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Remembering Someshwar Nath Bhargava (1937-1983): A Great Human Being and An Outstanding Plant Pathologist / Mycologist from Allahabad University, Prayagraj

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ABSTRACT

We present here the life and research of Someshwar Nath Bhargava who made enormous contributions as a wonderful teacher and an original researcher in the area of fungal diseases of plants. He was trained both at Allahabad University in India, and at Cambridge University in U.K. First, Govindjee presents here, on behalf of all the authors, a brief description of Someshwar Bhargava's personal life and an overview of his research in the 1960s and in the 1970s. This is followed by a detailed reminiscence of all aspects of Someshwar's life, particularly in the 1980s, by his former doctoral student Ravi Shankar Pandey. Then, we present a reminiscence by Raj Prasad, who knew him from his own early days in Allahabad, followed by reminiscences from Someshwar's sister Ranjana Bhargava and brother Rameshwar Bhargava. We end this Tribute[a] to S.N. Bhargava with concluding remarks related to the students he had trained, and his publications under References, the latter, as collected and organized by Harbans Kehri Kaur.

Keywords: Allahabad university, Great Human, Mycologist, Plant pathologist

INTRODUCTION

Someshwar Nath Bhargava was born in Allahabad (now Prayagraj), India, on April 5, 1937. His mother was Rupkanti Bhargava, and his father Gajadhar Prasad Bhargava, a distinguished lawyer at Allahabad High Court. Figure 1 shows an informal photograph of Someshwar, from the early 1970s, while visiting a local park in Allahabad, whereas Figure 2 shows his portrait that adorns the door where he had his office, in the Department of Botany, at Allahabad University, when he was teaching there during the late 1960s till the early 1980s.

[a]We also refer the readers to **tributes** to four other scientists from the Botany Department of Allahabad University, Prayagraj; they are : Ravindar Kaur Sawhney (Govindjee et al. 2021); Lalit Mohan Srivastava (Govindjee and Naithani 2021); Tadimeti Raja Rao (Govindjee et al. 2022); and Manmohan Manohar Laloraya (Govindjee et al. 2023)

Figure 1. Someshwar Nath Bhargava, in the early 1970s, in a park in Allahabad. *Source:* Taru Bhargava

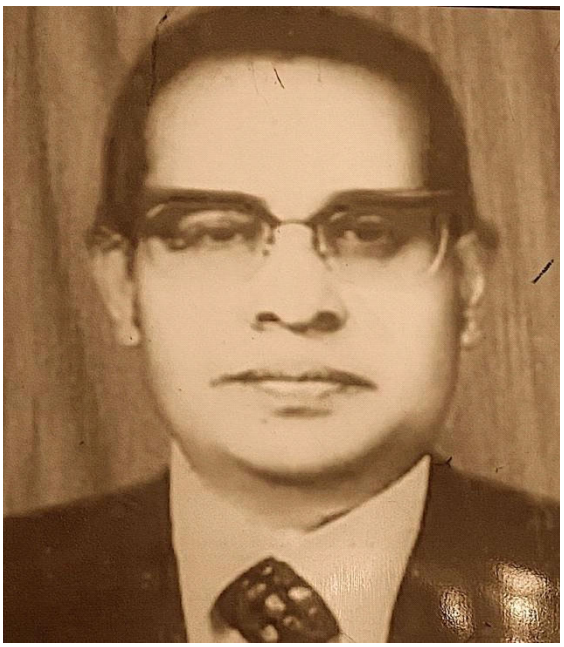

Figure 2. A 1980 photograph of Someshwar Nath Bhargava in the Department of Botany at Allahabad University. *Source*: Harbans Kehri Kaur

Someshwar Nath Bhargava passed away on November 12, 1983, at Allahabad. He left behind his wife Rajni and two daughters (Taru and Radhika), who now live in the USA. Someshwar was one of the eleven children in the family, which includes his sister Ranjana, and three brothers (Rameshwar; Pradeep; and Rakesh), all living in the USA. Other siblings, now deceased, were two sisters (Madhuri and Bacchi), and four brothers (Vishwanath; Amarnath; Onkarnath and Sirish).

