

**GOVERNMENT OF INDIA  
MINISTRY OF SCIENCE AND TECHNOLOGY  
DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH**

**LOK SABHA**

**UNSTARRED QUESTION NO. 1173  
(TO BE ANSWERED ON 14.12.2022)**

**CSIR**

**1173. SHRI RAMCHARAN BOHRA:**

**Will the Minister of SCIENCE AND TECHNOLOGY be pleased to state :**

- (a) whether the Government has fixed any target for Council of Scientific and Industrial Research (CSIR) in the field of research and development;**
- (b) if so, the details thereof along with the achievements made by the CSIR so far;**
- (c) the details of the number of projects introduced by CSIR for the progress and development of the country; and**
- (d) the details of the funds allocated to CSIR. and the funds spent by it during the last three years and the current year?**

**ANSWER**

**MINISTER OF STATE (INDEPENDENT CHARGE) OF SCIENCE AND  
TECHNOLOGY & EARTH SCIENCES**

**(DR.JITENDRA SINGH)**

- (a) Yes, Sir. Council of Scientific and Industrial Research (CSIR) is positioned to undertake research and development focused at the unmet need and deliver knowledgebase/ technology to benefit the masses and Indian industry. CSIR has been pursuing diverse Scientific and Technological activities and thus has been delivering as per national missions/ priorities. CSIR is playing a significant role in the socio-economic development of the country. CSIR addresses national needs through its innovative research, strong fundamental science, industry partnerships, entrepreneurship, translational research, capacity building and policy making.**
- (b) The major recent achievements/initiatives of CSIR is given in Annexure -1.**

(c) R&D activities being pursued by CSIR in following categories of projects namely: (i) Fast Track Translation (FTT) Projects; (ii) Fast Track Commercialization (FTC) Projects; (iii) Mission Mode Projects; (iv) Focused Basic Research (FBR) Projects; and (v) Niche Creating High Science/ High Technology (NCP) Projects. These are grouped into eight themes: (i) Aerospace, Electronics, Instrumentation & Strategic Sectors (AEISS); (ii) Civil, Infrastructure & Engineering (CIE); (iii) Ecology, Environment Earth & Ocean Sciences and Water (E3OW); (iv) Mining, Minerals, Metals and Materials (4M); (v) Chemicals (including leather) and Petrochemicals (CIP); (vi) Energy (Conventional & Non-Conventional) and Energy Devices (EED); (vii) Agri., Nutrition & Biotech (ANB); and (viii) Healthcare (HTC). Further, CSIR is also implementing projects under NMITLI (The New Millennium Indian Technology Leadership Initiative) and Fundamental & Innovative Research in Science of Tomorrow (CSIR-FIRST) categories. The number of projects under above mentioned categories are as below:

S.No.	Project Category	Number Of Initiated / ongoing Projects
1	NCP/FBR	281
2	Mission Mode Projects	19
3	CSIR-FIRST	12
4	NMITLI	4
5	FTT/FTC	113
6	Other Projects	22

(d) The details of the funds allocated to C.S.I.R. and the funds spent by it during the last three years and the current year is as follows:

Rs in Crore

Financial Year	Fund Allocated	Expenditure
2019-20	4831.58	4831.58
2020-21	4208.00	4101.22
2021-22	5233.72	5174.34
2022-23*	5567.76	3651.66

\*BE for FY 2022-23 & Tentative expenditure till 30.11.2022

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**Major recent achievements/initiatives of CSIR**

