# TEACHER'S ACTIVITY REPORT 2020 - 2021

**FACULTY: Science**

**DEPARTMENT/ COMMITTEE : Biochemistry**

**IQAC ACTIVITY No: SVC/2020-21/BIOCHEM/SOC/7**

**NAME OF THE ACTIVITY: Interview with Dr. Shahid Jameel, leading virologist known for his work on Hepatitis E virus**

| **DATE** | **FACULTY** | **DEPARTMENT/COMMITTEE** | **COORDINATORS NAME** |
|---|---|---|---|
| January 2021 | Science | Biochemistry, SVC<br>Catalysis, Biochemical Society | Dr Anju Kaicker<br>Dr. Nandita Narayanasamy<br>Dr. Kameshwar Sharma |
| **TIME** | **VENUE** | **NUMBER OF PARTICIPANTS** | **NATURE: Outdoor/Indoor** |
| 12:30 pm - 1:30 pm | Online | 3 staff and 8 students | Indoor |
| **SUPPORT/ASSISTANCE:** | No Funding | | |

**BRIEF INFORMATION ABOUT THE ACTIVITY (CRITERION NO. – II, V, VII):**

| | |
|---|---|
| TOPIC/SUBJECT OF THE ACTIVITY | Conduct of an interview with an eminent virologist Dr. Shahid Jameel. |
| OBJECTIVES | • To provide students with the opportunity to interact with a virologist to discuss about the current situation of the world.<br>• Train them in the conduct of an interview and to translate the interview into a published document after proper editing |
| METHODOLOGY | • Screen for a suitable personality for the given subject.<br>• Obtain their consent for the interview and fix a convenient time.<br>• Conduct the interview with prepared and extempore questions<br>• Write, edit, format and publish in the Department Annual magazine 'Expressions' |
| OUTCOMES | • Students learn the importance of background reading required to conduct an interview.<br>• They appreciate the discipline and decorum necessary when interacting with scientists and administrators in a professional space<br>• Hands on experience in journalistic skills.<br>• Positive encouragement and inspiration towards higher education and research |

**PROOFS & DOCUMENTS ATTACHED (Tick mark the proofs attached):**

| | | | | |
|---|---|---|---|---|
| Notice & Letters | **Student list of participation** √ | **Activity report** √ | **Photos** √ | Feedback form |
| Feedback analysis | News clip with details | Certificate | Any other | |

| IQAC Document No: | Criterion No: II and III | Metric No: |
|---|---|---|
| Departmental file no | IQAC file No; | |

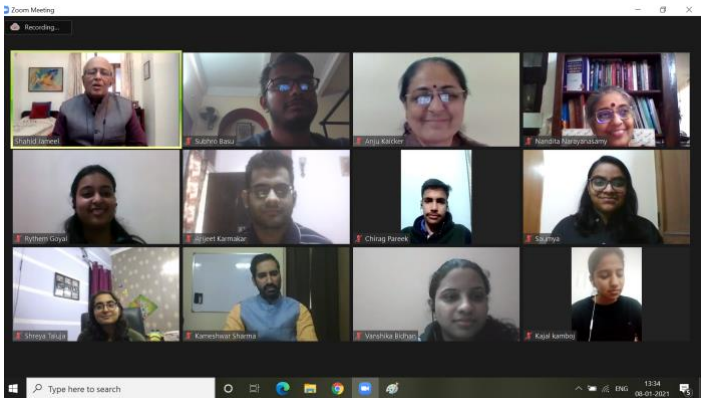
| NAME OF TEACHER & SIGNATURE | NAME OF HEAD/ COMMITTEE INCHARGE & SIGNATURE | IQAC COORDINATOR (SEAL & SIGNATURE) |
|---|---|---|
| Dr Anju Kaicker<br>Dr. Kameshwar Sharma<br>Dr. Nandita Narayanasamy | Dr Kameshwar Sharma<br>Teacher in Charge<br>Department of Biochemistry | Dr. N. Latha<br>IQAC Coordinator<br>Sri Venkateswara College |