ACADEMIC LIFE AND RESEARCH

Someshwar was a distinguished postgraduate from the Botany Department of the University of Allahabad; his DPhil thesis (Bhargava 1962) was in Botany (with specialization in Mycology and Plant Pathology) under Professor Ram Narayan Tandon (1903-1999; Raychaudhuri 2000). In addition, he completed his MSc (by research) from the University of Cambridge, UK (Bhargava 1969; also see below for Reminiscence by R.S. Pandey). Someshwar served the Department of Botany of Allahabad University as a Lecturer from 1963 till 1983; he was going to be a Reader in Botany-ironically, he died just 10 days before it.

Below, one of us (Govindjee) provides a glimpse of Someshwar's overall research through an overview of what he did during the 1960s and 1970s; his research in the 1980s is presented in the Reminiscences by Ravi Shankar Pandey (an author of this Tribute). We begin with a summary of his research that he did with his mentor Professor Ram Narayan Tandon.

Research with his Doctoral Advisor Professor R.N. Tandon in the 1960s

Tandon and Bhargava (1961) provided the first report on the growth and physiological characteristics of an important fungus *Pestalotiopsis glandicola*; they showed that it grew over a wide pH range (1.5 to 10.2, but with an optimum at pH 6.1), and in the temperature range of 21° C- 27°C, but it did not grow without carbon (50 g/l glucose was good, but sucrose was the best); further, growth and sporulation was shown to be dependent on the amount and kind of nitrogen source used: Mg nitrate being the best for its growth and asparagine & potassium nitrate being the best for its sporulation, whereas potassium dihydrogen phosphate gave complex results. Tandon and Bhargava (1962a) showed how different

monosaccharides were used by different fungi. Soon thereafter, by using chromatography, Tandon and Bhargava (1962b) found that sucrose and maltose were absent in the diseased pineapple plants after seven days of infection by *Botryodiplodia*, but glucose and fructose were fully present. Then, Bhargava and Tandon (1963a) studied the effects of many sulfur and phosphorus compounds on the growth and reproduction of the following fungi: *Fusarium solani*, *Botryodiplodia ananassae*, and *Macrophomina phaseoli*. They found that Mg sulphate was the best, but that sodium sulphite, and sodium bisulphite were toxic to these fungi. Although potassium metabisulphite prevented growth of *F. solani* and *M. phaseoli*, it supported the growth of *B. ananassae*. In addition to obtaining valuable results on many fronts, Bhargava and Tandon (1963a) found that phosphorus was essential for the growth of all the three fungi mentioned above. Further, Bhargava and Tandon (1963b) presented, for the same fungi, a thorough study on the effect of "vitamins" (e.g., biotin; thiamine; inositol; pyridoxine) on their growth and sporulation. Here, the interesting result was that the fungi (pathogens) used were self-sufficient and the addition of these vitamins had no significant effect on their growth although there was a slight variation in their reproduction.

In addition to the above, Tandon and Bhargava (1963) described the characteristics of *Fusarium solani* that attacks *Gladiolus* bulbs; at the same time, they provided information on 14 different fungicides, and found that *Flit-406* was very effective in controlling the disease; 0.5% Flit-406, used 3 weeks before the infection, completely stopped the dry rot disease. Further, certain environmental conditions (such as low temperature) were better in controlling the disease; further, Someshwar noted that maltose and sucrose were missing in the diseased parts! This was followed by the work of Bhargava and Tandon (1964) where they reported the effect of 25 different carbon sources and 22 different nitrogen compounds on the growth and sporulation of the fungus *Pestalotiopsis glandicola* (Cast.) Steyaert. They found that potassium nitrate and asparagine were the best nitrogen source, but there were almost ten carbon sources, including glucose and fructose, that were equally good. Further, Tandon and Bhargava (1965a) described the formation of new oligosaccharides in fruits after they were infected by fungi; and Tandon et al. (1965b) provided new detailed information on new fungal diseases of several tropical fruits.

