

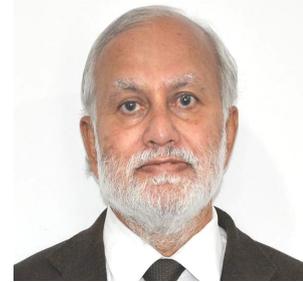
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## FROM CHAIRMAN'S DESK

We are all in the midst of the unprecedented biotic disaster in a century, the COVID-19 pandemic, impacting our life and livelihoods. As a timely gesture, the KSTA organised a Meet on 'COVID-19: Strategy and Way Forward for Karnataka', in collaboration with Planning, Programme Monitoring & Statistics Division, Government of Karnataka, at Bengaluru, on 19 June, 2020. Senior functionaries of the Government, leading experts from different sectors of Health, Agriculture, Industry, Education, Science & Technology, Public Affairs and Policy took part in the discussions, along with stakeholders such as FICCI and KSNDMC. The output of the Meet has been published as the first Strategy paper of the Academy.

As being seen and experienced in the present scenario also, Science, Technology & Innovations have been transforming lives. In the process, partnerships and collaborations have become critical for fast tracking generation and application of novel technologies for societal benefits. With increasing multisectoral needs on one hand and vertical specialisations on the other, solutions have to be multidisciplinary and cutting across boundaries, whether subjects or institutions. Every enterprise is looking for innovations for enhanced efficiencies and reduced production costs, to be both



Prof. S. Ayyappa

sustainable and remunerative.

In this context, the KSTA, with the objectives of inculcating scientific temper across civil society, facilitating technology dissemination, fostering innovations and entrepreneurship for societal benefits, is exploring the canvass of partnerships. Possibilities of collaboration with institutions of repute, both public and corporate, in different areas of science, engineering and technology, are being accorded priority. Accordingly, MoUs were signed with a number of organisations located in Karnataka, with regard to joint training programmes, R&D efforts and related aspects. I believe, together we can make a difference. Let us join hands for contributing our bit to the society through STI and the spirit of partnerships.

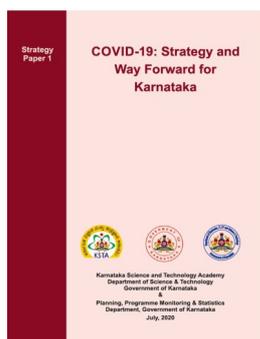
- S. Ayyappa

INSIDE THIS ISSUE:	
EDUCATION THAT MOTIVATES STUDENTS TO INNOVATE: THE NEED OF THE HOUR — PROF. RAJASAB A. H.	2 - 3
POST COVID EDUCATION, RESEARCH IN ANIMAL SCIENCES AND HEALTHCARE — PROF. KATRE SHAKUNTALA	4 - 5
COVID 19 IMPACT AND WAY FORWARD — PROF. K. NARAYANA GOWDA & PROF. S. RAJENDRA PRASAD	6 - 7
SHOULDN'T WE CARE AS MUCH ABOUT PHYTOPLANKTON AS WE DO ABOUT THE RAINFORESTS? — ANAGHA RAGHUNANDAN	8
KSTA MEETINGS	8
PROGRAMS DURING SECOND QUARTER (JUL.—SEP.) OF FY 20—'21	9
MOU AND COLLABORATIONS	9
DID YOU KNOW	10
KSTA THEME SONG	11
UPCOMING PROGRAMS/PUBLICATIONS	11

## COVID-19: STRATEGY AND WAY FORWARD FOR KARNATAKA



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KSTA and the Planning, Programme Monitoring & Statistics Division, Government of Karnataka have jointly brought out the first strategy

paper on Covid 19 and was submitted to the Government of Karnataka. The Chief Secretary has directed all the Departments to implement the recommendations of strategy paper in their respective fields (No. KEA 04 EVN 2020 Dt. 11.08.2020)

## EDUCATION THAT MOTIVATES STUDENTS TO INNOVATE: THE NEED OF THE HOUR

Syllabus oriented teaching method is a common practice in most of the schools and colleges in the country. Syllabus prepared by a few educators or adopted from elsewhere, lacks factors that are thought-provoking among students. Teachers also mechanically follow and teach within the framework of the syllabus. Instead of this, if we attract the attention of the student on various events in the nature, motivate them to apply the knowledge gained during daily life, impart them with various problems of the society and engage them in research to resolving them – the benefits to science and society are enormous.

If the students are taken outside and explained as various process of biology, chemistry, physics occurring in nature, they get real interest, experience and knowledge instead of sticking only to the classroom teaching. The knowledge gained in such a way will enable them to take up research in future towards solving societal problems. Society will be greatly benefited if, students are taught well the relationship existing between human-animal-nature, the importance of the environment, the problem of energy and other such aspects, empower them to take up research and innovations in future. Who knows in which corner the little Galileo exists? Therefore, it is the responsibility of a teacher to motivate students to take up innovation and is the need of the hour for a country like India.

Since, I am basically a life science scientist, I have tried in this article to explain how human welfare is possible through curiosity, research and discovery from the perspective of biological examples.