- **Technology of converting Distillery Spent Wash as Sustainable Resource for Indigenous Potash Fertilizer developed by CSIR and technology implemented at Aurangabad Distillery Ltd. (60 klpd))**
- **Successful test flight of IAF on Bio-Jet Fuel developed by CSIR-IIP and successful landing at high altitude of Leh.**
- **CSIR-IICT signed a global patent licensing agreement with Sun Pharma worth Rs 240 crores.**
- **Indigenous Dental implants were developed that are cost effective in and Technology transferred to an industry for commercialization.**
- **Cost effective and energy efficient technology of Hydrazine Hydrate used in agro and pharma industry developed and Commercialization Partner is GACL, Vadodara**
- **Lead Free & Non-toxic Red Mud Based X-ray Shielding Tiles developed and licensed to industry**
- **3 kWe Polymer Electrolyte Membrane Fuel Cells (PEMFC) was developed that can be used in generators etc.**
- **Whole Genome Sequencing of 1000 Indians for Healthcare and Biomedical Applications completed by CSIR in 6 months' time.**
- **Development and launch of green crackers that decrease pollution at least by 30%. Over 250 MoUs and 325 non-disclosure agreements (NDAs) signed with fireworks manufactures and nearly 600 emissions testing certificates issued to fireworks manufactures.**
- **Technical support for Design & Construction of PMAY-G Rural Houses in Odisha. Design and building plans suitable for various geo-climatic zones.**
- **A DME fired ultra-clean fuel and DME-LPG blended fuel cylinders were launched and handed them over for common public and CSIR-NCL (National Chemical Laboratory)**
- **A pilot plant of Coal to Methanol was inaugurated at CSIR-CIMFR, Dhanbad**
- **The technology of eco-friendly and efficient Phytorid Technology Sewage Treatment Plant (STP) was developed and implemented in various locations.**

- **CSIR developed an indigenous technology, Emergency Retrieval System (ERS), for quick retrieval of power transmission in the event of failure of transmission line towers.**
- **CSIR and KPIT Technologies Ltd. successfully ran trials of India's first Hydrogen Fuel Cell (HFC) prototype car running on an indigenously developed fuel cell stack at CSIR-National Chemical Laboratory, Pune.**
- **CSIR also developed the indigenous technology for continuous large-scale production of precision silver nanowires on a large scale towards Atamribhar Bharat.**
- **Bangalore International Airport Limited (BIAL) – operator of Kempegowda International Airport (Bengaluru Airport) – became the first airport in India to install the indigenous AWMS (Aviation Weather Monitoring System) technology developed by CSIR-National Aerospace Laboratories (CSIR-NAL), Bengaluru, at both ends of the new runway.**
- **CSIR-NCL in collaboration with a start-up has developed a new class of self-expandable stents based on a novel scroll design.**
- **CSIR-NAL has successfully developed state-of-art Indigenous Autoclave Technology for processing advanced light weight composites that are integral to modern day civil and military airframes.**
- **CSIR-IIP and GAIL have developed a technology that can convert 1 tonne of plastic waste and other Polyolefin products into 850 litres of the cleanest grade of diesel.**
- **CSIR- IICT has developed a technology to manufacture hydrazine hydrate, which is used in agrochemicals, pharmaceuticals and water treatment.**
- **CSIR-IICT has developed and patented a high rate biomethanation technology known as ANAEROBIC GAS LIFT REACTOR (AGR) for the generation of biogas and bio manure from organic solid waste like poultry litter, food waste, press mud, cattle manure, organic fraction of municipal solid waste (OFMSW), sewage sludge etc.**
- **CSIR-IITR has developed AO-kit which is used to detect Argemone oil adulteration in Mustard oil.**
- **CSIR has launched the program on 'Skill India Initiative' which aims to equip young minds with the necessary technological skills through exposure to CSIR laboratories.**
- **CSIR-NCL has produced a new variety of saffron crocus that can grow well in wider environmental conditions.**

- The Indian Navy and CSIR signed a MoU to undertake joint research and development of advanced technologies for the Indian Navy.
- The Council of Scientific & Industrial Research (CSIR) has entered into a Memorandum of Understanding (MoU) with the Khadi and Village Industries Commission (KVIC) to leverage the expertise available in CSIR with the effort of KVIC for promotion of honey production and also to enable wider outreach of the CSIR technologies and products.
- CSIR-NBRI has developed 'transgenic rice' that will reduce arsenic accumulation and contamination in rice grains.
- The CSIR-NPL has developed "Hydroelectric Cell" that operates at room temperature, produces no excessive heat and greenhouse gases, and being made of inexpensive precursors cheaper than fuel cells.
- Using tissue culture practices, CSIR-IIIM has for the first time successfully cultivated banana in Jammu and Kashmir.
- CSIR-NAL has taken up the development of Acoustic Based Hit Identification and Analysis System (ABHIAS) for marksmanship training in the subsonic range.
- CSIR-IICT has designed hollow membranes which purify drinking water efficiently without causing any decrease in the mineral levels in water.
- CSIR-CIMFR has discovered shale gas in two areas in the Gondwana basin in Central India and Godavari basin.
- CSIR-CSIO has developed a reading device, Divya Nayan, that helps the visually impaired by reading the text aloud.
- A first of its kind earthquake warning system has been developed by CSIR-CSIO. The system has the ability to sense tremors, record them and generate an SMS to the concerned action points, in real time. It has been deployed and is operational at Delhi Metro since July 2015.
- CSIR-NEIST has developed a process for value addition to the NER low-quality coals for production of the high-value advanced carbon nanomaterials i.e. Carbon Quantum Dots (CQD).
- An Electronic Nose (E-Nose) to sniff out dangerous gases in the pulp and paper industry has been jointly developed by CSIR-NEERI and Centre for Development of Advanced Computing (C-DAC).
- A particulate matter (PM) wind-tunnel has been established at CSIR-NPL. This is a first and unique facility in the country to test and calibrate PM<sub>1</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> samplers.