Following the above outstanding research with Prof. R.N. Tandon, Someshwar worked also with other research collaborators including M.P. Srivastava and A.K. Ghosh. Srivastava et al. (1965) described, in depth, rot symptoms in mango, caused by several fungi including *Aspergillus niger*, *Colletotrichum gloeosporioides* and *Botryodiplodia theobromae*. Further, Someshwar recorded losses at different places and on different varieties of mango. Among the above-mentioned three fungi, they found that *A. niger* was the most common fungus attacking mango. Soon thereafter, Srivastava et al. (1966) described the characteristics of new species of fungi infecting several plants: (i) *Sordaria allahabadensis* on the flowers of *Carica papaya* L; (ii) *Thielavia appendiculata* on the leaves of *Punica granatum* L.; (iii) *Phomopsis amraii* on the leaves of *Mangifera indica* L; and (iv) *Phoma punicae* on the twigs of *Punica granatum* L.

With A.K. Ghosh (see Ghosh et al. 1965, 1966), Someshwar Bhargava showed that fungus infection caused a rapid decline in Vitamin C (ascorbic acid) content in guava fruit tissues, as well as mango and papaya. Further, it was suggested that this decline was caused by an increase in Vitamin C degenerating enzymes either by the fungus or by a host pathogen complex.

A Glimpse of Someshwar Bhargava's Research in the 1970s

In the 1970s, Someshwar published first with his professor R.N. Tandon : Tandon and Bhargava (1971) presented, at a symposium, all aspects of the deterioration that fungi cause on the nutritional value of many fruits, and with D.N. Shukla, he described a new foot rot disease in *Celosia* (Shukla and Bhargava, 1975a), and then he studied *Fusarium oxysporum*, isolated from the seeds of *Phaseolus mungo* (Shukla and Bhargava, 1975b), and *Curvularia pallescence* from the seeds of *Panicum* (Shukla and

Bhargava, 1975c) as well as many other fungi isolated from the seeds of oil crops and of pulses (Shukla and Bhargava, 1976a, 1976b 1976c, 1977a, 1977c, 1977d). At about that time, Shukla and Bhargava (1977b) described a new foot rot disease of tomato.

The 1970s was a highly active period of research for Someshwar: Chandra et al. (1978) described the toxicity of the culture filtrate of *Aspergilli* to some fungal pathogens causing fruit rot; Shukla and Bhargava (1979a) reported a new root-rot disease in Sesame (*Sesamum indicum*), whereas Shukla and Bhargava (1979b) reported a foot and stem rot disease of Balsam. This was followed by a description of a fungal disease in "*Til*" (Shukla and Bhargava, 1979c). These two scientists were then joined by A.P. Singh, who reported on a new disease of stalk-end rot of *Aegle marmelos* (Shukla et al. 1977). Then, with N.K. Singh, Someshwar published observations on two new head-rot disease of the sunflower (Shukla et al. 1978a), on two new foot-rot diseases (Shukla et al. 1978b), and on an ear-rot disease of *Curvularia lunata* growing near Allahabad (Shukla et al. 1978c). Lastly, with P.K. Dwivedi, Someshwar reported new fungal diseases of cape gooseberry (Shukla et al. 1978d). Thus, the 1970s was a decade of discoveries of many fungal diseases by Someshwar and his many co-workers**.** Before his extensive work with R.S. Pandey is presented, we mention that he observed tremendous losses in the oil content of plants due to fungal invasions, an observation of great economic importance to India (see Shukla and Bhargava 1980).

Now, we present a highly personal and detailed story by one of the authors (Ravi Shankar Pandey) about who Dr. Someshwar Bhargava really was – both as a human being as well as a researcher and a scientist in the late 1970s and the early 1980s.

