS).

For over 25 years, thousands of research papers held by the library of the inadequately-funded Yerevan Physics Institute (YerPhI) were locked away in dusty storage rooms. They had become so dirty that it was impossible for them to be cleaned without causing damage.

“In the 60s, 70s and 80s we distributed our research papers to all large laboratories and transferred them to the IAEA,” said Ashot Chilingarian, Director of YerPhI. “Fortunately, INIS had digitized and preserved all the archives, which are now accessible to us in digital form. They have been literally saved.”

In May 2016, after YerPhI was granted the status of National Laboratory, its management asked the IAEA for help to reconstruct the old archives. IAEA

staff provided YerPhI with the research papers in digital form and helped them to set up a digital scientific repository. Through the repository, the team has made all the recovered research papers available online at ivenio.yerphi.am.

Scientists at YerPhI conduct research in the fields of high-energy physics and astrophysics and collaborate with international partners using the world’s biggest accelerators and cosmic ray detectors, Chilingarian said. They have been collaborating in international experiments since the 1980s. Today YerPhI publishes approximately 30% of Armenia’s research papers and plans to add all new research publications to the repository.

“The project has not only allowed YerPhI to acquire and reuse the lost scientific information, but has also introduced modern technologies to support the operation of Armenia’s research facilities,” said Zaven Hakopov, INIS coordinator at the IAEA. Based on Armenia’s example, the IAEA plans to assist more countries to create national nuclear



Photo: YerPhI

information repositories to stimulate research and development, he added.

INIS is operated by the IAEA and hosts one of the world’s largest collections of published information on nuclear science and technology. It contains four million bibliographic records accessed by over two million users worldwide every year. Through INIS, the IAEA is able to gather nuclear data, information and knowledge resources on the peaceful use of nuclear energy and makes this available to its Member States, contributing to advancing research and development and helping countries achieve the United Nations Sustainable Development Goals.

— *By Laura Gil*