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DRDO News

DRDO Technology News

Press Information Bureau
Government of India

Ministry of Defence

Thu, 13 Aug 2020 6:46PM

Raksha Mantri Shri Rajnath Singh launches 15 products developed by Defence PSUs and OFB; MoD continues Atma Nirbhar Bharat Week Celebrations

Raksha Mantri Shri Rajnath Singh launched here today four products each by OFB and BEML, two by BEL and one each by HAL, BDL, MDL, GRSE and GSL, developed by respective DPSUs/ OFB as part of ***'Atma Nirbhar Bharat'*** week celebrations which continues till tomorrow, the 14th August 2020**.** Chief of Defence Staff, General Bipin Rawat, Defence Secretary Dr Ajay Kumar, Secretary Defence Production Shri Raj Kumar and senior officers from DDP were present. CMDs of DPSUs and Chairman, OFB participated in the event through video conference links. Addressing them, Shri Rajnath Singh said "Self-reliance in defence manufacturing is one of the key objectives of the 'Atma Nirbhar Abhiyan'. He expressed confidence that the drive for "ATMA NIRBHAR BHARAT" to realise the goal of self-reliance would give the necessary impetus to India's defence production. "The concerted efforts being put in by Department of Defence Production, Ministry of Defence, to streamline the procurement procedures, production policies and indigenization initiatives would assuredly lead to the development and manufacture of indigenous defence products bringing down our dependence on imports thereby restricting outflow of Foreign exchange, encourage development of domestic Industry, insulate India from external pressure and ensure lifetime spares and service support to the defence equipment," he added.

Referring to corporatization of OFB, Shri Rajnath Singh said "if government owned defence industries are to compete at national and international level then the outdated practices will have to be done away with. We need to have modern management techniques, technology infusion and collaborative efforts to help aid the state defence industries serve the country efficiently. With this purpose the government has initiated steps towards Corporatisation of OFB. I am sure this step will not only help remove the constraints of controlled pricing, but will also infuse corporate management practices and efficient systems. I understand that it will be a challenge for OFB to reinvent itself but I hope they will succeed in it."

Among the products launched today included the prototype of Nag Missile Carrier (NAMICA) developed by Ordnance Factory Medak in association with **DRDL, Hyderabad**. NAMICA has the potential for import substitution to the tune of Rs. 260 Cr in the first phase, which may go upto more than Rs 3000 Cr. The other products of Ordnance Factory Board such as the fully indigenous 14.5 mm Anti Material Rifle being manufactured with the existing facilities at Ordnance Factory Trichy, the upgraded Commander's Thermal Imager Cum Day Sight for T90 Main Battle Tank and the prototype of 8.6x70 mm Sniper developed by Rifle Factory Ishapore for engaging long range targets, were also launched.

Raksha Mantri appreciated BEML for the products launched today saying their endeavours towards indigenization and reduction in imports are impressive. He said "The 150 Ton payload capacity Dump Truck, one of the biggest Electric Mining Dump Trucks, and Super Giant Mining Excavator of 180 Ton Capacity, both indigenously designed and manufactured with cost benefit of over 20% than the imported equipment and with expected foreign exchange savings of Rs. 1500 Crs and Rs. 220 Crores respectively are true 'atma nirbhar' products." He said "'GAUR', the BEML Medium Bullet Proof Vehicle built on a high mobility chassis, with impressive features and customizable protection levels and custom built Heliportable 100 HP Dozer, with very high indigenization levels of 85 % and 94% respectively, are remarkable products."

The roll out of the 150th Do-228 aircraft by Hindustan Aeronautics Limited, HAL, is a milestone in the indigenous manufacture of the proven platform. The christening of the 150th aircraft as IN-259 and customising it as a dedicated platform for Indian Navy in the Maritime Reconnaissance & Intelligence Warfare role is a true reflection of the technical prowess of HAL. Further, HAL and IISc have joined hands to establish a Skill Development Center at IISc's Challakere campus in Karnataka. The goal of this Center is to create a model facility that would provide skill development programmes for various beneficiaries ranging from local community members to high-end engineering professionals in line with the "Make in India" Mission.

The Linear Variable Differential Transducer fully designed and developed by BEL, which is critical to attain accuracy & precision in guiding and seeking the target, and the launch of 1kW Transmitter Aerial Switching Rack which is an import substitution for HF Aerial switching Unit, for providing better long-term support to Indian Navy, are genuine indigenized products.

The Konkurs Launchers Test Equipment designed and developed by Bharat Dynamics Limited, BDL, to check the complete functionality of Konkurs Launcher replacing the earlier imported system from Russia will save foreign exchange of US $ 17.7 Million.

Garden Reach Shipbuilders and Engineers Limited, GRSE's design and development of the Portable Pedestrian (Assault) Bridge, first of its kind made of Carbon Fibre Polymer Composite Material, to meet the requirements of the Indian Army is a genuine 'atma nirbhar product'.

The indigenous development of Gearbox for the Indian Coast Guard Offshore Patrol Vessels project by GSL is a success story not only in Self-reliance but also in partnering with a private company, resulting in saving of Rs 37.50 Cr for 5 ship sets due to Indigenization.

Underwater Remote Operated Vehicle by MDL which has completed laboratory trials commences its Field Evaluation Trials at Chennai today.

Raksha Mantri unveiled these products by pressing a remote button. He congratulated the Management and Employees of DPSUs and Ordnance factories for their effort in churning out the indigenised products and applaud their commitment towards the cause of 'atma nirbharta'. Shri Rajnath Singh specially congratulated Secretary, Defence Production and his team for the initiative taken to celebrate the 'Atma Nirbharta' week from 07 to 14 August 2020. He said "The impressive list of indigenous products and new products which have been launched today, gives me confidence that the DPSUs and Ordnance Factories would be the prime drivers of the 'atma nirbhar abhyan' and contribute immeasurably to the cause of national security and self-reliance." He further added "some of the products launched today will not only cater to the needs of defence sector but will also be useful for the civil society when needed. DPSUs and Ordnance Factories are national facilities, created and strengthened over a long period of time and have considerable technical prowess and capacity. They also have well-structured R&D and testing facilities and manufacturing capability which should be fully used for indigenous design, development and manufacturing."

https://pib.gov.in/PressReleseDetailm.aspx?PRID=1645558

FINANCIAL EXPRESS
Read to Lead

Fri, 14 Aug 2020

Will Atmanirbhar Bharat revive the fortunes of the Indian Army's Main Battle Tank Arjun?

The changing dynamics of Mountain warfare, more specifically in respect of India China Line of Control kind of terrain with a heady mix of mountains and open hard track terrain, "requires a rethink on our operational philosophy for deployment of mechanised forces with tailor-made equipment to suit our requirements" says an Indian Army veteran

By Huma Siddiqui

The Ministry of Defence (MoD) has recently released its Import Embargo list as part of its Atmanirbhar Bharat initiative. Efforts are on to ensure that the Indian Armed Forces cut down their dependency on imported platforms, and help use the platforms manufactured locally. The changing dynamics of Mountain warfare, more specifically in respect of India China Line of Control kind of terrain with a heady mix of mountains and open hard track terrain, "requires a rethink on our operational philosophy for deployment of mechanised forces with tailor-made equipment to suit our requirements" says an Indian Army veteran.

The debate on indigenous production in the defence sector to cut down import dependency has been going on. There has been some positive outcomes including the classical case of Main Battle Tank `Arjun'.

Order for 124 Arjun tanks (MK I) was placed in the year 2000.

When did MBT `Arjun' project start?

It was in 1996 that the Indian government decided to mass-produce the tank at the Heavy Vehicles Factory (HVF) in Avadi, Chennai. Order for 124 Arjun tanks (MK I) was placed in the year 2000. India thus joined the select group of 10 countries worldwide that have designed and developed their own Main Battle Tank. The other countries that have designed and developed their own MBT are the UK, France, Germany, USA, Israel, South Korea, Russia, Japan and China

In spite of a proven, indigenous MBT and DRDO having created capabilities within the country for the fabrication of Hull and Turret for accelerated deliveries, the Cabinet Committee on Security in 2019 approved the procurement of 464 Russian made T-90MS main battle tanks in a Rs 13,400 Cr deal.

Interestingly, as per the result of the comparative trials held between the Arjun MK I and T 90 tank in 2010, the Arjun outperformed the T 90 on several parameters including accuracy and consistency of firepower, mobility and agility. The Arjun also boasts of a superior power to weight ratio, which is necessary for combat on the move.

CAG Report in December 2014 observed that the benchmark fixed by the Army for the evaluation of the T-90 tank was more relaxed vis-à-vis MBT Arjun on the multiple parameters including scientific stress technique, Check of lubricants/oils, System reliability, Laser range finder, the firing of armour piercing ammunition ad medium fording amongst others.

In the last few years, based on Army's requirements, Arjun MK I has undergone 89 improvements. This has transformed Arjun into a highly advanced platform, comparable to the most technologically advanced MBTs globally which includes the likes of Merkava from Israel, M1 A2 Abrams from the USA, and Challenger from Great Britain amongst others. Upgraded Arjun MK I A was successfully demonstrated to the Army in December 2019.

The pertinent question, therefore, is if Arjun could prove its superiority over the T-90 on some critical aspects then certainly, the Arjun MK I A, with significant technological advancements, will be far better positioned for both offensive and defensive tasks.

Arjun Vs T-90

According to a senior officer T-90 has had its own share of challenges. In a tank biathlon held in Russia in August 2017 where tank crews from 19 countries competed in simulated battlefield conditions to determine which is the best, Indian Army was knocked out after both the main and reserve T-90 tanks developed mechanical problems.

T-90 tanks also suffer from night blindness as its night vision system does not work in high temperatures of the desert regions. Electronic systems of the tank also have failed consistently l in the desert heat. By comparison, Arjun has a much advanced night fighting capability, has not faced any troubles in high temperatures and does not even require any air conditioning due to its rugged systems suited for desert conditions.

"Arjun MBT presents a great potential to further the "Make in India" and self-reliance vision of the Government. Arjun MBT line has been lying idle since 2010-11 when the last Arjun MK-Is rolled out. Will the renewed emphasis on cutting down imports will bring a fresh lease of life to Arjun, like LCA Mk 1A and Basic Jet Trainer programs is yet to be seen," observed the senior officer quoted above.

Expert View

Sharing his view with Financial Express Online, Brig NK Bhatia (retd) says, "With Chinese PLA having modernised at a rapid pace with the creation of mechanised formations in its Western Theatre Command, necessitate a matching capability enhancement in respect of our own mechanised formations."

Currently Indian Army's armoured formations are equipped with Russian built T-72 and T-90 MBTs with a limited number of indigenously produced Arjun tanks. These are essentially medium/heavy tanks that are more suited to the plains of Western India.

According to him, "The requirement of a tank for mountains would essentially encompass agility, mobility and manoeuvrability to facilitate rapid deployment. Mechanised/armour units would primarily be required to act as anti-armour platforms to counter enemy's armour thrusts through the gaps in the mountainous terrain."

"This needs a relook in our deployment philosophy of placing medium tanks in the mountains due to the inherent problem in their deployment and connected issues relating to mobility and logistics. Another factor that weighs in heavily against the deployment of current series of tanks in the mountains is their vintage and issues connected with their serviceability in mountains," Brig Bhatia opines.