Reminiscences by Ravi Shankar Pandey, mostly in the 1980s

My first meeting

It was in the late 1979 that I first met Dr. Someshwar Nath Bhargava who was then on the faculty of the Department of Botany, of the University of Allahabad. My purpose of meeting him was to register under him as a research scholar to do work under his guidance for my doctorate (DPhil) degree. Before meeting him, I had imagined him as a serious and senior university professor, but when I entered his office, I found him to be a young gentleman of about 40 years, sitting and smiling in his chair. In this very first meeting, I bowed down by touching his feet (as was the Indian tradition) and he gestured to me to sit on the chair in front of him. After a general introduction, I gave him all the information about my educational background. While giving me permission to do research under his guidance, he requested his senior research student Dr. Deena Nath Shukla, who was also present in the room, to help me in completing all the formalities related to my admission and registration. *Thus, in the very first meeting Dr. Bhargava impressed me as a gentle, simple, and learned person, and I started a new life of academic work under his guidance.*

The beginning of my research

Just a day after all the admission formalities were completed at the university, Dr. Bhargava (my teacher, my Guruji, i.e., respected teacher/ guide) gave me a highly valuable lecture and outlined the proposed research work for my thesis. It dealt with research on the '*Diseases of the Fruit Crops'*. He directed my research for the next 6 months, while visiting the fruit orchards, and even the fruit market in the town of Allahabad. I surveyed different pre-harvest and post-harvest diseases, some important fruit rots, and even other diseased plants. With the help of a few others in Dr. Bhargava's research group, I isolated the fungal pathogens of several diseases and prepared their cultures, under his wonderful guidance. In the meantime, upon his advice, I applied for a Junior Research Fellowship of CSIR (Council of Scientific and Industrial Research) to support my doctoral research. What is special is that, with great kindness, he offered to pay for my fees, and to provide me personal accommodation close to his own residence until the fellowship started. I was overwhelmed by his

generosity, and I humbly told him, with folded hands, that his 'blessings and moral support' were already with me, and that nothing else was needed at the moment.

My first holiday, from work, and a story to share

During the 1979 Christmas and the winter vacation, I went, for 7 days, to my village *Chitrakoot*, which is about 80 kilometers from Allahabad. However, I returned to the Department 3-4 days late, and Dr. Shukla informed me that Professor Bhargava had asked me to go see him at his residence. As soon as I reached there, he offered me sweets to eat, and wished me a *Happy New Year* and told me that the sweets had been prepared at home from the milk of their cow! *What was going through my mind?* I was sitting there eating sweets in his study room and thinking that he might be angry with me for returning late for work. At the same time, I was also thinking that if he is really angry, then why is he giving me sweets to eat! I thought that I would get scolded after a while, but first I must eat the sweets. My respected teacher came back after some time and asked me how sweet was the "sweet"; I replied, "it was very good". He then said that now take my scolding. And when he started scolding me, with great intensity, I started remembering my grandmother—*Nani Yad Aa Gayi*! - he kept scolding me for about ten minutes! However, the bottom line of this scolding was that a casual approach in life does not work in research : "*If you want to do research work, do it diligently*". When I started to leave after this episode, he said, in a clear voice: *Wait*! And taking out an envelope and handing it out to me, he said, smilingly: "*this is the letter from* the *CSIR. informing us about your receiving the fellowship*". Now I understand that along with the good news, Dr. Bhargava (my Guruji) also wanted me to be aware of the responsibility that goes with the award. As a guide, and a guardian, there was a wonderful but strange combination of love, affection, and discipline in his nature. Being overwhelmed by his fatherly behavior, I touched his feet with gratitude and took his blessings and went to the laboratory in the university. When I remember this incident today, I laugh, *so-to-say in my heart*, how simple and gentle Dr. S.N. Bhargava (my Guruji) was from the inside, but I note that sometimes he tried unsuccessfully to appear strict from the outside! I cannot forget the above incident of being fed sweets and being scolded.