**Tardigrades:** the body structure and biological functions of these miniature animals, which we have not heard much about, is marvellous. It is surprising that Tardigrades organisms can survive in the region having temperature as low as  $-4\text{ }^{\circ}\text{C}$  and as high as  $150\text{ }^{\circ}\text{C}$ . They can also live in vacuum, in outer space and in UV Light. Even they can survive under deep sea where the pressure is 1200 times higher. There were also instances of surviving in

dried moss plant over a hundred years. The biological nomenclature of this animal is Milnesium tardigradum and are less than 0.5 mm in size. They generally survive on remnants in deep sea and on other plants. They are referred as "sea bear" because of their body shape and structure. The body structure, biological functions and ability to live in extreme conditions are inspiring for many researches.

Understanding of the biological activities in these organisms may one day be used by humans and other organisms to sustain life during natural disasters (Fig. 1)

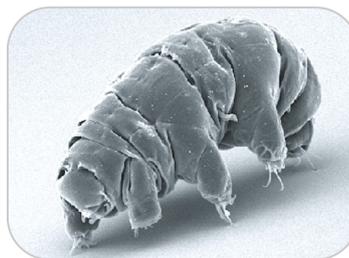
**Fang-Blenny fish:** The case of Fang-Blenny fish is most exciting one. The fish, which lives on Australian coral reef, has the ability to fend off large fish that come to eat with its comb-like teeth. This fish releases Opioid peptides, a chemical that causes intoxication when bitten. Opioid peptides also imbalances the blood pressure and causes erratic movement in big fish and thus Flang Blenny escapes saving its life. The case of Flang Blenny could inspire students to pursue further research on Opioids-peptides. This chemical may also be used for medical use (Fig. 2).

It is a folklore belief that even Camel faints when it eats this plant! How it is true scientifically?

**Retema raetam.** It is a shrub that grows naturally in the deserts of the North Sahara, Saudi Arabia and other Midwestern regions. People have seen that when Camels eat this shrub, its flower and seeds in excess, have become faint. I was wondered when I heard this from people. So, what does science say to this folk knowledge? When explored in the internet,



Prof. Rajasab A. H.



Source: <https://en.wikipedia.org/wiki/Tardigrade>

Fig. 1: Tardigrades (*Milnesium tardigradum* – an eutardigrade)

- \* Size – less than 5mm
- \* Can survive in vacuum and also in outer space
- \* Can survive extreme hot and low temperatures ( $-200^{\circ}\text{C}$  and  $+150^{\circ}\text{C}$ )
- \* Can survive up to 120 years in extreme desiccation, this is because of the presence of Trehalose in their membrane
- \* Can withstand radiation 1000 time more radiation than other animals
- \* They are first known animals to survive after exposure to outer space



Source: [https://en.wikipedia.org/wiki/Bluestriped\\_fangblenny](https://en.wikipedia.org/wiki/Bluestriped_fangblenny); <https://www.docseducation.com/blog/fang-blenny-pint-sized-toxicological-terror>

Fig. 2: Fang Blenny: *Plagiotremus rhinorhynchos*

A bite from a two-inch-long tropical fish may not seem like a cause for alarm, but these feisty creatures are packing an additional punch: an unusual, opioid-containing venom that tanks a predator's blood pressure. This venom contains three principal ingredients: an enzyme similar to scorpion venom, a neuroactive component like that of the notorious cone snail, and a heroin-like opioid peptide.

Fig. 3: *Retema raetam*  
Species : *Retema raetam*  
Family : Papilionaceae

it has been shown by the research that the extract of this plant when tried on rats resulted in the reduction in its blood sugar levels. That means, this plant can be a medicine for diabetes. By combining book knowledge, study of nature and folklore could inspire students to make new discoveries (Fig. 3).

**Discovery of Anaesthesia:** Horace Wells, an American dentist, noticed a surprise during his young days and that instigated the discovery of anaesthesia. Horace Wells (1815 to 1848), who lived only for 33 years, was aware of pain experienced by his patients during removal of their tooth. In those days, partying, dancing and laughing by breathing Nitrous Oxide, were common. On 12th of December night (1844), Horace Wells was at a party along with his wife. He noticed that one gentleman, Samuel A Cooley, was laughing and dancing even though his leg was injured. That day, as usual everyone at the party have inhaled N<sub>2</sub>O. Inspired by this, next day he came to his hospital and inhaled N<sub>2</sub>O and forcibly removed his own tooth with the help of dentist John Riggs and felt no pain. Later, he tried on 12 of his patients and got the same result. This led to many researches on anaesthesia. Now it is impossible to perform any surgery without anaesthesia. That one observation by Horace Wallace made him immortal. If we educate our students with the current scientific issues, their keen attention can lead to many innovations.

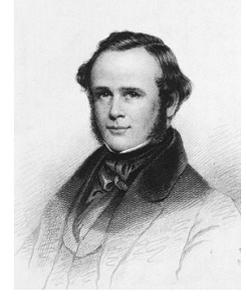
Horace Wells's life was tragic for many reasons. He committed suicide by cutting his wrists and died without pain by consuming chloroform. Chloroform was extensively used from 1840 until the Second World War (1939-45), for amputation of legs of wounded soldiers. An accidental discovery by Horace Wells has changed the history of surgery. Even the death of Horace Wells is a medical memory.