For Reference

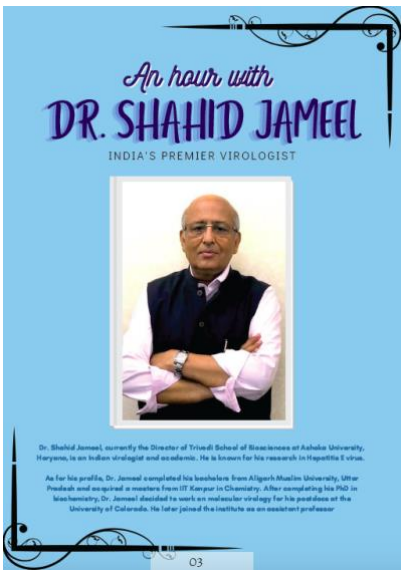
| | | | | |
|---|---|---|---|---|
| Criterion I | Curricular Aspects (planning & Implementation) | | Criterion V | Student Support & Progression |
| Criterion II | Teaching Learning & Evaluation | | Criterion VI | Governance |
| Criterion III | Research, Innovations & Extension | | Criterion VII | Institutional Values & Best Practices |
| Criterion IV | Learning Resources and Infrastructure | | | |

**Proofs**

- **Photo**




Due to the pandemic, this year the editorial board conducted the interview online on Zoom Meet. The interview has been published in the annual magazine.



- **Interview Report**

# INSIGHTS FROM THE INTERVIEW

**Q) Sir, you had done your PhD at Washington State University in the Department of Biochemistry but did your post- doctoral in Virology. So what made you change from Biochemistry to Virology and do research on it?**

I actually started out as a chemistry student. My B. Sc. and M. Sc. were both in pure chemistry, and I had never done a biochemistry lab before, I landed up to do my PhD in Biochemistry, My department at Washington State had sort of realized this, that I was coming from a pure chemistry background, never having done an enzyme assay, so they made me the teaching assistant of a biochemistry lab in my first two semesters. I did all my biochemistry lab in those two semesters. And the protocol used to be that we would make all the reagents and would do all the experiments before the students actually used those reagents and did those experiments. so it was a wonderful way of self learning. When I was completing my PhD in 1984, it was a time when molecular biology was just coming out, so I was actually quite keen to learn molecular biology but I was also interested in disease. So I decided that I was not going to go on learning molecular biology just working on anything but I would rather work on a disease model. When I was looking for a Postdoctoral fellowship , I had two offers. One was from a very high powered lab which had an army of Post Docs and the other offer was from somebody who was just starting his lab and I was going to be his first Post Doctoral student. I went to the second guy, because I realized that if I have to learn molecular biology I would rather learn at the bench directly instead of learning it in a big lab through other postdoctoral seniors. I didn't know a thing about hepatitis viruses, I went there to learn molecular biology and it happened to be in a lab that worked on hepatitis viruses. That really started off my life long affair with viruses. That lab was really fun.

"If you are in science thinking that you are going to have a Eureka moment quite frequently, you are sadly mistaken. Eureka moments come maybe once in your lifetime. The rest of the time you actually prepare your mind to recognize that Eureka moment because if you don't have a mind that is prepared to recognize it, you will miss it in a flash and you wouldn't even know it."

**Q) Sir we have seen that many students in India prefer to do their PhD or Postdoctoral studies abroad. Why do you think that students prefer to go abroad and should this be changed?**

Well, let me first go back and say, what is the purpose of a PhD. I think it is not to publish papers. Very few people actually discover something really fundamentally new. If you are in science thinking that you are going to have a Eureka moment quite frequently, you are sadly mistaken. Eureka moments come maybe once in your lifetime. The rest of the time you prepare your mind to recognise that Eureka moment because if you do not have a mind that is prepared to recognise it, you will miss it in a flash and you wouldn't even know it. So, a good PhD is all about training your mind to be objective, to be analytical, to actually look at data and see patterns in it. So, I would say, go to a laboratory, where you have the freedom to learn and develop analytical and objective thinking. Do not worry whether it is an American university or a European university or an Indian university. There are many places in India that are as good or, I would say, even better than many places in the United States (US). Yes, I know that the average university in the US is possibly better than the average university in India but weigh your options carefully and I would say do not jump into a PhD at the first opportunity you have. See what you are getting into. You will spend 5 years of your life doing a PhD, so make sure that those five years are spent really learning what you want to learn. That is more important.

**Q)You did both your PhD and Postdoctoral study abroad, then what motivated you to come back to India and continue your research here ?**

Well, I would be honest. I came back because my family was here. I didn't come because I was a super nationalist or something. I was looking for opportunities to come back to India. I got a nice opportunity, ICGEB was just starting. I had a good offer, which would have provided me professional satisfaction. That's actually the most important thing. If you are going to be doing a PhD, you are likely to be poor all your life, so money doesn't really matter. Look after professional satisfaction, whether what you are getting into will give you professional satisfaction. For me, it was really a mixture of things. The offer from India came at the right time. I wanted to come back to India, purely for family reasons, and everything just fell into place.