My research with Professor S.N. Bhargava

After about six months in the laboratory, I had already isolated many pathogenic fungi that cause diseases in fruit crops and had prepared their pure cultures. According to Dr. Bhargava's suggestions, the fungi causing two rots in *Amla* (*Phylanthus embelica*) fruits were by *Phoma putaminum* and *Phomopsis sp* (Pandey et al. 1980a; also see Pandey et al. 1980b). A causative agent of *bael* (*Aegle marmelos*) fruit rot was another *Phoma glomerata* sp. (Pandey et al.1980c). We also described fungicidal control of diseases in apples (Pandey et al. 1980d), and then a fungus identified as *Scytalidium* state of *Hendersonula,* causing leaf spot of *mango*, was another (Pandey et al. 1981). I continued to study all the four diseases, mentioned above. During this study, several research papers were published in various research journals (see above) at the suggestion of Dr. Someshwar Bhargava, due to which my mind was engaged in research work and my enthusiasm to work also increased. In the lab, my senior Dr. Shukla and my fellow researcher Dr. Arun Arya (see e.g., Arya et al. 1981) continuously cooperated with me. Such a cooperation, under the guidance of Dr, Bhargava, was the daily routine of working in his Plant Pathology Lab. However, when I was free, i.e., not doing experiments, I used to sit in Dr. Bhargava's office, read, write, and prepare research papers for publication.

At that time there were about five research scholars working under Dr. Bhargava and his research and teaching career was at its peak (see Research Students under Concluding Remarks). All the papers of Dr. Bhargava's team were published in top research journals of India as well as abroad. As just one example, I would like to mention a paper by Dwivedi and Bhargava (1982) on fungi attacking seeds of spices, where they

recorded, for the first time in India, a rot disease in fenugreek (*Trigonella foenum-graecum)* by *Alternaria alternata*, as well as in *Coriandrum sativum* by *Curvularia pallescens,* and, showed that the younger plants were more susceptible than the older plants. Further, Bhargava et al. (1979) and Bhargava et al. (1982) described foot and stem rot of *Salvia,* and Bhargava et al. (1982) described a new foot rot of fig, an important fruit.

Teaching and editorial activities of Professor S.N. Bhargava

Dr. Bhargava taught a MSc (Agriculture Botany) class; *during his lectures, he would become so engrossed that he would lose sense of time; often, he would lecture continuously for two, and sometimes even three hours*. In addition, he would come to the Botany Department even during the holidays and give guidance to us in our research work. Being the honorary Secretary of the University Athletic Association, he was often busy with administrative work. In addition to all of the above, he also served on the editorial board of the journal 'National Academy Science Letters'. For this, he was sent, for review, for editing, and for approval, research papers related to his area of research. We consider ourselves fortunate that he would often discuss key topics and ideas, related to the above.

On the Bhargava family

During the above period, I had the opportunity to get-to- know Dr. S.N. Bhargava closely (Guruji, our respected teacher) as well as his family. Whenever we visited his home, all of us students received utmost affection from his dear wife—respected Mrs. Rajni Bhargava; she treated us as if we were her own sons. Both their daughters (Taru and Radhika) used to call us Bhaiya (brother). We were also introduced to his father Pandit Gajadhar Prasad Bhargava, who was a well-respected topmost senior advocate of the Allahabad High Court; in addition, we also met Guruji's elder brother Shri Amarnath Bhargava, also an advocate (he is now deceased). I received high respect and affection from all in his home; we were treated as family members; this is actually the result of the generous and affectionate nature of Dr. Someshwar Bhargava. Whenever any special food or drink item came from the outside in their house, we were invited to share in it. Pankaj, Neeraj, and Manoj, sons of his elder brother Mr. Amarnath Bhargava, grew up in front of us. Following Amarnath Ji, Taru was a top-ranked Indian woman player of Table Tennis in the whole of India; she had won many competitions; further, Radhika, who was younger than Taru, grew up in front of us. Dr. Bhargava was also an avid table tennis player; he was the Captain and the Manager of the Allahabad Table Tennis Group; by virtue of this, he also held the post of Honorary Secretary of the Athletic Association of Allahabad University. Figure 3 shows a 1981 photograph of Dr. Someshwar Bhargava with his wife Rajni and their two daughters Taru and Radhika, mentioned above.