- **CSIR-CLRI has made a useful breakthrough, extracting high-grade gelatin from raw animal hide and skin trimmings wastes at leather tanneries.**
- **CSIR-CBRI developed fire retardant water based clear/transparent coating that could be used on all types of wood and wood-based interiors (i.e. the materials / products used inside the building, either existing or new).**
- **CSIR-NIIST has developed Fluorescent Fibers and Ink for Security. Invisible fluorescent fibers find important use for preventing currency/document/ consumer goods counterfeiting. Fluorescent ink formulations with unique fluorescent signatures has application for security printing.**
- **CSIR-IGIB has set up a pilot platform entitled “Genomics and other omics technologies for Enabling Medical Decision (GOMED)”.**
- **CSIR-CEERI has designed and developed 2.6 MW S-band tunable pulsed Magnetron, which was successfully tested and used as a microwave source, to generate the required X-ray dose using a LINAC system for Cancer treatment.**
- **CSIR-AMPRI has developed a process know how for manufacturing agro waste particulates/fibers (*Parali*) reinforced composites as an alternative for Medium density fiberboard (MDF).**
- **CSIR-NML has developed an indigenous hydrogen standard (CRM) in steel as an import substitution.**
- **The country’s first ever “Highway Capacity Manual” (HCM) developed by CSIR-CRRI that will guide road engineers and policy makers about road expansion was released.**
- **CSIR-NEERI, Nagpur launched the Indian air quality Interactive Repository or IndAIR which has archived approximately 700 scanned materials from pre-internet era (1950-1999), 1215 research articles, 170 reports and case studies, 100 cases and over 2,000 statues, to provide the history of air pollution research and legislation in the county.**
- **CSIR-CBRI has developed cost effective nano-silica (n-SiO<sub>2</sub>) for high performance concrete to replace silica fume, an imported material.**
- **CSIR-NCL has developed an eco-friendly and simple solution that uses food grade salt to dissolve POP based idols.**
- **CSIR has developed a low-cost and portable Ksheer Scanner, a technology to detect adulterated milk.**

- **Affordable, and Disaster-resistant housing, termed as SERCular housing technology is developed by CSIR-SERC, for Pradhan Mantri Awas Yojana - Grameen (PMAY-G).**
- **CSIR-CCMB in collaboration with the Indian Institute of Rice Research at Hyderabad has released a new variety of rice that resists pests and is also beneficial for those with diabetes.**
- **Next Generation Sequencing (NGS) facility has been set up at CSIR-Centre for Cellular and Molecular Biology (CCMB). The facility includes technology for high genome sequencing and diagnostic sequencing of clinical samples.**
- **CSIR-CFTRI has developed a technology for developing carbonated fruit juice beverages containing natural fruit juice/pulp in concordance with FSSAI regulations for fruit juice beverages.**
- **CSIR-CDRI has developed a standardized nano-formulation from *Spinacea oleracea* (Palak) for prevention and management of osteoarthritis by preventing cartilage damage.**
- **CSIR-IITR has developed device based on the principle of anodic oxidation that is useful for the treatment of drinking water supplies that have microbial contamination.**
- **A plant based on Wax Deoiling Technology developed by CSIR-IIP set up at Numaligarh Refinery, BPCL was dedicated to the Nation by Hon'ble Prime Minister, Shri Narendra Modi.**
- **CSIR-IMMT has developed a process for recovering iron, nickel and chromium from chromite overburden in the form of nickel and chromium bearing pig iron has been developed.**
- **CSIR-CMERI has developed a micro nano scale laser patterning machine for generation of hydrophobic surfaces on polymers for their use in various societal applications such as self-cleaning surface generation which finds applications in clinical consumables, cutlery, polymeric covers etc. on clinical consumables, polymeric covers etc.**
- **CSIR- NML has developed a process for ecological recovery of cobalt and other valuable metals from the black powder and other constituents of LIBs.**
- **CSIR- CMERI has developed technology for safe disposal of Municipal Solid Waste (MSW) generated on daily basis and generation of fuel gas containing predominantly CO and H<sub>2</sub>.**
- **CSIR-CSMCRI has developed novel seaweed-based animal feed additive formulations to enhance the productivity of animals, improving the quality of animal products, and boosting immunity.**