**Spring the base of life:** The arrival of spring in India is *Vasantostava*, a celebration in nature, a base of life, arise of love. In *Vasantostava*, our poets relish the melody of the cuckoo and new emerging leaf of mango tree. Analysing this *Vasantostava*

from a scientific standpoint is an excitement. The trees shed old leaves and adorn with new leaflets. With the arrival of *Varuna*, the rain, land cools and insects feed on greens and breeds. The birds feed on these insects and nest with their companion. Young butterflies, honeybees feed on flowers and buds. All these events occur naturally. When scientifically viewed, these events are inter dependent. The kind of dependency motivates many scientific discoveries. If the connections between organisms in the nature is properly understood, protection and preservation of nature become possible. For instance - in winter the fallen leaves become manure, washed away with rain water passing through ditches and drains reaches sea through rivers. We do not notice these fallen and manured leaves. But the fish at the delta region are waiting for these leaves every year. These leaves, water-borne insect and pests and other nitrogenous substances are the food for these fishes. Thus, there is a link among the arrival of *Vasantostava* – the sprouts – the falling leaves – dying insect and pests after completing life cycle – monsoon rains – breeding and life of fish and is a nature's wonders. Similarly, in nature, in the sky, in the sea, there are many more wonders. These wonders may become knowledge base. But the mindset and vision are important to realise them. Inspired by nature and folklore knowledge, teachers should inculcate scientific temper and innovative mindset among students. We have difficult problems in society? We must teach how to find solutions to the problems in the society through scientific innovations and it should be a part of the text. Then, at least a few students will make a stride in the field of research.

When I visited Edinburg in the UK last year and saw the castle there, a panel on the way to the castle caught my eyes. The writing on it says:

**“Edinburg is hotbed of genius.  
University was founded in 1583.  
Joseph Black discovered CO<sub>2</sub>  
Dolly cloned sheep was born nearby.**



Dr. Horace Wells



[https:// www.ancient-origins.net/horace-wells](https://www.ancient-origins.net/horace-wells)



<https://wellcomecollection.org/works/j8femfjv>

Fig. 4: Discovery of Anesthesia

**The Fellows of Royal Society  
Edinburg included John Hutton -  
founder of Modern Geology.  
Sir James Black - inventor of  
Blocker heart disease drug,  
Adam Smith - Father of Modern  
Economics.  
James Clerk Maxwell - Formulator  
of Electro Magnetic Theory”**

So many innovations have taken place in a small place like Edinburg. The big question is why this is not possible in India.

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## POST COVID EDUCATION, RESEARCH IN ANIMAL SCIENCES AND HEALTHCARE

### A: Education Sector

Since the lockdown situation happened without much notice, an expected sudden shift in academic delivery from F2F to 'Online' has been quite unsatisfactory for several reasons:

- \* In the Indian education ecosystem in general, at all levels of educational delivery, F2F has traditionally been the predominant practice, and largely, all our teachers are comfortable only with such practices. However, of late, due to a global shift in emphasis to adopt computer-aided educational technologies, and due to the high-cost of adopting such technologies, the practice has taken off more noticeably and in quick time, in private institutions rather than in public institutions. This is true also because many companies have sprung up to reach out such technology-aided and content-based e-solutions to institutions but at a high cost affordable only by affordable private institutions. Even amongst private and unaided institutions, those who are fee-dependent for their revenue, have not had the luxury of adopting these e-solutions, and such institutions are no better than public institution.
- \* However, the efforts of the Government in reaching out training to teachers of Government-aided institutions (especially schools), under the TALP (Technology-aided learning programme) and the efforts of the Chalkere unit of IISc., in providing domain- based and technology-aided training (both in theory and practicals), have provided adequate support for teachers in schools, pre-university colleges. This has had a spiralling effect, and many of our teachers have not only implemented the TALP in reality, after going back to their institutions after training, but have also uploaded a number of YouTube videos of their lectures for the benefit of the learners. Many of these YouTube videos are very popular and have earned government school/college teachers coveted state and national awards for their efforts. Aside of this, there are also several educational material available through Byjus / Khan Academy/Tata Stride and such others, which are being accessed both by our teachers and students based on their interest and guidance to access the appropriate search engines. This practice has been there for a couple of decades before now and has no relation with the lockdown during COVID. It is true that such efforts were undertaken by only those teachers who were motivated to bring about such transformations and was not practiced by all teachers.
- \* The situation of Lockdown during COVID brought about a sudden need for all teachers at all levels of education to resort to technology-aided teaching-learning practices, for which neither the entire teaching community nor the educational institutions were ready, for many lacked the training/expertise as also the necessary ICT infrastructure availability and proper administrative/technical support. So, essentially what was resorted to and insisted by managements was not the planned 'Online' TL practices but a weak "Emergency Remote Teaching-Learning" (ERTL)



Prof. Katre Shakuntala

that was resorted to. Proper Online learning calls for a lot of preparation, well-thought over content preparation, planned time-schedules and continuous availability of network connectivity and other accessories of distance learning programmes. World over, today, it is advocated that instead of a full online learning, a blended learning/hybrid learning programme is more effective, which also requires a lot of planning and involvement of both the management and the teachers. Therefore, with the experience of what happened due to sudden lockdown, it is now necessary for managements, teachers and the authorities to reach out appropriate training as also erect appropriate infrastructure to shift at least partially to planned 'online education' in the institutions. May be TALP and similar training modules must be made mandatory to all teachers (Government, aided and unaided private institutions alike), to enhance their Teaching practices and add value not only to their profiles but also add competitive value for their learners.