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**Q)So sir how easy or difficult was it for you to set up a lab, right from scratch?**

In a way, I was a little privileged because when I first landed in ICGEB in September, 1988, I was shown an empty lab. It had benches, it did not even have a stool to sit on. I had no office, no chairs, no tables, nothing. You can see and complain about it. On the other hand, it was an opportunity to build things the way you wanted to build them. There were a couple of us in the same position, I was not the only one. We essentially rolled up our sleeves and said, " Okay, we are going to build this place." But we were also a little privileged because funds were not lacking. In the initial days of ICGEB, we had good funding. So, whatever we wanted, we could get it. That way we were privileged. It was actually because of that, that I could publish my first paper from India before one year was over. Most people are not able to do that. I know it takes at least 2-3 years to establish a lab. But I quickly identified a problem and got on to it. All that really helped. But yes, it is not easy, it is difficult. You can better look at it this way, if you are not going to do it, who will.

**Q) Right now, we have the news in the air that synthetic viruses are being processed and are much more affordable and accessible in many labs as compared to the earlier times. So do you think this could be the reason behind increasing incidences of viral infections and outbreaks, like the one we are facing right now?**

I don't think there is any evidence that the virus we are dealing with right now is a synthetic virus. Do you know that the first virus was made in a lab in the late 1990s or early 2000s. It was done by Eckard Wimmer's group in State University of New York in the US. They essentially synthesized the complete cDNA of a poliovirus base by base, by purchasing oligonucleotides commercially. The reason they did it was to show how easy it is to make a synthetic virus, by simply buying things off the shelf. hey produced a virus which was infectious and which also showed neuro virulence in mice. That was actually the first synthetic virus. There is no evidence that this one is a synthetic virus. Why are outbreaks increasing? The viruses are jumping into humans and if you look at data from the last 50 years, 75% of these viruses have jumped from animals into humans. And when I say animals, it is wild animals into humans. Wild animals don't normally come into contact with humans. This happens when you destroy their habitats and how are we destroying their habitats.

The first transfer that often happens is from a wild animal to a domesticated animal. And then it comes from domestic animals into humans. Although, the present virus possibly came directly from a bat into humans, but bats are known to have roosting sites close to human habitations. It could also be that it got transferred from a wild bat to a bat that was living close to human habitations. I think this destruction of the environment is really the number one cause for viruses jumping from animals into humans.

The strongest logic, why Coronavirus 2 is not a synthetic virus is that, if I were asked to make a virus that will replicate very well in humans, I would start with a virus that is already known to replicate in humans. I would never use a virus that is never shown to infect humans. So the SARS- coronavirus 2 has the highest homology to a virus that was discovered in bats in Eastern China in 2018. That virus has never been shown to cause human disease. So if I were really asked to make a virus that affected the human population, I would start with SARS-coronavirus 1. I would not start with a bat virus that has never been shown to infect and cause disease. So that's a very strong logic as to why this virus is not a lab made virus.

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**Q) Do you feel that ethical implications imposed by the development of synthetic viruses outweigh the application of synthetic biology ?**

No one can deny that technology is there to make synthetic viruses. Now, technology is a very funny thing. Technology can be used for good and for bad as well. Nuclear energy can be used to power lights and refrigerators and on the other hand, it can also be used to create a bomb. I think how we use technology, how we regulate ourselves to use technology is important. And there must be structures to regulate this. Self-regulation is possibly the best way.

When recombinant DNA technology came out, there was immense debate that now this technology is going to create super humans. And it reached a point where there was a one-year moratorium on any recombinant DNA work till guidelines were laid out in place. So yes, we have gone through this. I am sure we will go through all of this again and we need to keep updating ourselves as technology develops. There is always the possibility, no one can deny that. But whether it will happen or not is doubtful. Recombinant DNA technology has so far, not produced any super humans. We must regulate ourselves and ensure that we don't land up destroying ourselves.

Technology is there but this also must be realised that if a synthetic virus can be created, its vaccine can also be created equally easily. The sequence of the SARS- coronavirus 2 was revealed on 7th January 2020. And within 42 days, Moderna had shifted the RNA vaccine from its facility to NIH for human trials. Within 2 months, that vaccine had gone into humans for trails. So that's also true. That technology has also developed equally well. And there is one very good outcome of coronavirus, that is the testing of these RNA vaccines. This is the way of the future. There is a company that actually synthesizes, what they call, vaccine printers. Vaccine printer is simply a nucleic acid synthesizer which can be remotely controlled. If I know the sequence, I could be sitting at home and through my cell phone send a message to this machine which is located anywhere, connected to the cloud, giving it instructions to make a piece of nucleic acid and that nucleic acid would be the vaccine of the future. So, technology has both sides to it.