"The need for a new tank exclusively for mountains with modern platforms incorporated in it, in the backdrop of current Indo China stand-off, is not only justified but timely. Any decision with respect to fresh acquisition of a modern tank will need introspection to suit their deployment specific to our requirements.

The decision need not be rushed through as any new acquisition will take considerable time to train and deploy with setting up of matching logistic facilities," he concludes.

https://www.financialexpress.com/defence/will-atmanirbhar-bharat-revive-the-fortunes-of-the-indian-armys-main-battle-tank-arjun/2053964/

DEFENCE AVIATION POST
Your Connect To The World Of Defence And Aviation

Fri, 14 Aug 2020

India's defence shopping to go desi

A nuclear-weapon state with the world's fourth largest military depending overwhelmingly on imports to maintain its armed forces: this is the irony that India seeks to overcome on the eve of its 74th Independence Day. The declaration of a list of banned defence imports by the Ministry of Defence (MoD) is a good first step in this direction.

On August 10, the MoD announced an "import embargo" on 101 defence platforms, ranging from bulletproof vests, artillery pieces and unmanned aerial vehicles (UAVs) to radar systems, missile destroyers and light transport aircraft (LTA). Defence Minister Rajnath Singh said that this will result in the domestic industry gaining new contracts "worth almost Rs 4 lakh-crore within the next six to seven years".

To help Indian companies manufacture defence equipment on the embargoed list, the MoD pledged a "coordinated mechanism for hand-holding of the industry by the defence services". This is obviously also intended to help policy-makers gauge current and future capabilities of the domestic defence industry "for manufacturing various ammunition and equipment within India," as the ministry observed.

This means the country's defence industry now has two options: one, it could design and develop the systems in the negative list on its own; or, it could manufacture the systems by using the technologies developed by the Defence Research and Development Organisation (DRDO) to meet the requirements of the armed forces.

The MoD's announcement of this negative list, however, need not push up many eyebrows. Last February, at the 11th Defence Expo in Lucknow, Prime Minister Narendra Modi had set a $5 billion target in defence exports for India by 2025. The Prime Minister invited private businesses to invest in the country to realise "handsome returns on investment" and, in the process, make India self-reliant in defence manufacturing.

https://www.defenceaviationpost.com/2020/08/indias-defence-shopping-to-go-desi/

ThePrint

Fri, 14 Aug 2020

Submarines, AK 203 rifles — two Make in India projects Modi govt set to push on priority

Tenders for the submarines are expected to be issued 'soon' while the Indo-Russian AK 203 rifles could be finalised by October

By Snehesh Alex Philip

New Delhi: The Narendra Modi government is pushing for two major Make in India projects — six conventional submarines for Navy, and AK 203 rifles factory — to get them off the ground over the next few months, ThePrint has learnt.

The awaited tender for 114 fighter jets could, however, take time, said sources in the defence establishment.

Tenders for the Naval Utility Helicopters and the Kamov deal are among the other projects on the anvil, said the sources.

Last week, the government had released a new negative import list for defence systems.

File photo of Prime Minister Narendra Modi | ANI

The two chosen projects

Sources said the tender for the six conventional submarines with Air Independent Propulsion (AIP) system will be issued "soon". The state-run MDL and the private player L&T are the frontrunners for this mega project, P75I.

The procurement of these six diesel-electric submarines also features in the negative import list.

The India-Russia joint project for the manufacture of the AK 203 rifles is the other project that is likely to get a push. This could be firmed up before the expected summit between Prime Minister Narendra Modi and Russian President Vladimir Putin in October, said the sources.

The deal was first announced in 2018 amid tremendous excitement, but hit a roadblock over price negotiations. The Indo-Russia Rifles Pvt. Ltd, a joint venture between the Ordnance Factory Board (OFB), the Kalashnikov Concern and Rosoboronexport (the Russian state agency for military exports), has failed to arrive at an offer price for the AK 203 rifle.

It was expected that the price of each rifle would be around $1,100 per piece, but it has risen due to a number of issues. The defence ministry has now constituted a committee to break this logjam.

The delay has forced the Army to order SiG 716 rifles from the US under a fast-tracked process to arm its frontline troops. With 72,000 SiG rifles already delivered, the Army is now pursuing emergency procurement of another 72,000.

The other projects

Earlier this week, ThePrint had identified seven mega Make in India projects that are yet to begin despite Modi government's public announcements. The two projects that are now set to get a push featured in the list.

Sources indicated that a third project involving new fighters for the Indian Air Force could take time.

India is currently in the process of inducting the 36 Rafale fighters ordered from France in 2016. There is speculation that India could decide to buy additional 36 Rafale jets and fall back on greater numbers of Tejas Mk 1A and Tejas Mark II aircraft. However, there is no clarity on this yet.

Meanwhile, the sources added that work is on to issue formal tenders for the Naval Utility Helicopters and Kamov choppers too.

https://theprint.in/defence/submarines-ak-203-rifles-two-make-in-india-projects-modi-govt-set-to-push-on-priority/480653/

DECCAN Chronicle

Fri, 14 Aug 2020

IAF Chief RKS Bhadauria reviews readiness at Western Air Command, flies MiG-21 Bison

The Western Air Command (WAC) looks after both the crucial borders with China and Pakistan

By Pawan Bali

New Delhi: Indian Air Force (IAF) chief Air Chief Marshal RKS Bhadauria on Thursday flew fighter aircraft MiG-21 Bison at a frontline air base under Western Air Command to send a message that the air force is all prepared to take any challenge from adversaries.

The Western Air Command (WAC) looks after both the crucial borders with China and Pakistan. The Western Air Command has over 200 bases placed under its command and has been involved in all major operations in India. Due to its geographical location, the Command has always been the hub-centre of all operational activities during any operation, including Kashmir Operations 1947-48, Sino-Indian Conflict 1962, Indo-Pak War 1965, Indo-Pak War 1971, Operation Pawan 1986 (Sri Lanka) and Operation Safed Sagar 1999 (Kargil).

Indian Air Force said on Thursday that the Air Chief Marshal was briefed by the Air Officer Commanding (AOC) of the base on the readiness and operational status of the lodger units located at the base.

Bhaduria reviewed the operational preparedness of the base and interacted with air force personnel serving on the frontlines. He urged the air force personnel to maintain the highest standards of readiness. He also appreciated their efforts in preserving IAFs combat potential during the ongoing COVID 19 pandemic.

The Indian Air Force has kept almost all its air bases under the Western Command at a “very high level of readiness” in view of the over three-month border row with China in eastern Ladakh.

Last week, IAF Vice Chief Harjit Singh Arora had visited Daulat Beg Oldie Advanced Landing Ground (ALG) in Ladakh, where Chinese have intruded in the Depsang plains in an attempt to dominate this strategically important sector which is near Aksai Chin. During the visit Air Marshal Arora also flew Chinook and Light Combat Helicopter in Ladakh.

Indian Air Force has already deployed Sukhoi-30MKI, Mirage 2000 and Jaguar fighter aircrafts to advanced positions to counter threat from China.

IAF Apache attack helicopters and Chinooks helicopters are also active in Leh and are carrying out day and night operations. Chinook has been used to rapidly transport heavy weaponry and men to the high altitude areas along the LAC under tough weather conditions.

https://www.deccanchronicle.com/nation/current-affairs/140820/iaf-chief-rks-bhadauria-reviews-readiness-at-western-air-command-flie.html

Fri, 14 Aug 2020

Indian Navy sets up new innovation and indigenisation unit NIIO to boost self-reliance in defence manufacturing sector

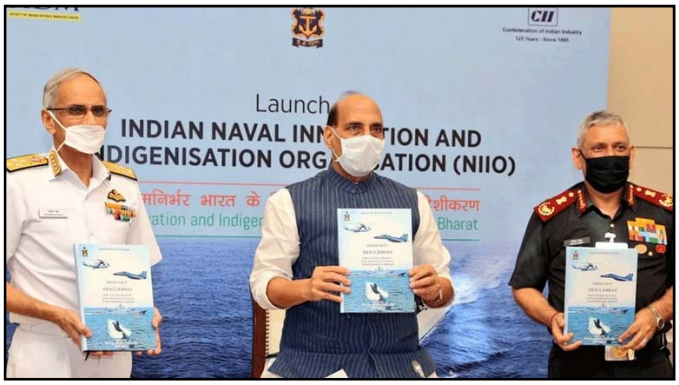
To boost self-reliance in the defence manufacturing sector, Defence Minister Rajnath Singh launched a Naval Innovation and Indigenisation Organisation (NIIO) on Thursday

Edited By Ritesh K Srivastava

Highlights

- ***Indian Navy on Thursday set up new innovation and indigenisation unit NIIO***
- ***NIIO was launched by Defence Minister Rajnath Singh***
- ***The NIIO will be a three-tiered organisation***
- ***It will boost self-reliance in the defence manufacturing sector***

New Delhi: To boost self-reliance in the defence manufacturing sector, Defence Minister Rajnath Singh launched a Naval Innovation and Indigenisation Organisation (NIIO) on Thursday.



The naval organisation will put in place dedicated structures for the end-users to interact with the academia and the industry to foster innovation and indigenisation for self-reliance in defence, in keeping with the vision of `Aatmanirbhar Bharat`.

During the launch event, the Indian Navy signed memorandums of understanding with the Uttar Pradesh Expressway Industrial Development Authority (UPEIDA), the Raksha Shakti University (RSU) in Gujarat, the Maker Village in Kochi and the Society of Indian Defence Manufacturers (SIDM).

The NIIO is a three-tiered organisation. The Naval Technology Acceleration Council (N-TAC) will bring together the twin aspects of innovation and indigenisation and provide apex level directives.

A working group under the N-TAC will implement the projects. A Technology Development Acceleration Cell (TDAC) has also been created for the induction of emerging disruptive technology in an accelerated time frame.

The Draft Defence Acquisition Policy 2020 (DAP 20) envisages the service headquarters establishing an Innovation and Indigenisation Organisation with the existing resources.

The Indian Navy already has a functional Directorate of Indigenisation and the new structures will build upon the ongoing indigenisation initiatives, as well as focus on innovation.

https://zeenews.india.com/india/indian-navy-sets-up-new-innovation-and-indigenisation-unit-niio-to-boost-self-reliance-in-defence-manufacturing-sector-2302576.html

THE ECONOMIC TIMES

Fri, 14 Aug 2020

Vice Admiral Dinesh K Tripathi assumes charge as Director General Naval Operations

Synopsis

On promotion to the rank of Vice Admiral in June 2019, Tripathi was appointed the Commandant of the prestigious Indian Naval Academy at Ezhimala in Kerala, the Navy noted. The Flag Officer is a specialist in communication and electronic warfare and has served on frontline warships of the Navy as Signal Communication Officer and Electronic Warfare Officer.

New Delhi: Vice Admiral Dinesh K Tripathi assumed charge as Director General Naval Operations (DGNO) on Thursday, said the Indian Navy. The Flag Officer commanded the eastern fleet from January 15, 2018, to March 30, 2019, the Navy said in a statement.

Later, Tripathi served as the Executive Officer and Principal Warfare Officer of Guided Missile Destroyer INS Mumbai, the Navy mentioned.