- **CSIR-CSMCRI, in collaboration with engineering partner M/s Chem Process Systems Private Limited, have developed complete technology solution for valorization of spent wash generated in sugarcane molasses-based alcohol distillery.**
- **CSIR-CEERI has developed stone dust-precipitator system for stone carving artisans, provides dust free environment to the workers and is ready for deployment in smaller factories.**
- **Indigenous technology for synthetic aviation lubricants was developed for the first time in the country by CSIR-IICT in collaboration with five other organizations using indigenously available renewable raw material to a major extent.**
- **CSIR-SERC has developed a construction technology Called Laced Steel-Concrete Composite Technology (LSCC) that promises to make buildings blast-proof.**
- **CSIR-NML has developed a technology for production of Tungsten metal powder from plant tailings or waste sample.**
- **CSIR-CIMAP has successfully sequenced the genome of the tulsi plant, *Ocimum tenuiflorum*, also known as *Ocimum sanctum*, and holy basil.**
- **The new upgraded version of SARAS PT1N, a 14-seater passenger aircraft developed by the CSIR-NAL completed a successful maiden flight on 24th January 2018.**
- **CSIR-IMMT has design, developed and installed a vertical lifting system for hydraulic transportation of minerals/ores has been successfully completed.**
- **A technology for enhanced production of ergocalciferols (Vitamin D2) in Shiitake mushroom has been developed by CSIR-IHBT for captive cultivation for Vitamin D2 enriched mushroom in 2 months with yield of 0.5-0.6 kg fresh fruiting body per kg of dried substrate.**

#### **Covid-19 related Achievements**

- **CSIR was one of the earliest institutions in India that set-up COVID-19 testing facilities as early as in March 2020. Today, thirteen laboratories have carried out over 13,00,000 tests.**
- **CSIR had developed Medical Oxygen Concentrator plants based on PVSA technology and is setting up 120 of them under PM CARES along with DRDO.**
- **CSIR has set up 11 makeshift hospitals at different places in India with a total bed capacity of about 350. More hospitals are in the offering at Delhi, Punjab, HP and A&N.**



- **CSIR has also made many innovations related to diagnostics including developing the FELUDA kit, the Dry Swab and Saline Gargle methods for sample collection.**
- **On the COVID-19 surveillance front, CSIR laboratories have undertaken sequencing of SARS-CoV-2 to find the type of strains present in India and to understand if the virus undergoes genetic changes while it is spreading in the country. As a part of INSACOG they have played a critical role in genomic surveillance and more than 10,000 sequences have been determined.**
- **CSIR is also working with several state governments in genomic surveillance including Kerala, Maharashtra, Haryana etc**
- **CSIR-NAL has developed high quality PPEs and transferred the technology to MAFL, Bengaluru. After certification, about one lakh pieces have been supplied to Government.**
- **CSIR had designed and developed UV-C disinfection technology for inactivation of virus that can be installed in air ducts in malls, movie theatres and auditoriums etc.**
- **CSIR has also come out with comprehensive ventilation guidelines for offices and buildings to decrease air borne transmission of virus.**
- **CSIR also developed a cost-effective process of Favipiravir and transferred the technology to Cipla, which is being sold in the market as Ciplenza. CSIR has undertaken many clinical trials for repurposing of drug for treatment of COVID-19. The Council launched a website that gives comprehensive information about the numerous COVID-19 clinical trials that CSIR is engaged in partnership with industry, other government departments and ministries.**
- **CSIR and Ministry of AYUSH have joined hands to validate some of the traditional AYUSH formulations for their safety and efficacy through scientific evidence and AYUSH-64 has been recommended for use in Covid-19 patients**
- **CSIR developed a low-cost indigenized; non-Invasive bi-level positive airway pressure ventilator-SwasthVayu and more than 1300 of these have been supplied to various state governments.**
- **The Aarogyapath and Kisan Sabha apps developed by CSIR in a short span of time ensures a national healthcare supply chain and connects farmers to the supply chain and freight transportation management system respectively.**
- **Some of the notable innovation technologies developed by CSIR are as below:**