A more important situation which requires a lot of planning and implementation is the reopening of the educational institutions post lifting of the lockdown. Here, it is necessary to understand that a 'one-size fit for all' strategy will not be successful. Each level of education starting from Early Childhood Education, through pre-nursery-nursery-primary-secondary-tertiary – each has its own specific contexts, needs and parental-anxieties. So, it is necessary to thoroughly examine each situation, and workout strategies that would yield the best results. For this, the teachers in charge, the Head of the Institute, and the managements must come out with institution-specific and education-level-specific strategies of institutional sanitization, social distancing during learner contact as well as stay in the institution, sharing of learning materials and staff allocation. Since the infrastructure availability and faculty availability are highly diverse, each institution must draft a plan in accordance with the general guidance given by the authorities and implement the plan/strategies to ensure optimal learning environment with maximum safety to learners as well as all other components of the institution. Every institution must be sensitive to the situation and open for probity at all times. There must be an institution-specific Risk management team made responsible for the planning process and implementation of the strategies, and regular reports must be submitted to the authorities, for information and intervention if necessary.

A drop in admissions due to fear in the minds of the parents and/or a necessary situation due to infrastructure constraints to keep up to the mandatory social distancing norms, should be forecast and appropriate strategies worked out by each institution, to lower the burden of revenue loss.

KSTA must be given the responsibility of developing multimedia material in bilingual media (at least at school level), in science and technology subjects. Such material should not be just syllabus-based but beyond the syllabus too, so that learners are motivated to pursue science, technology and skill development further education of their choice. While doing so KSTA must involve renowned teacher-scholars at each level of education to develop the media material, as also have external experts drawn from higher levels of education, to scrutinize and approve the contents thus developed. This would ensure availability of quality learning resources at all levels of education.

Due to shift in emphasis on Technology-aided learning, it is quite likely that many institutions at all levels of education may be rendered disruptive. Therefore, both the authorities and the management must come out with feasible plans to avoid such a situation through appropriate strategies/model.

In any situation post-lockdown, teachers, managements and authorities must pay particular attention to access, equity and inclusiveness – which calls for a parallel shift in emphasis on personalized learning, competency-based and out-come based learning. Especially at lower levels of education, teachers must also be trained to adopt the theory of multiple intelligence, especially in reaching out to students with learning disabilities as also to PWDs. Lockdown and post-lockdown period will be a testing time especially for the teachers to reach out to the students with learning disabilities and the differently-abled students. Gender-based Inclusiveness is a sensitive yet important issue that needs to be borne in mind.

### B: Research in Animal Sciences

- \* Funding agencies must be forthcoming to fund relevant basic research in animal sciences (Microbiology, epidemiology, virology, Cell Biology, genetics and such others).
- \* Meaningful research collaborations between renowned researchers working on basic science projects and those working in applied research organizations/industries must be encouraged through wide publicity and facilitating ease of collaboration and recognition.
- \* The modelling undertaken by the IISc and JNCRC group of scientists must be widely publicized, for the benefit of people at large and interested people in particular.

### C: Healthcare

- \* Many renowned experts in healthcare have enlightened us with dos and don'ts, need for healthcare institutional preparedness for COVID and POST-LOCKDOWN situations, which has added a lot of value to the strategies expected.

- \* A lot of statistical information has also educated us on forecasting the spread of the pandemic in the coming days and what needs to be done by individuals and the authorities.
- \* One aspect that was not addressed was the psychology of people in different situations. Especially related to the teens, it is known that India has one of the highest teen suicide rates. In schools and colleges, recent trends are that students bond with strong friendships and even relationships (though precocious). COVID norms of social distancing, lockdown and fear of COVID infection would have a lot of psychological affects and therefore, it is necessary for all institutions to cater to the psychological counselling needs of all students in general and specific identified serious cases to avoid unfortunate happenings.
- \* Parents too need counselling and while the institutions cannot arrange for this, there must be regular PTAs through VCs, to have a good rapport and get useful feedbacks.
- \* In general, the public is bombarded with a lot of statistical data on COVID related infections, rise in death rates and so on, which is also affecting the psychology of parents of children below the age of ten, children of that age and adults beyond the age of 60-65. Some statistical information/publicity on the low number of cases/fatalities in these age groups, and fatalities largely/only due to co-morbidities, would be of great help to boost the psychology of people in this senior-age group.
- \* Some more information on individual immunity would be beneficial to readers.
- \* Yet another aspect of deep thinking (at my level) is the generally-casual attitude of people who either do not know the seriousness or want to defy norms due to their own attitudes or a weakness of the humans to lie in situations for their own personal gains- all of these are causes for unexplainable spikes in the spread of the pandemic. How do we anticipate and/or handle these situations?
- \* One of the uncertainties is the duration of the COVID situation. People must be made aware that like any other viral epidemic of yester years, one needs to learn to live with COVID-19, with necessary life-style changes. This must be publicized widely to remove the fear psychosis amongst the people and let them act in the situation with responsibility and not with fear. This itself will have an immune-boosting effect.
- \* I personally believe that the authorities must arrange to have designated psychological counselling centres where people in need must be able to seek help online and if need be having follow up facilities.