On promotion to the rank of Vice Admiral in June 2019, Tripathi was appointed the Commandant of the prestigious Indian Naval Academy at Ezhimala in Kerala, the Navy noted.

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Later, Tripathi served as the Executive Officer and Principal Warfare Officer of Guided Missile Destroyer INS Mumbai, the Navy mentioned.

https://economictimes.indiatimes.com/news/defence/vice-admiral-dinesh-k-tripathi-assumes-charge-as-director-general-naval-operations/articleshow/77531753.cms

THE TIMES OF INDIA

Fri, 14 Aug 2020

RSU inks MoU with Indian Navy for capacity building, research projects

By Parth Shastri

Ahmedabad: Gandhinagar-based Raksha Shakti University (RSU) on Thursday entered into an agreement with Indian Navy for capacity building and joint research projects.

The agreement was signed during the launch of Naval Innovation and Indigenisation Organisation (NIIO).

NIIO was launched defence minister Rajnath Singh in an online webinar. Chief minister Yogi Adityanath, Chief of Defence Staff General Bipin Rawat and Chief of Naval Staff Admiral Karambir Singh also attended the event.

Prof Bimal Patel, director general of RSU, and Vice Admiral G Ashok Kumar, vice chief of Naval Staff, signed the MoU.

“The signing of the MoU between RSU and the Indian Navy today marks the beginning of a new partnership with a view to strengthening the country's security infrastructure and furthering the goal of defence indigenisation in the country,” said Prof Patel after the event.

RSU officials said that the MoU aims to synergize RSU’s expertise of encouraging innovations in the security space for providing incubation assistance to the entrepreneurial start-ups which are

focused on enhancing the capabilities of Indian Navy. “Joint research projects and residential training programs for Indian Navy officers would be conducted among the various activities for the aim of capacity building of our armed forces,” said the official.

The defence minister also launched Maritime Innovation Forum (of Security and Scientific Technical Research Agency- SASTRA) at the event. The platform would be used for deliberations on defence manufacturing in India.

https://timesofindia.indiatimes.com/india/rsu-inks-mou-with-indian-navy-for-capacity-building-research-projects/articleshow/77532161.cms

ThePrint

Fri, 14 Aug 2020

Close combat is so last century. China will use drones, PGMs, high-end tech against India

The three new areas of warfare, which constitute cyber, electronic and space domains, have been adopted well by the Chinese PLA

By Lt Gen H S Panag (Retd)

Status quo continues to prevail in Eastern Ladakh. There has been no progress with respect to disengagement for the last one month despite two rounds of Corps Commander-level talks on 14 July and 2 August, and the Division Commander-level talks held on 8 August in the Daulat Beg Oldi Sector, to resolve the impasse.

An Indian Army truck on a Kashmir highway leading to Ladakh | Representational image | ANI

The People’s Liberation Army (PLA) has refused to carry out any disengagement in Depsang Plains and Pangong Tso, claiming the current deployment to be as per China’s 1959 claim line. In Hot Springs-Kugrang River-Gogra Sector, the disengagement is restricted to approximately 1 km and not as per the decisions taken during the Corps Commander-level talks held on 30 June, which envisaged a buffer zone of 4 km. Only in the Galwan River the disengagement is complete, with a buffer zone of 4 km, of which 3 km is on our side of the Line of Actual Control (LAC). Reserves of both sides remain poised in depth areas to cater to escalation along with precautionary deployment all along the LAC.

Despite the presence of both forces in close proximities at various locations along the LAC and the unfortunate incident of 15 June, in the event of an escalation, we are not likely to witness the traditional close combat. Traditional close combat is a passé. What the attacking troops did in the bygone era in close combat was to locate and kill the enemy and destroy its defences as the same could not be done by the available surveillance/reconnaissance means and weapon systems of the past. Modern military technology has revolutionised the method of attack and the PLA has it in abundance.

As per my assessment of the PLA doctrine, war in high Himalayas would not play out in the traditional pattern.

Traditional pattern of conflict in high altitude

The traditional pattern of defence in high altitude terrain is to hold dominating heights, which cannot be bypassed, prepare hardened defences with adequate fire power, and position reserves for counter-attack in case the enemy captures any position. Infiltration between defences is countered

by holding positions in depth and keeping adequate reserves. At a higher level, reserves are also kept for a counter-offensive.

The build-up of the enemy's attacking troops in the open is targeted with air power and long-range artillery/missiles. The defender has an advantage due to protection provided by pill boxes/bunkers. The movement of enemy infantry attacking uphill is laborious due to lack of Oxygen and it is forced to fight a step-by-step battle from a position of disadvantage. Vertical envelopment to get behind the defences suffers from limitation of reduced load capacity of helicopters and their vulnerability to air defence. Hence, the terrain favours the defender and for any success, the attacker has to pay a very high price. A classic example of this is the Kargil War of 1999. It took 85 days for two divisions plus additional artillery and infantry units worth another division under command, and extensive employment of air power to evict 3,000 – 3,500 enemy troops deployed in platoon-sized posts.

If this pattern is employed by the PLA to defeat the seasoned Indian Army, it is bound to come to grief and suffer defeat itself. The question that arises is, does the PLA have a more imaginative approach to fight in high altitude to achieve its political/military aim?

Likely pattern of attack by the PLA

In the last three decades, there has been a quantum jump in military technology in fields of intelligence, surveillance, reconnaissance, air-delivered Precision Guided Munitions (PGMs) and weapon platforms. Military technology is dependent on extensive use of computers, electronics and satellites. Hence, in addition to the traditional domains of warfare — land, sea and air — three more domains — cyber, electronic and space — have been added.

Since Gulf War I in 1990, the PLA has adopted and adapted to this Revolution in Military Affairs (RMA). The PLA also adopted comprehensive tri-services integration in the form of theatre commands controlled by a joint headquarters in Beijing in February 2016. Today, it is a close second to the US in exploitation of high-end military technology in all six domains.

The PLA will neutralise the 'predominance of the defence' in high altitude terrain by not getting involved in "close infantry combat" over unfavourable terrain. If at all it chooses to use force, its pattern of attack will be driven by high-end technology with overwhelming use of PGMs, cyber and electronic warfare. The much romanticised 'blood and guts' close combat is a relic of the last century.

The high altitude terrain is devoid of any vegetation. Satellites, drones, and cyber/electronic surveillance/reconnaissance will accurately plot the details of the defences, headquarters, weapon systems and logistic and communications infrastructure across the entire depth of the defence zone. Depending on the military aim and level of operations, a PGM-based air and missile campaign may precede the ground attack along with cyber and electronic counter measures to neutralise the command and control systems of formations/units and weapon systems. Alternatively, the scale of the operations may be restricted in terms of space. The area to be captured will be subjected to a similar attack of much higher intensity. Weather and climate have little or no effect on such an attack. Hence, the same can be undertaken even during the winters when operations in high altitude get restricted.

(Lt Gen H S Panag PVSM, AVSM (R) served in the Indian Army for 40 years. He was GOC in C Northern Command and Central Command. Post retirement, he was Member of Armed Forces Tribunal. Views are personal.)

https://theprint.in/opinion/close-combat-is-so-last-century-china-will-use-drones-pgms-high-end-tech-against-india/480533/

THE WEEK

Fri, 14 Aug 2020

Winter is coming

The Army must stock supplies if it has to post more troops along the LAC in Ladakh

By Pradip R Sagar

The line between disorder and order lies in logistics, wrote Chinese military strategist Sun Tzu. The observation is quite relevant for India today. With no immediate de-escalation between India and China in the Ladakh sector, the Indian military now faces the challenge of getting crucial supplies to the nearly two lakh soldiers and support staff deployed there.

On August 11, Chief of Defence Staff General Bipin Rawat told a parliamentary committee that the military was ready for a long haul on the LAC and for deployment in harsh winter.

No other army deploys as many soldiers at such heights, and the Leh-based XIV Corps carries out the world's largest winter stocking exercise annually. The Army spends an estimated 015 lakh a year to keep a soldier on heights ranging from 15,000ft to 18,000ft. The cost excludes weapon and ammunition, information on which is classified.

Ready for the long haul: An Army convoy in Ladakh | Sanjay Ahlawat

Retired Major General Amrit Pal Singh, former chief of operational logistics of the XIV Corps, said that, usually, about two lakh tonnes of supplies are transported and stored before the winter sets in October, cutting Ladakh off from the rest of the world. This is called Advanced Winter Stocking (ASW), which serves the forces for about six months. "But with additional deployment, you require at least double the logistics," he told The WEEK.

Ladakh is connected by road through the Manali-Leh road and the Jammu-Srinagar-Kargil-Leh route. During winter (October to March), passes on these routes are closed. So, in the window between April and September, the Army dispatches about 100 trucks a day with rations, engineering and medical stores, weapons, ammunition and equipment, clothing and vehicles. There are about 80 items stocked for soldiers, including vast amounts of kerosene, diesel and petrol, which provide heat and fuel vehicles.

Singh said that a Srinagar and Leh round-trip for a truck that can carry 10 tonnes of supplies costs around 01 lakh. With a C-17 Globemaster military aircraft, which can carry up to 50 tonnes, an hour-long flight would cost roughly 024 lakh. A helicopter sortie of 45 minutes costs around 04 lakh. Multiple transport aircraft usually carry 200 to 250 tonnes of supplies every day from Chandigarh to Leh.

He also said that, by this time every year, about one lakh tonne of supplies would have been dispatched. "But we still need to send nearly three lakh tonnes in the next two months," he added. "In the best-case scenario, if we use 400 trucks a day, we can send 4,000 tonnes by road. [But] maintaining the road for peak transportation capacity is the need of the hour. We find slush on roads due to [heavy traffic] of trucks."

He also pointed out that Leh was just the first stop. There, the Army needs transit shelters for truck crew and support staff. Not everything can go by air; heavy material has to go by road. Though Zoji-la and Rohtang are the main passes, the road gets tougher from there. There are two more passes on the route—Baralacha La and Thanglang La—which are at a higher altitude than Rohtang.

Retired Lieutenant General D.S. Hooda, former northern Army commander, said that the advanced winter stocking is usually a well-planned exercise, but with additional deployment, the issue was not only transportation, but also procurement and supply. For instance, the Army would

need pre-fabricated shelters, which cost at least 015 lakh apiece, to accommodate 20 troops each. “Shelters have be to procured, transported and constructed before winter,” he said. “It is almost next to impossible to carry out any construction in winter. Planning for construction of shelters usually takes place over two seasons. Now we have taken the decision to remain on those heights, [so] we need to speed up the process. The window is small now, and I see it as a big challenge.”

Reportedly, the Army, through its defence attaches in embassies in the US, Russia and Europe, is hunting for makers of warm clothes and snow tents. Additionally, the Ordnance Factory Board has been asked to speed up deliveries of extreme cold climate (ECC) clothing.

Military observers said that, with the temperature dipping to minus 40 degrees Celsius, it is going to be a battle of who lasts there. The soldier has to negotiate three elements—the weather, his health and, of course, the enemy across the border. With better infrastructure and an easier terrain in Tibet, the Chinese can continue to mobilise from deep areas. However, it costs the People’s Liberation Army four times as much to sustain a soldier on the Tibetan plateau than in the plains.