On Dr. S.N. Bhargava's health and more

Whenever he had free time, Dr. Bhargava would share with us his experiences about his stay in England as well about his brain tumor. According to him, when suddenly there was a problem in seeing, when he was

Figure 3. A 1981 photograph of the family. In the front row, left to right : Rajni Bhargava; and Radhika Bhargava; in the back row, left to right: Someshwar Bhargava and Taru Bhargava, Source: Taru Bhargava

in England, medical doctors discovered that he had a tumor in his brain and that had to be operated on. Mrs. Rajni Bhargava and Taru had gone to England with him; he was operated successfully in a hospital there. He told us that the operation went on for about eight hours, and that he could regain consciousness only several hours after that. Due to this illness, his second DPhil could not be completed, but on the basis of his research work, he was awarded an MSc from Cambridge University (see Bhargava 1969).

On another topic, Dr. Bhargava was fond of cars; when he was returning from London, he bought a small 'Morris Minor' car (manufactured in Oxford, UK), and had it shipped directly from there to Allahabad, India; it looked like a frog in vintage look. He did not forget to mention that the company had stopped the production of this model and after his car, there was only one unit left and even that was removed from it being sold. Because of this special car, he had his own identity at the University of Allahabad. One winter day, it was very cold, and he had come to the Department wearing a woolen overcoat (top -coat); he told us that the cloth of the coat was 'Harris *tweed*', and it provided lot of warmth to him; then, he would tell us that it rained a lot in England during the winters, and that he used to go out wearing this coat. Dr. Bhargava had a very simple, and innocent nature; he always taught us small things of normal life! Sometimes he would order oranges for us all, while sitting in his office. If an orange looked bad to him, he would tell us how the good oranges should look, and then he would explain to us the nuances of bargaining! Sometimes he used to talk about his heart related ailment and what medicines he was taking after regular check-ups, little did we know that after being saved from one illness (brain tumor), another heart-related illness would take him away from us forever. Today his memories remain deeply entrenched in our minds.

About submission of my thesis under Professor Bhargava's supervision

My research work was almost completed in the middle of 1983. As instructed by Dr. Bhargava, I started writing it. *He was a perfectionist, and he wanted perfection in everything and in all his students*. First, I wrote my thesis three times by hand, and only then, but with some difficulty, I was ready for it to be typed. Then even after it was typed three times, my thesis was barely ready for submission to the University system! However, Dr. Bhargava had already appointed the examiners for my thesis through the university system. The Internal Examiner was the then ICAR. Director General Dr. S.P. Raychaudhuri, and the External Examiner was Dr. J.J. Smott of the U.S. Department of Agriculture (USDA). I remember that Dr. Bhargava was in constant contact with almost all the top plant pathologists of the country and abroad. Thus, after talking with both the examiners, Dr. Bhargava requested their reports within a month and also fixed the date for my DPhil *viva voce* exam. On October12, 1983, Dr. S.P. Raychaudhuri took my *viva* exam; and, on the same day, both he and Dr. Bhargava sent, to the University authorities, their recommendation to award me the D Phil degree (see Pandey 1983). This day was very important in my life. I went to Dr. Bhargava's home and, to express my respect, I touched his feet, took his blessings, and thanked him. He was very pleased and told me that now I should go to my village *Chitrakoot* and stay with my family for a few days. After taking his permission, I left for my village. Little did I know that this was my last meeting with my respected teacher Dr. Someshwar Nath Bhargava (whom I called Guruji).