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## COVID-19 IMPACT AND WAY FORWARD

Every sector is impacted due to COVID-19, more seriously agriculture and allied sectors. Farmers were continuously facing wrath of marketing of many farm produces over the decades. During the COVID-19, the problem has aggravated to the extent of many farmers not harvesting their farm produces such as fruits, vegetables, flowers, etc., in majority of cases, the prices offered was not covering even the cost of cultivation. In extreme cases, large number of farmers committed suicide and there are no documents to take stock of such farmers either in Karnataka or at the national level. Although the Government of Karnataka has offered some compensation to such farmers in the last two months, but it was a meager amount and it is difficult to compensate the loss since it runs to several thousands of crores.

Yet another unprecedented situation happened is reversal migration. Many youth who left the villages (making villages old age homes) for various reasons have come back to the villages. These youth left villages mainly because farming was not a remunerative enterprise, besides not getting alliance, lack of assured and dependable timely technical guidance, poor amenities in rural areas.

Due to migration in some areas during COVID-19, farmers also suffered in carrying out timely farm operations particularly harvesting in sugarcane and other crops.

**Preamble:** It is difficult to provide total solutions to all these problems due to COVID-19 impact, which is increasing day by day. An attempt has been made to provide feasible solutions with least investment and based on the successful experiences at University of Agricultural Sciences, Bangalore [UAS(B)].

Food and nutrition security should be given top most priority, reason being it is only healthy food that can provide immunity to all the citizens of the country. Therefore, every effort should be made to maintain the required food production as well as nutritionally rich farm produces including milk, meat, fish and so on.

### I. Reversal migration

Majority of the youth who have come back are willing to stay in the villages because of bad experiences in urban environment. These are landless, less landed and even average land holding family youth migrated on the one hand, low and medium educated youth on the other hand.

All these youth who have small and marginal holdings are to be tailored with integrated farming. KVKs in the respective districts to be given mandate to organize training cum exposure visits to integrated farms in their area. UAS, Bangalore has recognized and awarded one each farm youth and farm women practicing Integrated Farming in the *Krishimela* every year since 2011. These awarded youths are available in every Panchayat and their experience be shared for the newly trained youth. Such trained youth should be supported by all the development departments. More emphasis need to be given for these families on dairy, backyard poultry, sheep, goatary, piggery, apiary, mushroom



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cultivation, besides cereals, pulses and oil seeds, tree mulberry, fodder cultivation, perennial trees planting such as jack fruit, jamoon, etc., and a combination of these enterprises for each family. This process would help in stabilising the economy, continuous employment, minimizing cost of production, food and nutrition security.

### II. Value Addition and Processing (VAP)

The biggest opportunity for the state to provide employment to unemployed, underemployed migrants, and increased additional assured income to farmers is through VAP. It is said very often that State as well as country is loosing annually huge post harvest losses. Even the attention given by successive governments is not encouraging either because of poor policies or not addressing end to end issues.

There are many farm producers such as bio-fuels, tamarind are not harvested to the extent of two third, jackfruit nearly 50 per cent, many fruits and vegetables in varying degrees. The exact data both on quantity and economic loss needs to be generated.

The model evolved by UAS (B) for bio-fuels, tamarind, jackfruit and coconut can be replicated for these crops across the state and with some modifications to other similar crops.

The most important feature of the model, procurement is being done through Milk Producers Co-operative Society (MPCS) at 5 – 8% overhead cost besides organizing the farmers into groups. MPCS works 2 hours in the morning and 2 hours in the evening, relatively free between 10 AM to 3 PM. This facility should be used with an MOU between Karnataka Milk Federation (KMF) and other institutions, which are working at the grass root level for procuring most of the farm produces rather than creating another infrastructure facilities.

These models are available with UAS (B) and the details will be shared if the state government desires. The identified youth and Self Help Groups (SHGs) may be trained in KVKs, provide support from the respective development departments and other institutions such as NABARD, Financial institutions, etc.

### III. A) Threshing yard and custom hire services

According to latest estimates, India is loosing annually more than one lakh crore due to post harvest losses. The post harvest losses in Karnataka certainly runs to several thousands of crores annually although the

accurate data is lacking.

In the yester years, every family use to have a threshing yard for threshing their farm produces. In the recent years, most majority of farmers have opted for threshing on roads across the country because of increasing number of small and marginal holdings besides cost of establishing threshing yard individually. This action of the farmers has not only resulted in huge loss of grains, desperate sale due to fear of quality being affected when threshing is being done during rainy seasons due to limited storage facility, quality of grains as well as fodder due to mix of petrol, diesel, oil, urine, dung, etc. This type of grains are consumed by human beings and fodder by animals have resulted in many health hazards.