“Besides the temperature, the chilly winds in Galwan, Gogra and Hot Springs do the maximum damage,” said a serving Army officer, adding that it was the extreme cold and low level of oxygen that had claimed most of the 20 lives lost in the Galwan clash of June 15. “When you are in an eyeball-to-eyeball situation, you prepare yourself for any eventuality. Unlike in Siachen, troops on these friction points have to be on the highest level of alertness throughout winter.” He also said that the low temperature affects equipment, ammunition and artillery guns, which need special storage.

Military planners said that “mirror deployment” throughout winter would come at a huge cost. “All your perspective plans go for a toss if you do mirror deployment. Money and material meant for capability-building in some other areas is going to be diverted to Ladakh,” said Singh.

Instead of mirror deployment, he added, India should have done deterrent deployment, which means holding your forces back and putting them in places opposite to the enemy’s vulnerable areas. If this had happened, the Chinese would not have even moved to places like Galwan or Depsang, he said.

“Now, we are only committed and reactive,” he said. “Being reactive, you only pay in cost. We have lost an opportunity to be pro-active. With the absence of a mountain strike corps, the Indian Army is missing its offensive capabilities.”

Said Hooda: “Massive deployment, up to three division-level strength on those heights through the winter, will incur a huge cost. And if the situation does not improve, it will continue into the next year.”

The military thinkers seem to believe in Napoleon’s quote: “Amateurs discuss tactics; professionals discuss logistics.”

https://www.theweek.in/theweek/current/2020/08/13/winter-is-coming.html

THE NEW INDIAN EXPRESS

Fri, 14 Aug 2020

India, China militaries likely to participate in multinational joint exercise in Russia

While India has confirmed its participation, the response of other participating countries is not yet known, added the officer

By Mayank Singh

New Delhi: While the Indian and Chinese soldiers are locked in a stand-off in Ladakh, the militaries of the two countries are likely to carry out a joint exercise in September in Russia.

An Army officer said, “Russia has sent us an invitation for a multilateral exercise Kavkaz 2020 and the invitations have been sent to China and Pakistan too.”

While India has confirmed its participation, the response of other participating countries is not yet known, added the officer.

Indian army (Photo | PTI)

Russia is holding a multinational exercise from 15 September to 26 September in its Astrakhan region and has invited all Shanghai Cooperation Organisation (SCO) member countries and few other countries.

The militaries of 18 countries will partake in the exercise together.

About the theme of the exercise, “It is based on a joint operation by friendly countries against an enemy which has taken over a part of Russia,” told the officer.

India is sending a 178-member strong tri-services contingent, 140 Army personnel, and 38 officers from the Air Force and Navy. An Army Colonel rank officer will be leading the Indian Contingent.

The 18 countries include Russia, Iran, Egypt, Syria, Turkey, and the Central Asian Region countries.

The SCO is an eight-member economic and security bloc that India and Pakistan joined as full-time members back in 2017.

The founding members of this group include China, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan.

Joining the exercise in Russia will mark the beginning of international joint-exercises since the halt of training programs in view of COVID-19.

Prior to this exercise, Indian and Chinese marching contingents had participated in the 75th anniversary of Victory Day parade in Moscow in June.

Although Defence Minister Rajnath Singh and Chinese Defence Minister Wei Fenghe were there they did not meet.

Around 40,000 soldiers each of the Indian Army and the Chinese PLA has been locked in a tense standoff since the first week of May at the Line of Actual Control in Eastern Ladakh.

The standoff had turned violent on June 15 in which India lost 20 soldiers. The Chinese side had acknowledged their side of the casualties but did not make the figures public.

https://www.newindianexpress.com/nation/2020/aug/13/india-china-militaries-likely-to-participate-in-multinational-joint-exercise-in-russia-2183068.html

THE HINDU

Fri, 14 Aug 2020

Missile test equipment launched

Hyderabad: Defence Minister Rajnath Singh launched Konkurs Missile Test Equipment and Konkurs Launcher Test Equipment, which have been indigenously designed and developed by Bharat Dynamics Limited (BDL), on Thursday. Earlier, these products were being imported from Russia.

The two indigenous products were virtually launched by the Minister from New Delhi in the presence of Chief of Defence Staff General Bipin Rawat, Defence Secretary Ajay Kumar, Secretary - Defence Production Raj Kumar, senior officials from the Defence Ministry and CMD, BDL Commodore Siddharth Mishra (retired), and others present in Hyderabad.

The two products have been launched as part of the 'Atmanirbhar Bharat' week being celebrated from August 7-14. The Konkurs Missile Test Equipment is designed for checking the serviceability of Konkurs - M Anti-Tank Guided Missiles. Konkurs Launcher Test Equipment (KLTE) is designed and developed for checking the serviceability of Konkurs – M Missile Launchers, a press release said.

https://www.thehindu.com/news/cities/Hyderabad/missile-test-equipment-launched/article32348629.ece

PHYS.ORG

Fri, 14 Aug 2020

Researchers make green chemistry advance with new catalyst for reduction of carbon dioxide

Researchers at Oregon State University have made a key advance in the green chemistry pursuit of converting the greenhouse gas carbon dioxide into reusable forms of carbon via electrochemical reduction.

Credit: CC0 Public Domain

Published in *Nature Energy*, the study led by Zhenxing Feng of the OSU College of Engineering and colleagues at Southern University of Science and Technology in China and Stanford University describes a new type of electrocatalyst.

The catalyst can selectively promote a CO_2 reduction reaction resulting in a desired product—carbon monoxide was the choice in this research. A catalyst is anything that speeds the rate of a chemical reaction without being consumed by the reaction.

"The reduction of carbon dioxide is beneficial for a clean environment and sustainable development," said Feng, assistant professor of chemical engineering. "In contrast to traditional CO_2 reduction that uses chemical methods at high temperatures with a high demand of extra energy, electrochemical CO_2 reduction reactions can be performed at room temperature using liquid solution. And the electricity required for electrochemical CO_2 reduction can be obtained from renewable energy sources such as solar power, thus enabling completely green processes."

A reduction reaction means one of the atoms involved gains one or more electrons. In the electrochemical reduction of carbon dioxide, metal nanocatalysts have shown the potential to selectively reduce CO_2 to a particular carbon product. Controlling the nanostructure is critical for understanding the reaction mechanism and for optimizing the performance of the nanocatalyst in the pursuit of specific products, such as carbon monoxide, formic acid or methane, that are important for other chemical processes and products.

"However, due to many possible reaction pathways for different products, carbon dioxide reduction reactions have historically had low selectivity and efficiency," Feng said. "The electrocatalysts need to promote the reaction with high selectivity to get one certain product, carbon monoxide in our case. Despite many efforts in this field, there had been little progress."

Feng and his research co-leaders tried a new strategy. They made nickel phthalocyanine as a molecularly engineered electrocatalyst and found it showed superior efficiency at high current densities for converting CO_2 to carbon monoxide in a gas-diffusion electrode device, with stable operation for 40 hours.

"To understand the reaction mechanism of our catalyst, my group at OSU used X-ray absorption spectroscopy to monitor the catalyst's change during the reaction processes, confirming the role of the catalyst in the reaction," Feng said. "This collaborative work demonstrates a high-performance catalyst for green processes of electrochemical CO_2 reduction reactions. It also sheds light on the reaction mechanism of our catalyst, which can guide the future development of energy conversion devices as we work toward a negative-carbon economy."

More information: Xiao Zhang et al, Molecular engineering of dispersed nickel phthalocyanines on carbon nanotubes for selective CO_2 reduction, *Nature Energy* (2020). DOI: 10.1038/s41560-020-0667-9

Journal information: *Nature Energy*

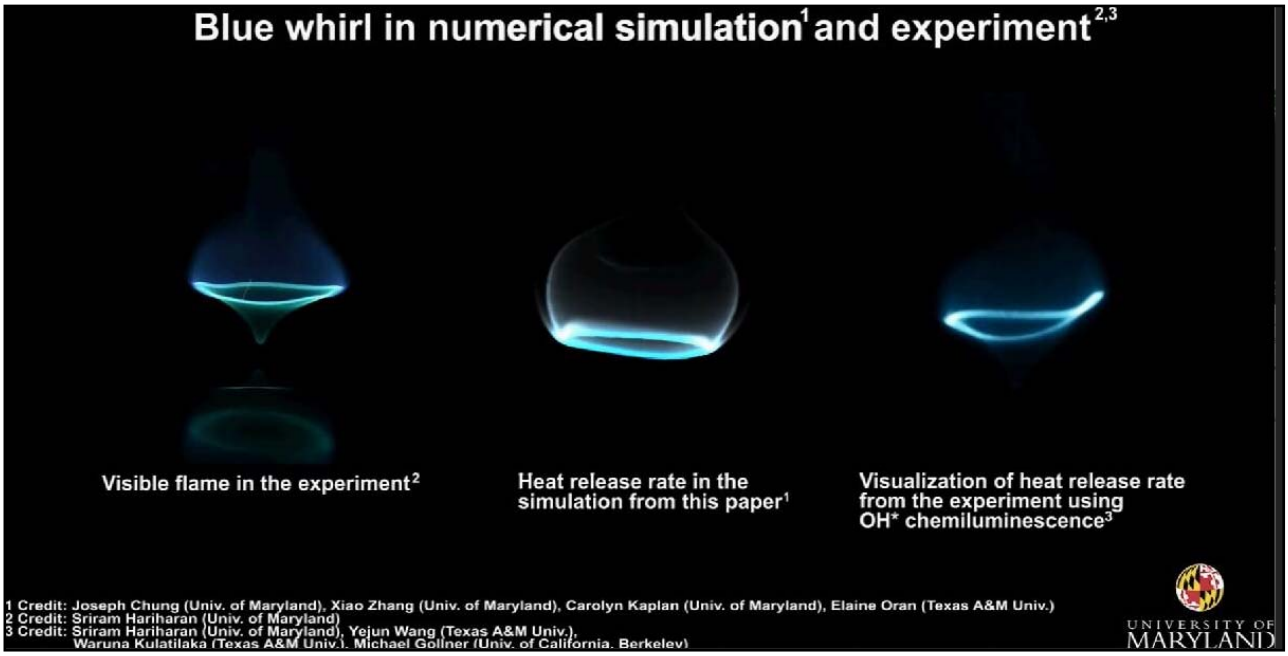
https://phys.org/news/2020-08-green-chemistry-advance-catalyst-reduction.html

Fri, 14 Aug 2020

Revealing the structure of the mysterious blue whirling flame

By Bob Yirka

A team of researchers working at the University of Maryland has uncovered the structure of the mysterious blue whirling flame. In their paper published in the journal *Science Advances*, the group describes using computer simulations to determine the structure of the unique type of flame.



Back in 2016, a team of researchers discovered what they described as a blue whirling flame while they were studying the properties of liquid fuel floating on water. They had added fuel to a tank full of water that was enclosed in a space that generated a vortex. They described a fire that looked at first like a tornado, but then shortly after, settled into what they dubbed a blue whirling flame. They noted at the time that its color suggested it likely was very efficient, burning the fuel without creating soot—a property that might be useful in cleaning up oil spills. Since then, others have looked at the unique type of flame, but no one had tried to understand its structure. In this new effort, the researchers took a closer look at the flame and found it was actually three types of flames that had merged into one.