**Q) Synthetic biologists try to modify the organisms, in order to increase their capability. Do you think this somewhere impacts the natural evolution process?**

Yes, absolutely! It is going to speed up evolution. If you see plant breeding for example, plant breeding was a slow process where you crossed two plants to get a new variety. But now, you do not have to cross two plants, you can simply introduce a gene from one plant to another to produce a new function in the plant.

> "Now that is really the fascinating thing about viruses- there is always some surprise around the corner."

**Q) Different viruses have different incubation periods, On what factors does the incubation period of a virus depend and what does it depict?**

Yes, different viruses have different incubation periods. So, the incubation period, which is the period from infection to disease, really depends on how the virus interacts with your immune system. Some viruses will replicate very slowly and show disease much later, others will replicate very quickly and show disease very fast. I can give you two examples- everyone is talking of SARS, so SARS can get into your body and replicate very quickly, causing a lot of protective responses from the body, like a cytokine storm. The cytokine storm is the body trying to attack the virus, but the body starts attacking itself. And that is what causes the serious disease that might lead to mortality. It's not the virus that leads to severe disease and mortality, it's the body's response.

On the other hand, there is HIV which infects, causes flu-like symptoms, and then disappears. But it does not really disappear, it integrates its nucleic acid in one's own nucleic acid, and now, it simply produces low levels of the virus throughout one's life. It slowly starts destroying your T-cells, and when your T-cells level reaches very low then you get other opportunistic infections and that is the time when you really see AIDS related disease. So, it really depends on how the virus replicates in the system and what sort of immune response it generates. Some viruses may even never show disease. So, it's a complex thing, it's not based on just one factor. Now that is really the fascinating thing about viruses- there is always some surprise around the corner. For example, you can produce rice that also produces Vitamin-A, you can even produce plants that are resistant to herbicides. So now you can spray herbicides and get rid of all the weeds and your plant remains unaffected. So yes, synthetic biology is speeding up evolution. Things were happening earlier as well but were happening at a much longer time scale and we are speeding up the process.

What is the downside of this- evolution not happening at its natural pace? The downside of it depends on how we use technology. Everything that we are doing today has an upside and a downside to it. Using CRISPR you can remove deleterious mutations, but using CRISPR, you can also create mutations. Synthetic biology is the biology of the future and it is really coming up very strongly. The motivation for synthetic biology is to produce new drugs, or organisms that produce a certain product or a certain metabolite very efficiently.

**Q) CRISPR is one of the most popular tools in synthetic biology, besides that could you tell us about some ground-breaking or unconventional tools synthetic biologists make use of?**

Well, biologists have also been using DNA control elements, for example- promoters and enhancers to switch genes on and off. I gave an example of vaccine printers- if I can make a vaccine or DNA based scrub on demand, that's synthetic biology. People are using DNA to fold into structures so they can be used as drugs, so again, if I could make that through a printer, you could have drugs on demand. Proteins are a bit difficult to synthesize. It is much easier to

make RNA and DNA than it is to make proteins and to fold proteins properly. You may have seen, for the first time, somebody has folded a protein, based on an algorithm- the computer predicted, what sequence to use to fold the protein into specific conformation.

**Q) There are a number of vaccines for SARS cov 2 virus that are being developed and distributed. We saw that Pfizer changed their efficacy data after Moderna announced their efficacy data, do you think this sort of competition between pharmaceutical companies is healthy for consumers? And what impact does it have on a researcher?**

Oh! The competition is always healthy for a consumer, whether it's for a vaccine, or a bar of soap, or a toothpaste. I think it's good that multiple companies have come up with various strategies to make vaccines and that they are competing with each other. In the end, it will be good for the consumer, but I think another thing that's equally important, is that many new platforms are being tested for the future. Before Covid-19 came, nucleic acid vaccines had never been used. We now have two RNA vaccines that have been licensed, a couple of DNA based vaccines are under trials. For the first time adenovirus vaccines are going to come in use, one of which, Chimp adenovirus- Oxford vaccine has already been licensed. So many new platforms are being tested. So, the point is that many new technologies are being developed and tested and licensed. The world will not need multiple vaccines for Covid-19, but the world will need multiple technologies for the future. That is a big takeaway from this pandemic.