Therefore, it is proposed to establish one threshing yard in every Panchayat initially and thereafter it could be extended to other villages of the panchayat in phase wise.

Establishment of threshing yard can be done with the help of NERAGA and Pradhan Mantri Yantra Dhara Yojane. Nominal budget be provided to establish low cost sheds, compound, storage structures and other purposes. Mechanism be evolved to sale all Minimum Support Price (MSP) declared farm produces at Panchayat level. Apart from threshing, the facility could also be used for sports and cultural programmes in the Panchayat.

Custom hire services may also be taken up for ploughing, sowing, pitting, transplanting, weeding, spraying, harvesting, transporting etc., at Panchayat level.

Majority of landless, less landed youth and SHGs be involved in threshing cum custom hire services. Training for these youth and SHGs be provided in KVKs with the help of RUDSETI and Farm Machinery Manufacturers on operation, maintenance and repairs.

Once, this is commissioned in each Panchayat, this will increase the income of farmers, provide quality grains to consumers, quality fodder to animals, employment to 50 to 60 youth and 25 – 30 SHGs almost round the year. Many old age families struggling for labour to take up various farm operations will help them to take up timely farm operations, minimize theft related problems and social harmony in the villages.

### III. B) Best use of Maize fodder

Maize is cultivated in Karnataka in an area of 14.38 lakh ha. during 2019-20. The area under Maize area is increasing continuously year after year particularly in the transition belt of Karnataka. But the uncomfortable part is, once Maize cob is harvested the fodder stalk is left underutilized. Annually, it runs to several lakh tonnes but there is no exact data on the quantity of loss. During summer months and in the years of drought, huge investment is made on import of fodder from neighbouring states. Dairy animals in urban areas are struggling for quality fodder.

Therefore, it is proposed to establish one large scale Silage unit in areas where large scale Maize fodder being wasted in the state. This initiative will provide quality fodder to dairy animals, additional income to Maize growers and employment to unemployed youth.

### IV. Attracting and Retaining Youth in Agriculture (ARYA)

ICAR is implementing ARYA through KVKs in the country. During 2015, it was started in 25 KVKs with the main objective of identifying such interventions considered to be more profitable and capable of providing assured income to farm youth. With encouraging results of providing additional income and employment to many youths inspiring them to stay back in villages, ICAR extended ARYA during 2018 to 100 districts across country and implemented through KVKs. During this year (2020) it is proposed to implement in 500 KVKs.

In fact, in the recently held national ARYA Review Workshop meeting organized by ICAR on 16.06.2020, I was suggesting that all the 718 KVKs in the country to be covered under ARYA at a time when majority of youth have come back to the villages due to COVID-19. KVKs have special advantage in training farm youth in integrated farming and VAP in a variety of enterprises due to multidisciplinary team of specialists working in KVK system.

Strongly urge the state government to support through additional grants for 33 KVKs functioning in the state of Karnataka to increase the coverage of more number of youth to take up new enterprises to enhance their income and employment opportunities, when reversal migration has taken place large scale in the state also.

### V. Recruitment and posting of Raitha Mitrtas at the Panchayat Level

Farmers were satisfied with the technical guidance and service rendered by Gramasevak and later Agricultural Assistant at the Panchayat level. Shifting of head quarters to Hobli level was not much useful to small and marginal farmers who constitute more than 90% as on today who are finding difficulty to visit Hobli level for various purposes. Therefore, Raitha Mitrtas may be appointed on temporary basis as desired by the Hon'ble Minister for Agriculture GOK, at the earliest, impart training on job responsibility and commissioned to work at the Panchayat level. This arrangement will enthuse, inspire and provide timely guidance and support to all farm families at the Panchayat level particularly to those who have come back with high expectations.

University will be happy to provide the technical help required in these areas for effective implementation by the state government.

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## SHOULDN'T WE CARE AS MUCH ABOUT PHYTOPLANKTON AS WE DO ABOUT THE RAINFORESTS?

The air we breathe is quite special; it contains approximately 21% oxygen. Ever wonder from where all this oxygen comes from? Let me guess, trees, right? What if I say there are microscopic, single celled organisms, called phytoplankton, drifting on the surface of water bodies, and that they are responsible for more than 50% of earth's oxygen supply. If we take two breaths, for one of them, we need to thank the phytoplankton, even though we do not know much about them in their own natural habitat.

The earth defines what we think of as 'normal' and 'habitable'. Most of the visible organisms live in a relatively limited range of temperatures of 5°C to 40°C and are protected from the sun's harmful radiation by our atmosphere. The earliest evidence of life dates back to 3.5 billion years ago, in a world with very low or no oxygen levels. These organisms, anaerobic single-celled prokaryotes, known as 'extremophiles', did not depend on oxygen metabolism. Instead, they used other molecules, such as sulphur, iron, and hydrogen, to produce energy. These oxygen independent metabolic pathways made early life on Earth possible.