To learn more about the nature of the blue whirling flame, the researchers created computer simulations using conditions known to generate them. They then slowly adjusted the parameters until they were able to generate the flame virtually. They discovered that the flame was actually the result of three known types of flames merging: those with an invisible outer flame, which happens when there is less fuel than oxygen in the mix—and two that had types of visible inner flames in which higher fuel ratios are more common.

The researchers suggest that knowing that the blue whirling flame is made up of other types of flames could allow for their creation in more controllable circumstances—and it should allow for skipping the tornado-shaped stage, which is a good thing, they note, because such flames are dangerous, as has been noted in recent years in wildfires. They also suggest that due to their efficiency, such flames might be used for cleaner combustion processes.

Journal information: *Science Advances*

https://phys.org/news/2020-08-revealing-mysterious-blue-flame.html

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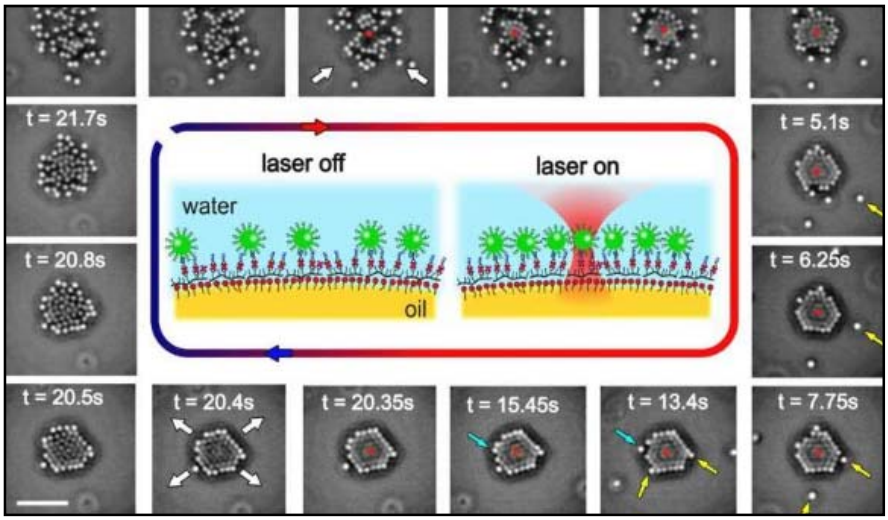
Fri, 14 Aug 2020

Crystallization of colloids secured to oil-water interface responding to laser illumination

By Bob Yirka

A team of researchers at the University of Cambridge has developed a method for the crystallization of colloids secured to an oil-water interface in response to laser illumination. In their paper published in the journal *Physical Review Letters*, the group describes their method and possible uses for it.

One of the basic ideas in the physics world is that when particles are suspended in a liquid gradient, they move from warmer areas to cooler areas. In this new effort, the researchers have demonstrated an exception to that rule—colloids crystalizing when the liquid around them becomes warmer.



The panels in the rim of the figure show a time trace (clockwise) of the video-microscopy images of the light-induced entrapment and release of 0.53 μ m large polystyrene colloids tethered to the water-oil interface (the sale bar is 20 μ m). Credit: *Physical Review Letters* (2020). DOI: 10.1103/PhysRevLett.125.068001

The work involved placing micrometer-sized balls of polystyrene (particles) into a mix of water and oil and then shining a light on the mixture to force it to grow warmer. But they also added something else—DNA "tethers" that constrained the particles.

In their setup, a drop of oil was placed in a small tank of water. The oil floated on top, forming an island of sorts, completely surrounded by the water. The polystyrene balls were then added to the mix—the DNA tethers allowed them to move freely around in the water, but prevented them from entering the oil drop. Next, the team trapped one of the balls with a laser beam, which forced the temperature around the ball to rise, creating a gradient in the water.

As a result, the particle moved toward the oil, which set off a flow near the edge of the oil drop. That fluid flow pulled on other balls that were near the one that was heated, packing them into a crystal. The overall takeaway from this experiment was that crystallization of tethered balls could be achieved by simply turning on a small laser—and that it could be just as easily undone by turning the laser off. The researchers had created a switching system that allowed for on-demand crystallization using colloids. The work demonstrates a laser-based method to manipulate particles

that are not themselves trapped. The researchers note that such a system could prove useful in developing new kinds of micrometer-sized tweezers.

More information: Alessio Caciagli et al. Controlled Optofluidic Crystallization of Colloids Tethered at Interfaces, *Physical Review Letters* (2020). DOI: 10.1103/PhysRevLett.125.068001

Journal information: *Physical Review Letters*

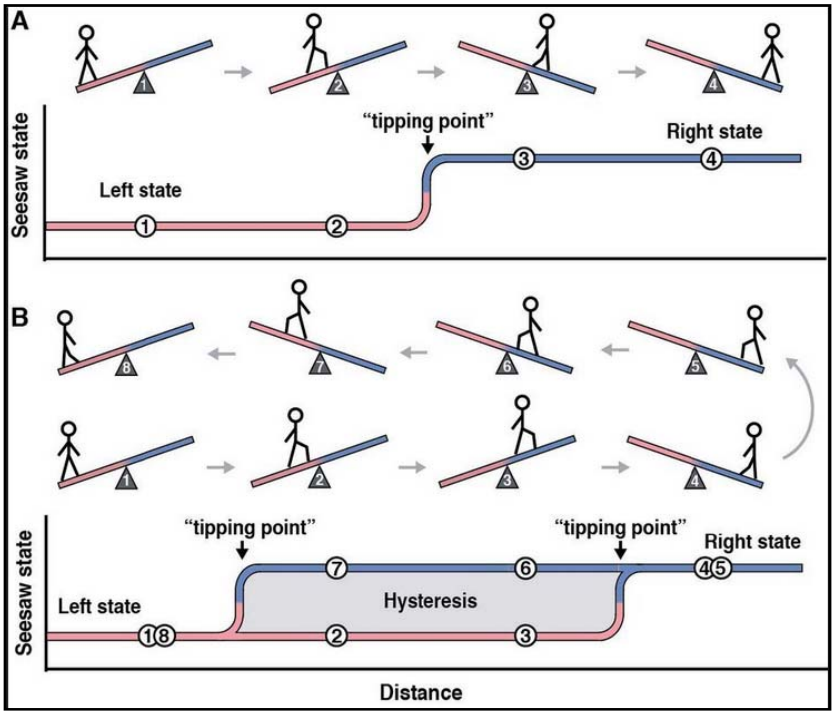
https://phys.org/news/2020-08-crystallization-colloids-oil-water-interface-laser.html

Fri, 14 Aug 2020

The hidden math of bacterial behavior

By Emily Velasco

As modern medical science has become increasingly aware of the positive role that bacteria and other microorganisms can play in our health, a mystery has emerged: How is it that beneficial microbial communities can sometimes "flip" into a harmful state that is stubbornly resistant to treatment?



A diagram describing multistability and hysteresis. Credit: Ismagilov laboratory

In a new paper published in *Science Advances*, researchers working in the lab of Rustem Ismagilov, Caltech's Ethel Wilson Bowles and Robert Bowles Professor of Chemistry and Chemical Engineering and director of the Jacobs Institute for Molecular Engineering for Medicine, show a mechanism that could explain how small triggers can cause a microbiome to flip from a beneficial state to a harmful state and get stuck there.

"We see microbial shifts in many diseases and conditions that affect health," says Tahmineh Khazaei (Ph.D. '19), lead author and postdoctoral scholar in biology and biological engineering. "What we don't know is how these switches occur and why they persist. Our research aims to help answer that."

Khazaei says that microbial shifts can be found in several conditions, like small intestine bacterial overgrowth (SIBO), gum disease, and wound infections—in all of these cases, anaerobic bacteria (those for whom oxygen is toxic) begin to proliferate among the aerobes, or "oxygen-breathing" bacteria.

"It is perplexing to see anaerobes proliferate in oxygenated environments that are seemingly unsuitable for their growth," she says.

Khazaei and her colleagues mathematically modeled these microbial communities and found that they and their propensity to switch between states can be described as a system featuring multistability and hysteresis (MSH). Multistability means the system can exist in two or more stable states, while hysteresis means the system has a tendency to want to stay stuck in a state once

it's there. MSH is a concept that's been known to physicists and engineers working in other fields, but here, the research team has found it applies to the behavior of microbial communities as well.

MSH can be thought of as a rusty seesaw with a person standing atop it. If the person stands on one end of the seesaw, that end will tip down onto the ground. That is one stable state.

If the person starts walking along the top of the seesaw toward the other end, they will eventually cross the center of the seesaw and it will want to tip its other end toward the ground—its other stable state. That is multistability. But because the seesaw is rusty, it will resist tipping until the person is well past the center. This tendency to resist change is hysteresis.

After developing their model, the team needed to see if MSH was a property of bacterial communities in the real world as well, so they built an incubation chamber that they could "tune" to see how microbial communities respond to changing conditions, and if they would undergo the theorized state switch. They chose two bacterial species, one aerobic and one anaerobic, that are found in SIBO patients, for the experiment.

As predicted by the model, after sugar levels were raised to a certain threshold in the chamber, the researchers saw the community switch from an aerobe-dominated state to a state in which aerobes and anaerobes co-existed. This new community state remained "stuck" (like the rusty seesaw) even when sugar was eliminated.

The team next examined what was happening at a biochemical level within the system and found that "metabolic coupling" allows them to survive together across a broad range of conditions, including in an oxygen-rich environment that would otherwise not support the anaerobic bacteria.

The metabolic coupling works like this: When sugar levels are low and oxygen levels are high, only the aerobic bacterial species can survive. When sugar levels rise high enough though, the aerobe uses up so much oxygen in its metabolism that it creates a low-oxygen zone around it that the anaerobe can live in. The anaerobe then survives by digesting complex sugars that the aerobe cannot. In doing so, it breaks these complex sugars down into simple sugars, some of which are then consumed by the aerobe. The aerobe's consumption of those simple sugars uses up oxygen in the process, thus keeping a hospitable low-oxygen zone for the anaerobe, even though oxygen is present in the surrounding environment. Once that state is reached, the system stays that way, even when the researchers stop adding simple sugars to the incubator, because the bacterial community can now survive on complex sugars instead. One species provides fuel for the community, while the other offers protection from oxygen.

"Mathematical models are predictive, but at the end of the day, you have to actually show it happens," Khazaei says. "When we saw the anaerobe growing in the presence of oxygen, it was a really exciting moment."

She adds that discoveries like this are important because they help us better understand what is happening when bacteria behave in unexpected ways.

Khazaei says a better understanding of how microbiome communities switch from states of health to disease may one day help researchers figure out ways to help them switch back to a healthy state.

The paper describing their findings, titled, "Metabolic multistability and hysteresis in a model aerobe-anaerobe microbiome community," appears in the August 12 issue of *Science Advances*.

"The microbiome-gut-brain axis is one of the many important areas of focus where applications to human health have been limited by the lack of understanding underlying causative dynamics," says Dr. Frederick Gregory, program manager at the Army Research Office. "This study highlights the potential importance of multistability and hysteresis as a foundational framework to study dynamics of microbial communities in many broadly relevant contexts. These outcomes, for example, can inform Army efforts to develop the next generation of combat feeding solutions to promote Soldier gut microbiome health and resilience to gut dysbiosis."