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**Q) Talking of the mRNA vaccines, what is your take on the risks associated with its integration into the genome or other factors?**

Firstly, the risks must be assessed long term, so we do not know that as of now. But a very fundamental thing with the mRNA is that mRNA is delivered into the cytoplasm. So, the way this mRNA vaccine works, is that you have just this mRNA in a lipid particle. Now, this lipid particle essentially fuses with the plasma membrane and delivers the mRNA into cytosol. The RNA gets translated there; the RNA never actually goes into the nucleus. So, the RNA gets translated into the cytoplasm, and after its half-life is completed, it eventually gets destroyed. For integration of RNA into DNA, it requires two biochemical events. First is the conversion of RNA into DNA, and the other is its integration. Both require enzymes, the first one requires reverse transcriptase and the second one requires integrase. Human cells do not contain reverse transcriptase in the cytoplasm and also lack the classical integrase. So, I think it is very remote from the biochemical point of view that the RNA is going to integrate into the genome.

**Q) In the western countries, like the US, and even in parts of Europe, we have seen a progressive increase in the number of Covid-19 cases, whereas in India, the number of cases are progressively declining even though the restrictions have been lifted. Is there any particular reason for this?**

When the cases were going up in India in between August and September, the number of cases in the US were declining. So, the US is going through a second wave. India on the other hand, had such a huge first wave, that I don't think we will have a second wave. So, India is down for possibly two reasons.

One is that we do not have the real figures, but then, I would not say that's the main thing. The main thing is that a lot of people in India have already been exposed to the virus and are therefore protected from the diseases- both in this outbreak, as well as with other endemic corona viruses. The fact that we get so many infectious diseases, it keeps our innate immunity level high.

What's been seen in COVID, is that if you can control the virus in your upper respiratory tract, essentially your nose and your throat, the virus doesn't get into your lungs, and if it doesn't get into your lungs, there is no severe disease and no mortality. So, I think, as a population, we are better at controlling the virus early, simply because we are exposed to so much other infections.

Mortality rate in India is the same as in all of South-East Asia, and Africa. So, India is not special. But yes, the mortality rate in India is almost half than what you see in the US or Europe. They are more sterile societies. They have more allergies, we have more infectious diseases. That's what the hygiene hypothesis is all about, if you are more exposed to infections in childhood, you are protected from allergies. We hardly see allergies in our country, but in the West, every other person has an allergy. Why the US and Europe are going through this is because they have not been careful. There are models that predict that 30% of Indians have already been exposed. In major cities, 50% of the people have already been exposed, that's not happening there yet. So, that's the reason we are going down.

"So, go after learning, do not go after impact factors and how many of your papers get published and all of that, that's nonsense! That is not going to help you, what will help you is how you develop your thinking."

**Q) What advice would you like to give to the undergraduate students who want to pursue research in future?**

**Couple of pieces of advice! ( Smiles) One is, read outside your coursework. Very important- don't just read textbooks, don't just read science. Be aware of what's happening in the world. Read outside your own area and that will always help you. As far as going for a PhD, be very selective in what you want to do and who you want to do with. You are going to spend the next four or five years of your life doing a PhD, so make sure you are in an environment where you are doing something you like to do, instead of going for it just for the sake of doing a PhD. You know PhD is a very funny thing. When you go to do a PhD, you think you will change the world, but believe me, the day after your PhD, is no different than the day before your PhD. The world is the same. And in a week's time your own excitement that you have a PhD, will wear off. You will never go back and look at your thesis ever again. So, do not run after those things. You should see the kind of capabilities you develop during your PhD. To me, a good PhD is whether you can think objectively, think analytically. I am never impressed by people who tell me "I published ten papers from my PhD", my next question to them is, what did you learn? So, go after learning, do not go after impact factors and how many of your papers get published and all of that, that's nonsense! That is not going to help you, what will help you is how you develop your thinking. That will always be with you, that will never leave you. So that is a good PhD.**

**Attendance**

**ACTIVITY: Interview**

**Date: January 2021**

**Time:12:30- 1:30 pm**

**Venue: NIA offices**

**Criterion No: II/ III**

| Sr. No. | Name of the student | Group | Signature |
|---|---|---|---|
| 1. | Subhro Basu | BSc (H) Biochemistry | |
| 2. | Vanshika Bidhan | BSc (H) Biochemistry | |
| 3. | Arijeet Karmakar | BSc (H) Biochemistry | |
| 4. | Kajal kamboj | BSc (H) Biochemistry | |
| 5. | Saumya Arora | BSc (H) Biochemistry | |
| 6. | Rhythm | BSc (H) Biochemistry | |
| 7. | Shreya Taluja | BSc (H) Biochemistry | |
| 8. | Chirag Pareek | BSc (H) Biochemistry | |

# SRI VENKATESWARA COLLEGE
## (University of Delhi)

## Internal Quality Assurance Cell



This is to certify that the Activity report (Teacher/Department /Society/Association) has been submitted for documentation to IQAC, Sri Venkateswara College, University of Delhi.

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