Scientists have reconstructed earth's ~4.6 billions of years history with the help of geological and genetic evidence. Remarkably, the oldest known bacteria were sophisticated single-celled photosynthetic organisms, 'cyanobacteria', that drastically transformed the terrestrial environment, ocean, atmosphere and helped make the planet habitable. The extremes still exist out there, often still dominated by the microbial communities. They are found all over the world, in places like the Himalayas, Yellowstone National Park, Iceland, Kamchatka, New Zealand, Italy, Mt. Lassen, and in the hypersaline bodies of water like Great Salt Lake, and Dead Sea.

These photosynthetic organisms use sunlight just as terrestrial plants do, and to convert carbon dioxide (CO<sub>2</sub>), water (H<sub>2</sub>O), and minerals into organic matter and oxygen. Not only that, but certain types of phytoplankton contribute in the formation of trace gases: Dimethyl Sulphide (DMS), sulphate aerosols, and cloud condensation nuclei (CCN), essential for the formation of clouds, which also scatter harmful ultraviolet rays directly back into space to keep our planet cool. They contribute to the marine iodine cycle, the movement of iodine from the ocean to the land, and balance the ozone levels between the troposphere and the stratosphere.

Plankton are also our largest supplier of fossil fuels. When these organisms die, they get buried, compressed, and that ultimately turns into reserves of oil and gas. Every year we consume the oil equivalent of approximately a million years of plankton buried beneath the ocean floor.



Anagha Raghunandan

Phytoplankton live in the surface layers of the ocean penetrated by sunlight, known as the euphotic zone. The huge biomass formed by surface phytoplankton constitutes the very base of the food chain, thus, are being depended on by larger organisms. Phytoplankton are consumed by protists, groups of zooplanktonic animals, and larvae. These organisms are themselves food for large predators—jellyfish, fish, birds, marine mammals, humans, etc.

However, with water bodies being polluted nowadays, phytoplankton may grow out of control and form harmful algal blooms (HABs). These blooms can produce extremely toxic compounds that have harmful effects on fish, shellfish, mammals, birds, and even people.

We should ask a question, have we done enough to save them like we do for the rainforests on earth? Scientists observed a decline in phytoplankton population in around eight out of ten ocean regions, and estimated a global rate of decline of approximately 1% per year over the last 50 plus years. This can be correlated with the climate change in our atmosphere. So, if the plankton were to reduce or disappear, it would set off a devastating chain reaction in the food chain; impacting about 70% of the human population who live within 60 km of the coastline, who predominantly rely on the aquatic food source. Them being the largest producers of oxygen, we would have less oxygen, and more carbon dioxide in the atmosphere, which could possibly lead to the next Ice Age of our planet.

So what should be done? Just like how agencies are managing the policies to reduce our carbon footprint, they should also start managing water pollution. Bringing awareness among citizens is the first step in managing the crisis.

So, shouldn't we thank the phytoplankton for that one breath?

- Anagha Raghunandan

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## KSTA MEETING

Executive Committee (EC): The 10th EC meeting of KSTA was held under the Chairmanship of Prof. S. Ayyappan, Chairman, KSTA on August 26, 2020 from 11:00 am to 1:30 pm.

## PROGRAMS CARRIED OUT DURING SECOND QUARTER (JULY–SEPTEMBER) OF FY 2020–'21

During July—September 2020, Nine programs related to frontier areas of science and technology were conducted through Video Conference (VC) mode in association with research institutes/ science forum/ educational organizations. The response from the participants is very encouraging.

Sl. No	Date	Program Title	Beneficiaries (No.)
1	July 3, 2020	Role of Biotechnology: A Review on Biological Drug Development	289
2	July 13, 2020	Role of Yoga and Nutrition	120
3	July 14-16, 2020	Applications of Geoinformatics	40
4	August 4-6, 2020	Innovation and IPR in association with KSCST and SFGC, Yelahanka	
5	August 7, 2020	Life After COVID-19	33
6	August 18-21, 2020	Research Methodology & Authorship Lab Workshop in Collaboration with IEEE COMSOC, Bengaluru Chapter	30
7	August 26-28, 2020	3rd international conference on "Confluence Technologies, AI, Humanoids, Biotechnology, Nanotechnology, Augmented Reality, Virtual Reality, Block Chain, Crypto-currency, Robotics, Automation, Cyber Security & Quantum Physics" in collaboration with SFGC, Yelahanka, MentroX Global New Delhi & Research Foundation India, New Delhi	
8	August 29, 2020	Indian Space Science and Technology Research: Past, Present and Future by Dr. A S Kiran Kumar, Former Chairman, ISRO, Bengaluru	120
9	September 22 -25, 2020	Recent Trends in Biotechnology in association with SFGC, Yelahanka	115



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## MOU AND COLLABORATIONS

During July—September 2020, MOU with 09 organisations/institutions were signed with the following purpose and scope:

- Inculcating scientific temper across civil society through science communication
- Facilitating technology dissemination through Academia-Farm-Industry interface, with a focus on rural areas
- Fostering innovations and entrepreneurship for societal benefits
- Organising conferences & outreach programmes
- Capacity building in frontier areas of Science & Technology