<b>S.No</b>	<b>Innovation/Technology developed</b>	<b>Year</b>
1.	Dental Implant	2019-20
2.	Nano-Biosensors and Microfluidics for Healthcare	2019-20
3.	Development of Affordable Technologies for Quality Milk Assessment	2019-20
4.	Innovative Processes and Technologies for Agrochemicals	2019-20
5.	Technologies for Robust Structural Health Monitoring of Critical Infrastructure and Conservation & Restoration of Heritage Structures	2019-20
6.	Catalysis for Sustainable Development	2019-20
7.	CRISPR based technique (FELUDA) for detection of SCA mutation	2019-20
8.	Food and Consumer Safety Solutions	2019-20
9.	Development of Fast, Durable and Energy Efficient Mass Housing Scheme	2019-20
10.	Drone based Electromagnetic and Magnetic Systems	2019-20
11.	Demonstration and validation of a 5kW HT-PEMFC based combined cooling and power system	2019-20
12.	Novel Therapy for Management of Sepsis	2019-20
13.	GOMED-Tech: Development, Translation and Commercialization of Genetic tests for prevalent genetic diseases in India	2019-20
14.	Image-Guided Vascular Vein Visualizer: VeinViz	2019-20
15.	Indigenous Nano-Materials for Construction	2019-20
16.	Hybrid Agro Waste Composite Materials	2019-20
17.	Process technology for large area (10 cm X 10 cm) manufacturing of micro-nano patterned (300 nm - 300 micron) hydrophobic surfaces:	2019-20
18.	Efficient and large-scale production of carbon quantum dots (CQDTs) from cheap coal feed-stock	2019-20
19.	Recycling of E-Waste	2019-20
20.	Electronics Augmentation on Bullet Resistant Bunker (BRB) Vehicle:	2019-20

21.	Vertical Slurry Transport System for Lifting of Minerals/Ores in Heterogeneous Regime	2019-20
22.	Thermal barrier coatings for strategic applications	2019-20
23.	Divya Nayan: A Personal Reading Machine for Visually Impaired	2019-20
24.	Scale-up of AutoCEPH: A software for 2-D Computerized Cephalometric Analysis as a web service	2019-20
25.	Precision instrumentation towards whole-slide digital microscopy for high-throughput analytics	2019-20
26.	Aircraft Testing with Bio-Aviation Fuels blended in Jet A1	2019-20
27.	Development of Cost-Effective Industry Grade Non-Contact Type Online Moisture Sensor Using Microwave and NIR	2019-20
28.	10kW Fuel Cell Stack and Hydrogen based Fuel Cell Car Prototype	2020-21
29.	Truenat for Point of care Tuberculosis detection	2020-21
30.	Seaweed Formulations for Productivity and Health of Dairy and Poultry Animals	2020-21
31.	Truenat for Point of care Covid-19 detection	2020-21
32.	CSIR- Technos-Raman (CTR Series) Raman spectrometers	2021-22
33.	Spike Protein based Subunit Vaccine for COVID-19	2021-22
34.	mRNA Platform for Vaccines and Therapeutics	2021-22
35.	INDICoV™ - Indigenous RT-PCR diagnostic kit	2021-22
36.	Solar DC Cooking System	2021-22
37.	Mechanized Sewage Cleaning System	2021-22
38.	Highly efficient and scalable process for manufacturing of Azelaic acid from oleic acid	2021-22
39.	Continuous, cost-effective and eco-friendly production process for Paracetamol	2021-22
40.	Coal gasification plant	2021-22
41.	Hydrogen based Fuel Cell Bus retrofitted with 40 kW LT-PEMFC Fuel Cell Stack	2022-23
42.	Marketing authorization for a diabetic drug	2022-23