After a visit to my home village- the sad demise of Dr. Someshwar Nath Bhargava

When I reached the Department of Botany, of Allahabad University, after spending a month in my village, I found Dr. Deena Nath Shukla sitting alone sad in Dr. Bhargava's room. On seeing me, he started crying suddenly. Seeing him cry like this, I understood that something untold has definitely happened. Somehow controlling himself– barely coming out of his mouth–he said that our Guruji (Professor Someshwar Nath Bhargava) is no more in this world. As the saying goes "If you bite me, there is

no blood" (मुझे काटो तो खून नहीं). Suddenly a scream came out of my mouth, and I felt as if the whole room was spinning. I couldn't believe my ears. Suddenly Dr. Shukla came near me and hugged me and both of us stood sobbing for a long time. This moment was very heart-breaking and sad for me. I could not believe that my Guruji (Professor Someshwar Nath Bhargava) was no more in this world. With a heavy heart and slow steps, I went to his home (on 28 Dayanand Marg, Allahabad) and met all the family members, but words could not come out of my mouth to express my heartfelt and deep condolence.

Special remarks on Dr. Someshwar Nath Bhargava-and some stories to remember

Dr. Someshwar Nath Bhargava, my Guruji, is now enshrined in my memory. Whenever I remember him, two or three incidents that show how courageous, and fearless he was come before my eyes. He was full of morals, but with an innocent heart like a child. Once the answer sheets of BSc examination of Kanpur University were sent to him for checking & grading, along with the condition that at least one-third of the examinees must be passed. However, according to Dr. Bhargava's judgment, only 15-20 students out of 500 could get passing marks. He was very frustrated; the following day, he brought all the 'exam books' and just threw them in front of me and Dr. Shukla and said that, out of these, I cannot pass more than 30% of the students; others cannot pass the Exam. It was his standard of morality.

Another incident is: When Dr. Bhargava was the Secretary of the University Athletic Association, one of the leaders of the students came to Dr. Bhargava's office to get admission, to the Botany Department, of an academically unqualified student from the "sports quota" and wanted to pressurize him for this. Dr. S.N. Bhargava firmly refused this request and said that "*I cannot do this wrong thing even if you shoot me*!". The spokesman was a dominating person; he got up fuming with anger on hearing this and took out a gleaming revolver from his pocket and pressed it against Dr. Bhargava's chest and shouted loudly : *Have you ever seen a revolver*? Dr. Shukla and I were sitting in the back of the room. There was silence in the room! Dr. Shukla snatched the revolver and dragged the person out of the room. Dr. Bhargava quietly got up and started his car that was parked in the Department premises and went home. The next day, Dr. Bhargava brought one of his licensed, foreign made, small pistols. He called both of us and took out the pistol and said : "Now, please call the spokesman for the unqualified student; first I will shoot him and then myself!". This shows how deeply and badly the incident had affected him. However, after two-three days, the same 'student leader' came to Dr. Bhargava's office and touched his feet and expressed regret for this incident. When I met this person last, and I reminded him of this incident, he laughed and said that it was his unforgiving foolishness that day!

Yet another incident comes to my mind. Once, when I reached his house on a holiday, I noticed that he was keeping all his books and reprints of research papers neatly arranged in his personal library. To me, it seems that Books and Reprints were dearer to him than life itself. I started helping him with this work. Once I saw him look down at his book-shelf, noticing that termites had eaten up several bundles of his collection of reprints. Seeing this, he got upset and took the "soil of termites" in both his palms and shouted loudly saying "I will make '*bharta*' out of you (i.e., I will smash you). He was crying and weeping like a child. Mrs. Rajni Bhargava and daughter Radhika came running after hearing his cries. It didn't take long for them to understand the matter. They not only explained what was happening but were also laughing. This scene is very unforgettable for me: Dr. Someshwar Nath Bhargava was crying like a child, and we all were laughing.