More information: Tahmineh Khazaei et al. Metabolic multistability and hysteresis in a model aerobe-anaerobe microbiome community, *Science Advances* (2020). DOI: 10.1126/sciadv.aba0353

Journal information: *Science Advances*

https://phys.org/news/2020-08-hidden-math-bacterial-behavior.html

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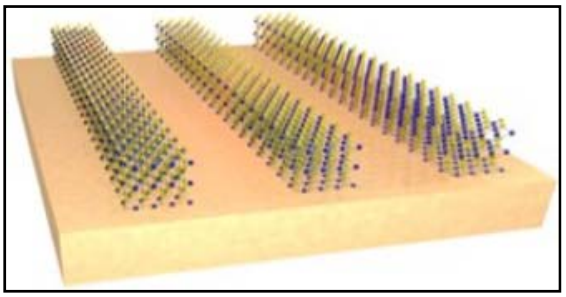
Fri, 14 Aug 2020

Engineers manipulate color on the nanoscale, making it disappear

Most of the time, a material's color stems from its chemical properties. Different atoms and molecules absorb different wavelengths of light; the remaining wavelengths are the "intrinsic colors" that we perceive when they are reflected back to our eyes.

So-called "structural color" works differently; it's a property of physics, not chemistry. Microscopic patterns on some surfaces reflect light in such a way that different wavelengths collide and interfere with one another. For example, a peacock's feathers are made of transparent protein fibers that have no intrinsic color themselves, yet we see shifting, iridescent blue, green and purple hues because of the nanoscale structures on their surfaces.



The researchers experimented with nanoscale strips of a two-dimensional semiconductor, tungsten disulfide, arranged on a gold backing. Credit: University of Pennsylvania

As we become more adept at manipulating structure at the smallest scales, however, these two types of color can combine in even more surprising ways. Penn Engineers have now developed a system of nanoscale semiconductor strips that uses structural color interactions to eliminate the strips' intrinsic color entirely.

Though the strips should absorb orange light and thus appear a shade of blue, they appear to have no color at all.

Fine-tuning such a system has implications for holographic displays and optical sensors. It could also pave the way for new types of microlasers and detectors, fundamental elements of long-sought-after photonic computers.

The study was led by Deep Jariwala, assistant professor in the Department of Electrical and Systems Engineering, along with lab members Huiqin Zhang, a graduate student, and Bhaskar Abhiraman, an undergraduate.

It was published in *Nature Communications*.

The researcher's experimental system consists of nanoscale strips of a two-dimensional semiconductor, tungsten disulfide, arranged on a gold backing. These strips, only a few dozen atoms thick, are spaced out at sub-optical wavelength sizes, allowing them to give off the type of structural color seen in butterfly wings and peacock feathers.

"We played with the dimensions of this system, took a lot of experimental measurements, and ran a lot of simulations. Then we noticed something weird," Abhiraman says. "If the dimensions of these strips were just right, the absorption of orange light, which should be intrinsic to the material, disappeared! In other words, the coating that comprised of these stripes is insensitive to incoming light and only shows the properties of the underlying substrate."

"Other nanophotonics researchers have previously shown before that structural color and these intrinsic absorptions can interact; this is called 'strong coupling.' However, no one has seen this kind of disappearance before, especially in a material that is otherwise supposed to absorb nearly

100 percent of the light," Jariwala says. "In the example of bird feathers or butterfly wings, it's the biological material's nanoscale structures which gives them iridescent colors, since those materials don't have much intrinsic color on their own. But if a material does have a strong intrinsic color, we show that one can do the opposite and make it disappear with appropriate nanostructuring. In some ways, it is cloaking the material's intrinsic color from its response to light."

Investigating this phenomenon involves understanding how intrinsic color works on a subatomic level. An atom's electrons are arranged in different concentric levels, depending on how many electrons that element has. Depending on the available spaces in those arrangements, an electron can jump to a higher level when it absorbs the energy from a certain wavelength of light. The wavelengths that are capable of exciting electrons in this way determine which are absorbed and which are reflected, and thus a material's intrinsic color.

Nanophotonics researchers like Jariwala, Zhang and Abhiraman study even more complicated interactions between electrons and their neighbors. When atoms are arranged in repeating crystalline patterns, such as those found in the two-dimensional strips of tungsten disulfide, their electron layers overlap into contiguous bands. These bands are what allow conductive materials to pass charges from electron to electron. Semiconductors, like tungsten disulfide, are ubiquitous in electronics because the interplay between their electron bands give rise to useful phenomena that can be manipulated with external forces.

In this case, the interaction of light and electrical charge within the semiconductor strips produced the unprecedented "cloaking" effect.

"When the electron is excited by orange wavelengths, it creates a vacancy known as a hole, leaving the crystal with a tightly bound pair of opposite charges called an exciton," Jariwala says. "Because light is a form of electromagnetic radiation, its electromagnetic field can interact with this charge excitation and in special circumstances cancel it out, so that an observer would see the orange of the gold substrate instead of the blue of the strips on top of it."

In their paper, Jariwala and his colleagues showed that the structural color effects and the intrinsic exciton absorption interaction can be modeled with the exact same mathematics as coupled oscillators: masses bouncing on springs.

"We applied this model and discovered that under certain conditions, this disappearance effect can be reproduced," Zhang says. "It's beautiful that a trick from classical mechanics can explain the way our structure interacts with light."

This type of structural color, or the lack of it, can be used to make nanometer thickness coatings that are engineered to be insensitive to incoming light, meaning the coating appears to be the same color as material underneath it. Different spatial arrangements of those nanoscale features could produce the opposite effect, allowing for brilliant holograms and displays. Traditionally, manipulating such features has been difficult, as the required materials were much thicker and harder to fabricate.

"Since this structural color that we observe is also very sensitive to its surrounding environment," Abhiraman says, "one can imagine make cheap and sensitive colorimetric sensors for chemicals or biological molecules if paired with the right chemical bait."

"Another area of potential application is integrated spectrometers and photodetectors on a chip," he says. "Even here, traditional semiconductor materials such as silicon have been hard to use since their optical properties are not conducive for strong-absorption. By virtue of the 2-D materials' quantum confined nature, they absorb or interact with light very strongly, and their sheet-like structure makes it easy to place or deposit or coat them on arbitrary surfaces."

The researchers think that the most powerful application of their system might be in photonic computers, where photons replace electrons as the medium for digital information, massively improving their speed.

"Hybridization of light and matter has long been used in optical communication switches and has been envisioned as the operating principle for the ultra-low threshold power lasers necessary for photonic computing," Jariwala says. "However, it has been difficult to get such devices to work

at room temperatures in a reliable and desired manner. Our work shows a new path towards making and integrating such lasers on arbitrary substrates, especially if we can find and replace our current 2-D semiconductors with ones that like to emit a lot of light."

More information: Huiqin Zhang et al. Hybrid exciton-plasmon-polaritons in van der Waals semiconductor gratings, *Nature Communications* (2020). DOI: 10.1038/s41467-020-17313-2

Journal information: *Nature Communications*

https://phys.org/news/2020-08-nanoscale.html

Fri, 14 Aug 2020

Landmark paper calls for need to develop the world's microbiome biobanking infrastructure

A team of scientists led by CABI's Dr. Matthew Ryan has outlined a series of challenges and opportunities presented in a necessary review of how microbiomes—biological communities including bacteria, archaea, fungi, algae, protists and viruses—can be 'banked' and preserved for generations to come.

Part of the culture collection at CABI's laboratories in Egham, UK. Credit: Tom Swindley/CABI

The researchers, who call for a prioritized list of what should be conserved from a scientific, economic, social and environmental perspective, present their views in the journal *Trends in Microbiology* and also suggest that the current biobanking infrastructure is 'fragmented and not prepared for the biobanking of microbiomes."

Dr. Ryan, Curator of CABI's Genetic Resource Collection, a type of biobank, said, "The microbiome research field is rapidly evolving, but the required biobanking infrastructure is currently fragmented and not prepared for the biobanking of microbiomes. The rapid advancement of technologies requires an urgent assessment of how biobanks can underpin research by preserving microbiome samples and their functional potential."

Biobanks conserve biological samples that traditionally are maintained as single organism or sterile cultures. They are essential for the research community to ensure high-quality research, and are like a failsafe for how research output is used in real world applications, e.g. to guide public health policies or develop products.

The researchers, working after an assessment of resource infrastructure needs carried out by the EU project MicrobiomeSupport, argue that microbiome science 'signals a paradigm shift in the scientific approach from preservation of microbe-free samples in culture collections (e.g. seed samples) towards preservation of complex communities, which requires the supporting infrastructure to be developed."

Dr. Ryan added, "The challenges of preserving microbiome samples optimally are immense. Researchers should be aware of unintentionally and fundamentally altering the functionality and integrity of the microbiome, which is a dynamic system that change in response to environmental influences and biotic factors."

"At the functional level, the removal of a single critical microbial component due to the application of a non-optimized storage approach could irreversibly affect the integrity of the system."

Co-author and EU Project Coordinator Dr. Angela Sessitsch, from the AIT Austrian Institute of Technology, said there are two essential questions that need to be answered when considering microbiome preservation—what should be preserved and what is the best way of preserving it?

"The question about what to preserve is a controversial one, and ultimately serves not only to underpin research quality and the generation of new microbiome-sourced microbial products (which may also have commercial value) but also to allow for preservation during time of altered agricultural and medical practices and climate change," she said. "Similarly, there is a need to ensure that products such as probiotics remain stable over time."

In outlining a range of existing facilities for the preservation of microbiomes—including the Microbiota Vault, which represents the first major step towards a comprehensive microbiome resource—the scientists also suggest that of the all techniques cryopreservation has been the 'gold standard' for microbial storage since the 1960s.

Dr. Bettina Schelkle, co-author from the European Food Information Council in Brussels, Belgium, said, '"The establishment of solid infrastructures for microbiome research, including biobanks, is essential, both for scientists and to maintain trust in science by citizens, particularly within a topic which receives so much hype as the microbiome.

Biobanks are a way to guarantee better application of research results within the public sphere and a way for scientists to have their work verified independently, should the need arise. They may also be crucial for biodiversity preservation; hence, the need and urgency for them is certainly there'".

Dr. Ryan concluded by suggesting that the biggest 'technological bottleneck' is the development of optimized methodologies for the preservation of microbiomes and for the assessment of preservations' success in terms of maintaining the composition and functionality of microbiomes.

Dr. Ryan said, "The clear complementarity between culture collections and biobanks necessitates an approach to enable that both work together to ensure that this critical microbiome research field has effective support. This will require the identification of infrastructural overlaps to gauge what is required and what is available/missing within the EU and beyond."

More information: Ryan M.J., et al. Development of microbiome biobanks - Challenges and Opportunities. 13 August 2020, *Trends in Microbiology*, DOI: 10.1016/j.tim.2020.06.009

https://phys.org/news/2020-08-landmark-paper-world-microbiome-biobanking.html

Business Standard

Fri, 14 Aug 2020

Scientists use AI to identify hundreds of Covid-19 vaccine candidates

The drug discovery pipeline is a type of computational strategy linked to AI -- a computer algorithm that learns to predict activity through trial and error, improving over time

Log Angeles: A team led by an Indian-origin scientist has used artificial intelligence (AI) to identify hundreds of new potential drugs that could help treat COVID-19, the disease caused by the novel coronavirus, or SARS-CoV-2.