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Establishments of CSIR are as given below:

### **Biological Sciences**

- (i) CSIR-Centre for Cellular and Molecular Biology (CSIR-CCMB), Hyderabad
- (ii) CSIR-Central Drug Research Institute (CSIR-CDRI), Lucknow
- (iii) CSIR-Central Food Technological Research Institute (CSIR-CFTRI), Mysore
- (iv) CSIR-Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP), Lucknow
- (v) CSIR-Institute of Genomics and Integrative Biology (CSIR-IGIB), Delhi
- (vi) CSIR-Institute of Himalayan Bioresource Technology (CSIR-IHBT), Palampur
- (vii) CSIR-Indian Institute of Chemical Biology (CSIR-IICB), Kolkata
- (viii) CSIR-Indian Institute of Integrative Medicine (CSIR-IIIM), Jammu
- (ix) CSIR-Institute of Microbial Technology (CSIR-IMTECH), Chandigarh
- (x) CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow
- (xi) CSIR-National Botanical Research Institute (CSIR-NBRI), Lucknow

### **Chemical Sciences**

- (i) CSIR-Central Leather Research Institute (CSIR-CLRI), Chennai
- (ii) CSIR-Central Electrochemical Research Institute (CSIR-CECRI), Karaikudi
- (iii) CSIR-Central Salt & Marine Chemicals Research Institute (CSIR-CSMCRI), Bhavnagar
- (iv) CSIR-Central Institute of Mining and Fuel Research (CSIR-CIMFR), Dhanbad
- (v) CSIR-Indian Institute of Chemical Technology (CSIR-IICT), Hyderabad
- (vi) CSIR-Indian Institute of Petroleum (CSIR-IIP), Dehradun
- (vii) CSIR-National Chemical Laboratory (CSIR-NCL), Pune
- (viii) CSIR-North-East Institute of Science & Technology (CSIR-NEIST), Jorhat
- (ix) CSIR-National Institute of Interdisciplinary Science & Technology (CSIR-NIIST), Thiruvananthapuram

### **Engineering Sciences Cluster**

- (i) CSIR-Advanced Materials and Processes Research Institute (CSIR-AMPRI), Bhopal
- (ii) CSIR-Central Building Research Institute (CSIR-CBRI), Roorkee
- (iii) CSIR-Central Glass and Ceramic Research Institute (CSIR-CGCRI), Kolkata
- (iv) CSIR-Central Mechanical Engineering Research Institute (CSIR-CMERI), Durgapur
- (v) CSIR-Central Road Research Institute (CSIR-CRRI), New Delhi
- (vi) CSIR-Institute of Minerals and Materials Technology (CSIR-IMMT), Bhubaneswar
- (vii) CSIR-National Aerospace Laboratories (CSIR-NAL), Bengaluru

- (viii) **CSIR-National Environmental Engineering Research Institute (CSIR-NEERI), Nagpur**
- (ix) **CSIR-National Metallurgical Laboratory (CSIR-NML), Jamshedpur**
- (x) **CSIR-Structural Engineering Research Centre (CSIR-SERC), Chennai**

#### **Physical Sciences Cluster**

- (i) **CSIR-Central Electronics Engineering Research Institute (CSIR-CEERI), Pilani**
- (ii) **CSIR-Central Scientific Instruments Organization (CSIR-CSIO), Chandigarh**
- (iii) **CSIR-National Geophysical Research Institute (CSIR-NGRI), Hyderabad**
- (iv) **CSIR-National Institute of Oceanography (CSIR-NIO), Goa**
- (v) **CSIR-National Physical Laboratory (CSIR-NPL), New Delhi**

#### **Information Sciences Cluster**

- (i) **CSIR-National Institute of Science Communication & Policy Research, New Delhi**
- (ii) **Fourth Paradigm Institute (CSIR-4PI), Bengaluru**

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