Sl. No.	Organisations/Institutions	Date of MOU
1	Aadichunchanagiri University, B.G. Nagara	01.07.2020
2	Karnataka State Remote Sensing Applications Center (KSRSAC), Bengaluru	01.07.2020
3	ICAR-National Institute of Animal Nutrition & Physiology, Bengaluru	01.07.2020
4	Bapuji Institute of Engineering & Technology, Davanagere	02.07.2020
5	ICAR-National Bureau of Agricultural Insect Resources, Bengaluru	15.07.2020
6	Siddaganga Institute of Technology, Tumakuru	24.07.2020
7	University of Mysore, Mysuru	25.07.2020
8	University of Agricultural Sciences, Raichur	27.07.2020
9	SJC Institute of Technology, Chikkaballapura	10.09.2020

## DID YOU KNOW

## Eye controlled robotic arm

- Dr. Anand R, SSO, KSTA



A research team at Indian Institute of Science, Bengaluru has designed a robotic arm that can be manipulated by eye movement using a computer interface, to help people with Severe Speech and Motor Impairment (SSMI).

This research, unlike other eye tracking systems, uses only webcams and computers instead of head implantation devices. Until now, it was very difficult for people with SSMI to physically operate devices such as joystick, mouse or trackball, or use speech recognition systems.

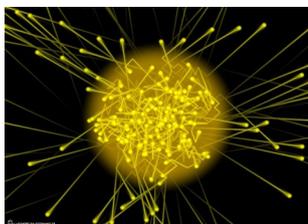
Using a robotic arm designed by the team of researchers led by Prof. Pradeepta Biswas at the Center for Product Design and Manufacturing (CPDM), disabled people can use their eyesight to perform mechanical tasks. It helps them to work on fabric printing and other handicrafts on par with the Normal peers.

The project has been commissioned at Vidya Sagar (Spastics Society of India) in Chennai and is in use. Many of the disabled people (who have cerebral palsy) are unable to focus precisely at a single point in their visual field, due to uncontrolled gaze movement. They are also not comfortable to look at all portions of the visual field equally. Prof. Biswas and his team used computer vision and machine learning algorithms to analyse live feeds of facial video from the users, and were able to estimate where the user was looking. Later they coupled this with an Augmented Reality application. This way the team has shown that the user can perform tasks like picking up and dropping objects using robotic arms, and placing them where they desire, as long as it was within reach of the robotic arm.

The research team is using video games as a medium to teach this new technology and may open the gateway to e-learning future for disable people.

## Quantum internet – Could make hacking a thing of the past

- Dr. Anand R, SSO, KSTA



[www.lactamme.polytechnique.fr](http://www.lactamme.polytechnique.fr)

In the era of online and work from home (WFH), there is a serious concern over the data security and protection of sensitive information. Every day new methods or algorithms are being employed to make it difficult to intercept and hack personal data and messages. But making it impossible is not been possible.

Prof. Siddarth Koduru Joshi from QET Labs, H H Wills Physical Laboratory and Department of Electrical and Electronic Engineering, University of Bristol and team have shown that quantum internet, a new type of internet and in this version of the global network, data is secure, connections are private and your worries about information being intercepted are a thing of the past. They have demonstrated simultaneous and secure connections between 28 pairings of eight users and this novel network topology is easily scalable to many users, allows traffic management features, and minimizes the infrastructure needed.

Presently online data is being encrypted by using mathematical problems that are easy to solve and unlock the encryption. In quantum communication, keys are created using photons and it is impossible to make

an exact copy as per the principles of quantum physics. Any attempt to copy these keys will cause errors that can be detected and hackers with high end computers also cannot replicate a quantum key or read the message in encrypts.

Though this concept presently is being operational in satellite communication and fiber-optic cables, the difficulty of scaling the standard two-user QKD protocols to many users has prevented the large-scale adoption of quantum communication.

The research team have shown that a widespread connectivity, much like the current internet, with security based on the laws of physics rather than computational complexity, is possible through a fully connected quantum communication network on a city-wide scale without active switching or trusted nodes.

## Further reading:

Siddarth Koduru Joshi *et al.*  
A trusted node-free eight user metropolitan quantum communication network, Science Advances, Vol 6; No. 3, eaba0959; 02 Sep. 2020

**KSTA THEME SONG**

KSTA released its theme song on August 26, 2020. The song was written by noted poet and lyricist Prof. Doddarange Gowda and music composition, recording and singing by famous singer Smt. M. D. Pallavi. Thanks to them from KSTA. The theme song was provided with appropriate video form and is hosted in the KSTA website.

**UPCOMING PROGRAMS/PUBLICATIONS****Best Book Award in Science, Agriculture, Technology & Medicine**

In order to encourage publication of Kannada books in the field of agriculture, science, technology and medicine, KSTA has been providing best book award for the selected books once in two years. Authors may submit 04 copies of books published during January, 2019 to November 2020 for the award. For further details visit KSTA website.

**Vijnana Loka – Bimonthly Magazine**

The September 2020 issue of *Vijnana Loka* is ready and during FY 2020-'21 three more issues (November of 2020 and January & March of 2021) will be brought out and will be distributed free of cost to pre-university and science degree colleges, science centres, libraries and other organizations across the state. All the issues are made available in KSTA website.

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