A health worker in personal protective equipment (PPE) collects a sample using a swab from a girl at a local health centre to conduct tests for the coronavirus disease (COVID-19), amid the spread of the disease at Ajmeri Gate area, in Delhi on Friday

"There is an urgent need to identify effective drugs that treat or prevent COVID-19," said Anandasankar Ray, a professor at the University of California, Riverside in the US.

"We have developed a drug discovery pipeline that identified several candidates," said Ray, who led the research published in the journal Heliyon.

The drug discovery pipeline is a type of computational strategy linked to AI -- a computer algorithm that learns to predict activity through trial and error, improving over time.

With no clear end in sight, the COVID-19 pandemic has disrupted lives, strained health care systems, and weakened economies, the researchers said.

Efforts to repurpose drugs, such as Remdesivir, have achieved some success. A vaccine for the SARS-CoV-2 virus could be months away, though it is not guaranteed, they said.

"As a result, drug candidate pipelines, such as the one we developed, are extremely important to pursue as a first step towards systematic discovery of new drugs for treating COVID-19," Ray said.

"Existing FDA-approved drugs that target one or more human proteins important for viral entry and replication are currently high priority for repurposing as new COVID-19 drugs," he said.

Ray said the demand is high for additional drugs or small molecules that can interfere with both entry and replication of SARS-CoV-2 in the body, adding "our drug discovery pipeline can help."

Joel Kowalewski, a graduate student in Ray's lab, used small numbers of previously known ligands for 65 human proteins that are known to interact with SARS-CoV-2 proteins.

He generated machine learning models for each of the human proteins.

"These models are trained to identify new small molecule inhibitors and activators -- the ligands -- simply from their 3D structures," Kowalewski said.

The researchers were thus able to create a database of chemicals whose structures were predicted as interactors of the 65 protein targets. They also evaluated the chemicals for safety.

"The 65 protein targets are quite diverse and are implicated in many additional diseases as well, including cancers," Kowalewski said.

Ray and Kowalewski used their machine learning models to screen more than 10 million commercially available small molecules from a database comprised of 200 million chemicals.

They identified the best-in-class hits for the 65 human proteins that interact with SARS-CoV-2 proteins.

The researchers identified compounds among the hits that are already FDA approved, such as drugs and compounds used in food.

They also used their models to compute toxicity, which helped them reject potentially toxic candidates.

This helped them prioritise the chemicals that were predicted to interact with SARS-CoV-2 targets.

The method allowed the researchers to not only identify the highest scoring candidates with significant activity against a single human protein target, but also find a few chemicals that were predicted to inhibit two or more human protein targets.

"Compounds I am most excited to pursue are those predicted to be volatile, setting up the unusual possibility of inhaled therapeutics," Ray added.

(Only the headline and picture of this report may have been reworked by the Business Standard staff; the rest of the content is auto-generated from a syndicated feed.)

https://www.business-standard.com/article/current-affairs/scientists-use-ai-to-identify-hundreds-of-covid-19-vaccine-candidates-120081300434_1.html

livemint

Fri, 14 Aug 2020

Oxford COVID-19 vaccine: Human trials to end by November, mass production from 2021

By Anulekha Ray

- ***India's apex drug regulatory body also granted approval to Serum Institute of India (SII) to conduct phase II and III human trial for the Oxford COVID-19 vaccine in India***

The phase III clinical trial of COVID-19 vaccine developed by the University of Oxford will be completed by the end of November of early December, an official said. University of Oxford joined hands with British Swedish firm Astrazeneca to make a COVID 19 vaccine. The phase III trial has already started in United States and Brazil. The vaccine has shown promising results in the first phase of clinical human trial. The researchers said that they found their experimental COVID-19 vaccine produced a dual immune response in people aged 18 to 55. “We are seeing good immune response in almost everybody," said Dr Adrian Hill, director of the Jenner Institute at Oxford University.

The phase III trial of Oxford COVID-19 has already started in United States and Brazil (AP)

Under an agreement between Mexican and Argentine governments and drugmaker, AstraZeneca may start production of Oxford COVID-19 vaccine in the first quarter of 2021. Sylvia Varela, head of AstraZeneca Mexico, said that Phase III trials were expected to conclude by November or December.

India's apex drug regulatory body also granted approval to Serum Institute of India (SII) to conduct phase II and III human trial for the Oxford COVID-19 vaccine in India. "As per the study design, each subject will be administered two doses four weeks apart (first dose on day one and second dose on day 29) following which the safety and immunogenicity will be assessed at predefined intervals," the official told *PTI*.

SII said the Bill & Melinda Gates Foundation will provide at-risk funding of $150 million to manufacture 100 million doses of COVID-19 vaccines for India and low-and-middle income countries. Under this agreement, Pune-based firm can charge a maximum of $3 per dose for the

two COVID-19 vaccines. The vaccine maker will get the funding from the Gates Foundation through international vaccine alliance GAVI.

"Keeping in mind the pandemic situation, we have two dedicated facilities to produce millions of doses of the COVID-19 vaccine, while withholding vast production of other products," Adar Poonawalla, chief executive officer, SII.

Russia on Tuesday declared that it had become the first country to approve a vaccine against novel coronavirus. Dubbed as Sputnik V, the vaccine was developed by Gamaleya Research Institute and the Russian defence ministry. Russia registered the vaccine after less than two months of human testing.

Russian President Vladimir Putin claimed that one of his daughters had been inoculated with the vaccine. “I know it has proven efficient and forms a stable immunity, and I would like to repeat that it has passed all the necessary tests," Putin said.

https://www.livemint.com/news/india/oxford-covid-19-vaccine-human-trials-to-end-by-november-mass-production-from-early-2021-11597314049068.html

india.com

Fri, 14 Aug 2020

Experimental COVID-19 vaccine prevents severe disease in mice

Scientists have recently found an experimental vaccine quite effective in mice. Read more to know about it

An experimental vaccine is effective at preventing pneumonia in mice infected with the COVID-19 virus, according to a study.

COVID-19 Vaccine (File photo)

The vaccine, which is made from a mild virus genetically modified to carry a key gene from the Covid-19 virus, is published in the journal Cell Host and Microbe. “Unlike many of the other vaccines under development, this vaccine is made from a virus that is capable of spreading in a limited fashion inside the human body, which means it is likely to generate a strong immune response,” said study author Michael S. Diamond from the Washington University.

“Our vaccine candidate is now being tested in additional animal models with the goal of getting it into clinical trials as soon as possible,” Diamond added. According to the study, the research team created the experimental vaccine by genetically modifying vesicular stomatitis virus (VSV), a virus of livestock that causes only a mild, short-lived illness in people. They swapped out one gene from VSV for the gene for a spike from SARS-CoV-2, the virus that causes Covid-19. The hybrid virus is called VSV-SARS-CoV-2. Spike protein is thought to be one of the keys to immunity against Covid-19.

The Covid-19 virus uses spike to latch onto and infect human cells, and the human body defends itself by generating protective antibodies targeting spike. By adding the gene for spike to a fairly harmless virus, the researchers created a hybrid virus that, when given to people, ideally would elicit antibodies against spike that protect against later infection with the Covid-19 virus. As part of this study, the researchers injected mice with VSV-SARS-CoV-2 or a lab strain of VSV for comparison.

A subgroup was boosted with a second dose of the experimental vaccine four weeks after the initial injections. Three weeks after each injection, the researchers drew blood from the mice to test for antibodies capable of preventing SARS-CoV-2 from infecting cells. They found high levels of

such neutralising antibodies after one dose, and the levels increased 90-fold after a second dose. Then, the researchers challenged the mice five weeks after their last dose by spraying the Covid-19 virus into their noses. The vaccine completely protected against pneumonia.

At four days post-infection, there was no infectious virus detectable in the lungs of mice that had been given either one or two doses of the vaccine. In contrast, mice that had received the placebo had high levels of virus in their lungs. In addition, the lungs of vaccinated mice showed fewer signs of inflammation and damage than those of mice that had received the placebo. “The experimental vaccine is still in the early stages of development,” the study authors noted.

https://www.india.com/lifestyle/experimental-covid-19-vaccine-prevents-severe-disease-in-mice-4110592/

NATIONAL HERALD

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Improved COVID outcomes in nations with higher TB vaccine

Researchers have found that tuberculosis (TB) vaccine administered during the past 15 years is associated with significantly improved Covid-19 outcomes

Researchers have found that tuberculosis (TB) vaccine administered during the past 15 years is associated with significantly improved Covid-19 outcomes.

For the study, published in the journal 'Vaccines', researchers from the Ben-Gurion University of the Negev and Hebrew University of Jerusalem in Israel, wanted to analyse the correlation between the Bacille Calmette-Guerin (BCG) vaccine for tuberculosis and Covid-19 outcomes.

The researchers discovered that BCG regimes are associated with better Covid-19 outcomes, both in reducing infection rates and death rates per million, especially for ages 24 or younger who had received the vaccination in the last 15 years.

"Our findings suggest exploring BCG vaccine protocols in the context of the current pandemic could be worthwhile," said study researcher Nadav Rappoport of the Ben-Gurion University.

"A growing number of clinical trials for testing the efficacy of BCG vaccination have been initiated," Rappoport added, according to the research team, there was no effect among older adults who had received the BCG vaccine.

Many countries have stopped inoculating their entire population, but some still use BCG widely. The researchers analysed data from 55 countries with populations of more than three million people, which comprise some 63 per cent of the world's population.

As the pandemic reached different countries at different dates, they aligned countries by the first date at which the country reached a death rate of 0.5 deaths per million or higher. They controlled for 23 variables including demographic, economic, pandemic-restriction-related, and country health-based.

BCG vaccine administration was shown to be constantly associated with Covid-19 outcomes across the 55 countries. To ascertain whether other vaccines also influenced Covid-19 outcomes, they conducted the same analysis for the measles and rubella vaccines and found that those did not have a significant association with Covid-19 outcomes.Other epidemiological studies have shown the effect of the BCG vaccine beyond tuberculosis, but scientists do not yet know why the vaccine has such an effect.

Recently, a study published earlier this month in the journal 'Cell Reports Medicine', revealed that the BCG vaccine has a general stimulating effect on the immune system and is therefore effective against Covid-19.

https://www.nationalheraldindia.com/health/improved-covid-outcomes-in-nations-with-higher-tb-vaccine

hindustantimes

Fri, 14 Aug 2020

Study confirms BCG vaccine efficacy

BCG protects against childhood tuberculosis (TB) in countries such as India, where it is administered to newborn babies as part of the immunisation programme

By Rhythmal Kaul

New Delhi: Yet another study has established that BCG (Bacille Calmette-Guerin) vaccine increases the ability of the immune system to fight off Coronavirus disease (Covid-19).

According the preprint study available on medRxiv, an open access server for health sciences, some staff members of the Emirates International Hospital in United Arab Emirates was administered a booster BCG vaccine at the beginning of March. By the end of June, the hospital staff was tested for Covid-19 using the reverse transcription polymerase chain reaction (RT-PCR) test.

By the end of June, the hospital staff was tested for Covid-19 using the reverse transcription polymerase chain reaction (RT-PCR) test.(PTI)

The participants were divided into two groups: booster vaccinated, and unvaccinated members."…Results: 71 subjects received the booster vaccination. This group had zero cases of positive Covid -19 infection. 209 subjects did not receive the vaccination, with 18 positive PCR confirmed Covid -19 cases. The infection rate in the unvaccinated group was 8.6% versus zero in the booster vaccinated group…," says the research paper that has not yet been peer reviewed.

"Our findings demonstrated the potential effectiveness of the booster BCG vaccine, specifically the booster in preventing Covid-19 infections in an elevated-risk healthcare population,"the paper adds.

This is at least the fifth study to show the possible benefits of the BCG vaccine, which has been administred to most Indian children for decades.

BCG protects against childhood tuberculosis (TB) in countries such as India, where it is administered to newborn babies as part of the immunisation programme.

India's low Covid-19 case load has been partly attributed to BCG vaccination that is a part of the National immunisation programme for about 50 years.

India is conducting its own study on the vaccine's efficacy.

"One of the reasons for low mortality due to Covid-19 in India is said to be the BCG vaccine which is being given at birth to all children since 1962-63. ICMR study is to establish that and is being conducted among elderly population. AIIMS, Delhi, is one of the trial sites. The work has started and ethics committee clearance is also in place. The vaccine will be given on OPD basis especially in people from hotspot areas," said Dr AB Dey, head, geriatrics department, AIIMS, Delhi.

The Indian Council of Medical Research- National Institute for Research in Tuberculosis (ICMR- NIRT) has initiated a multi-centric study to see if BCG can reduce the severity of Covid-19 among individuals aged 60 years and above residing in hotspots.

About 1000 healthy volunteers above 60-years of age are being recruited in six states with high Covid-19 disease burden, and will be followed up for six months."The process has begun at NIRT, which is identified the nodal institute to spearhead the study. It is too early to comment on the results, but we will share information when there is an update," said Dr Rajnikant Srivastava, spokesperson, ICMR.

The states where the study has been planned are Tamil Nadu, Maharashtra, Gujarat, Madhya Pradesh, Rajasthan and Delhi.

The researchers of the medRxiv study, however, do acknowledge there were certain limitations that could somewhat impact the results.

"…such as lack of clear understanding and documentation of any confounding factors between the two groups that could have influenced the transmission and infection rate, sample size, and discrepancy between the number of subjects in the two groups. Staff comorbidity as well as any over the counter supplements that the staff could have taken in attempts to prevent Covid-19 infection was not documented. Despite the limitations of this study, we feel that our findings of 8.6% versus zero percent infection rate is significant enough to suggest the promising effectiveness of an up-to-date BCG booster vaccine in prevention of Covid19 infection," they said in the paper.

https://www.hindustantimes.com/india-news/study-confirms-bcg-vaccine-efficacy/story-zj9Si5vLpKZAJOwDN6ZJJI.html

livemint

Fri, 14 Aug 2020

Most medical supplies for fighting Covid-19 now domestically manufactured

By Neetu Chandra Sharma

- ***As compared to other nations, India has managed a much higher recovery rate (67% compared to 50% in USA) and low fatality rates (2% compared to 3.25% in USA and over 10% in many European countries)***

Most of the medical supplies for fighting covid-19 pandemic are now being domestically manufactured which were earlier being imported, the centre said on Thursday indicating a boost to 'Atmanirbhar Bharat' and 'Make in India' campaigns.

Since 11th March 2020, the Union Government has distributed more than 3.04 crore N95 masks and more than 1.28 crore PPE kits to States / UTs / Central Institutions, free of cost (ANI)

Along with augmenting covid-19 facilities, the Union Government has been also providing medical supplies free of cost to the State/UT governments to supplement their efforts in containment of the disease. "Most of the products supplied by Government of India were not being manufactured in the country in the beginning. The rising global demand due to the pandemic resulted in their scarce availability in the foreign markets," the government said.

Since 11th March 2020, the Union Government has distributed more than 3.04 crore N95 masks and more than 1.28 crore PPE kits to States / UTs / Central Institutions, free of cost. Also, more than 10.83 crore HCQ tablets have been distributed to them, the union health ministry said in a statement adding that in addition, 22533 'Make in India' ventilators have been delivered to various States/ UTs / Central Institutions. The Centre is also ensuring their installation and commissioning, it said.

Jointly, Ministry of Health & Family Welfare, Ministry of Textiles and Ministry of Pharmaceuticals, Department for Promotion of Industry and Internal Trade (DPIIT), Defence Research and Development Organisation (DRDO) and others encouraged the domestic industry and facilitated to manufacture and supply essential medical equipment like PPEs, N95 masks, ventilators etc., during this period.

Meanwhile the total tally of covid-19 cases in India on Thursday reached 21,14,140 and toll touched 47,488. India currently at the third number globally among the worst coronavirus hit countries only behind USA and Brazil. The country however has one of highest recovery rates and lowest case fatality rates. India on Thursday recorded highest ever single day recoveries of 56,383 leading to the total number recovered covid-19 patients touching nearly 17 lakh (16,95,982).

As compared to other nations, India has managed a much higher recovery rate (67% compared to 50% in USA) and low fatality rates (2% compared to 3.25% in USA and over 10% in many European countries).

With increasing number of recoveries, while the Recovery Rate has crossed 70% (70.77% today), the case mortality among covid-19 patients has further regressed to 1.96%, and steadily declining, the union health ministry said adding that the actual caseload of the country is currently is 27.27% of the total positive cases and the recoveries exceed the active cases (6,53,622) by more than 10 lakh.

In terms of testing, crossing the 8 lakh/day milestone of tests in a single day, India has registered 8,30,391 tests conducted in the last 24 hours. The average daily tests conducted saw a sharp increase from around 2.3 lakh in the first week of July 2020 to more than 6.3 lakh in the current week, the government said. The cumulative testing as on date has jumped to 2,68,45,688 crore and the Tests Per Million has increased to 19453.

“India has fast paced its testing and tracing infrastructure, but much more is required. Innovations for mass testing and screening protocols need quick adoption and scale-up. India’s public and private medical research institutions have responded well to the challenge and with right support have the capacity to scale-up the efforts further," said Himanshu Sikka, Lead- Health, IPE Global, an international development consulting firm in healthcare. “With a population of over 1.38 billion people, the need of the hour is to innovate further around the mass testing and screening protocols to isolate the infected populations from further spreading the virus in the community and country," he said.

https://www.livemint.com/news/india/most-medical-supplies-for-fighting-covid-19-now-domestically-manufactured-11597329342646.html

YOURSTORY

Fri, 14 Aug 2020

[Startup Bharat] Kochi-based AI Aerial Dynamics has developed drones to fight COVID-19

Incubated in the Maker Village, the dronetech startup has helped the Kerala government design a UAV capable of spraying sanitisers. It is also helping in the thermal scanning of people in crowds

By Debolina Biswas

For a long time now, India has been depending on foreign countries to procure raw materials for machinery. However, with the ‘Make in India’ and Aatmanirbhar Bharat initiatives gaining ground, Indian startups are turning self-sufficient.

Following these ideologies, Kochi-based AI Aerial Dynamics is manufacturing indigenous UAVs (Unmanned Aerial Vehicles). The dronetech startup is offering its products at a better cost to consumers.

UAV developed by AI Aerial Dynamics | Image Source: Team AI Aerial Dynamics

Founded by college friends Vishnu V Nath, M Rubin Ray, Denny Poulose, and Sujai KJ, AI Aerial Dynamics was incubated at the Maker Village, Kochi, in 2019, and the company was registered in January, 2020.

Eureka moment

Vishnu, 31, holds a PhD in Aerial Robotics from CTU, Gujarat. He conceived this idea during his college days, in 2015. “The initial design was implemented as my BTech project and later others joined the group,” he says.

Starting as a hobby to build remote controlled aircrafts, the team, having successfully tested the UAVs, designed a business plan and started the company.

Vishnu, who is currently the CTO at AI Aerial Dynamics, previously worked with the Kerala State Departments of Police, Forest, Archaeology, and Disaster Management on case studies to implement UAVs in the respective departments.

Rubin Ray, 31, is an MTech graduate, and focuses on Machine Learning System Architect. He previously worked with Tata Elxsi. Sujai, 32, is currently pursuing MBA and is the CEO of the startup. Denny, 29, on the other hand, is the Director at AI Aerial Dynamics. The startup currently has a team of eight employees.

“We have been working out of Maker Village due to its world-class fabrication lab. Additionally, all our technical challenges are solved by the mentors from the Maker Village,” Vishnu says.

The founding team initially invested Rs 8 lakh to start the company, and it later received Rs 10 lakh from NIDHI - Promotion and Accelerator of Young and Aspiring technology entrepreneur (PRAYAS).

How does it work?

The dronetech startup designs UAVs according to the clients requirements. The team then designs and begins the simulation stage. Once manufactured, the product or drone is tested, re-optimised, and finally delivered to the client.

“The design and manufacturing of the drone is done in-house. All the parts are manufactured using in-house equipment and utilising Maker Village Lab facilities,” Vishnu says.

Only the carbon fibre and batteries are imported from Germany and the USA, respectively. AI Aerial Dynamics has autonomous UAVs from two kilograms to 100 kilograms payloads, and also has sensors, video, data link, and ground control stations.

The drones start from Rs 4 lakh. Besides product sales, AI Aerial Dynamics also generates revenue from customising designs, services, and spare parts sales.

Pandemic heroes

While there were initial delays in the procurement of components and payments, during the beginning of the COVID-19 pandemic, AI Aerial Dynamics soon started helping the Kerala government fight the virus.

It helped the government design an UAV capable of spraying sanitisers. The startup further deployed its drones to track people strolling outside their houses during the lockdown. It has also helped in the thermal scanning of crowds.

Garud, a UAV developed by the startup, is fitted with thermal scanners to read the temperature of people in a crowd. It has the capacity to carry a load of up to 60 kgs, and was used in Kerala to spray disinfectants, carry medical samples, and emergency deliveries with minimal human touch points

Flying high While the drontech industry is still in its nascent stage, the Indian UAV industry, as estimated by InvestIndia.gov, stands at around $885.7 million.

Some of the other drontech startups to watch out for in the Indian startup ecosystem includes the likes of Marut Dronetech, VINVELI, IdeaForge, Aero360, and Drona Aviation, among others. However, Vishnu says, “Our USP is that we offer customised products as per client requirements.”

AI Aerial Dynamics targets the defence sector, government entities, and agricultural sector. It is currently working on a project with Defence Research and Development Organisation (DRDO), under the Ministry of Defence, Naval Physical, and Oceanographic Laboratory (NPOL).

According to Vishnu, the drontech startup has recorded up to 15 percent growth in its production. The startup has so far sold three units, and its annual average revenue stands at Rs 35 lakh.

The startup is looking forward to getting its products certified by the Indian government. Additionally, “We have been working on manufacturing heavy lift UAVs that can carry humans, and we are also looking forward to raising funds from grants,” Vishnu says.

https://yourstory.com/2020/08/startup-bharat-kochi-drontech-startup-ai-aerial-dynamics-coronavirus