When our Guruji (Dr. Someshwar Nath Bhargava) was no more in this World, I left research and accepted to work, in the area of administration, as an Indian Government employee. However, whenever I would go to Allahabad, I would visit his home and meet the elder brother Mr. Amarnath Bhargava, who was living alone there, but unfortunately, he is also no more now.

Reminiscences by Raghuveer Raj Prasad (e-mail: arailprasad@gmail.com)

We knew the Bhargava family at several different levels. First the father (Shri Bhagwati Prasad, of Allahabad) of my dear wife, the late Shashi Prasad (1939-2015), had Shri Gajadhar Prasad Bhargava as his legal advisor. Thus, we knew the Bhargava family quite well. Our early connection led to a visit of Amarnath Bhargava (1932-2022), the elder brother of Someshwar Bhargava, to our home in the late 1990s, when we lived in Victoria, Canada. Amarnath was on a tour to Vancouver for his beloved sports and then he had come to our home, in Victoria, on the British Columbia (BC) Ferry. It makes me very glad to remember his wonderful expression of happiness with the hospitality he received from our family; further, we both felt very happy as if we were in Allahabad!

Now, I give some "*Reminiscences*" about Someshwar Nath Bhargava. Someshwar was two years junior to me, while I was at the Allahabad Agriculture Institute, in Naini, Uttar Pradesh. We used to often go together on our bicycles *to and fro* on the bridge – crossing the river Jamuna. Since Someshwar's father (Gajadhar Prasad Ji) was a well-established top lawyer, I was a bit surprised that he chose Agriculture over Law for his studies. As an aside, I remember that Someshwar had a brand-new shining bicycle, whereas mine was a bit older and a bit slower! In 1954, I completed my BSc (Agriculture) degree (in first division & first position); for me, it was a happy time since unlike the Bhargava family, I was from a farming family. I am really delighted to remember that- right after - Someshwar visited me at my home in Daraganj, in Allahabad—where he enjoyed watching the big farm that my parents had.

Further, I remember that Someshwar was highly inspired by my earlier conversations and advice – he obtained first division in both his BSc and MSc (Agriculture Botany) Exams. He went further and finished his DPhil, in Plant Pathology & Mycology, under Professor R.N. Tandon (who was also my teacher, and more importantly, an inspiration for my own studies). Both Someshwar and I were delighted that we were serving a very important area - that has a direct application in improving Agriculture, needed for our lives. Someshwar and I met several times since then, including once in the 1970s, at an International Plant Pathology Conference at Minneapolis, Minnesota, in USA. Both of us had been very friendly and respectful to each other. After he passed away, a memory plaque was placed on a door on the 2nd floor of the Department of Botany, at Allahabad University; to me, this is a great honor to him. I, personally, honor Someshwar Bhargava, through this brief 'Reminiscence'- the person he was, and the scientist he was, and above all, the great human being he was. Lastly, I express, on my behalf, and on behalf of many others, my admiration for Someshwar's contributions to his Alma Mater (University of Allahabad), and for his country, Republic of India in a rather short Academic Career. We all miss Someshwar.

Reminiscences by Ranjana Bhargava (email : ranjana67@gmail.com)

Someshwar, my older brother, was my guardian and mentor. I called him Someshwar Bhaiya. He monitored my whereabouts and gently told my mother: 'Amma, do you know where your dear daughter is? My earliest recollection of his caring and admiring spirit was when I visited Mumbai (formerly Bombay). Since no reservation was made in the train, I was taken, with all the luggage, to the women's compartment. At one of the stations, where the train stopped, Someshwar Bhaiya came running to check on me. I had already packed his lunch and water and gave it to him. He ran back to get into his compartment. Throughout his life, he told this little episode and complimented me as his lifesaver.

Someshwar was always willing to practice table tennis with me, knowing I did not play as well as he did. In addition, he always took charge of paying expenses, for anything we needed, and would distribute money expeditiously. What I remember most is his singing and doodling during the above activities,

Someshwar Bhaiya's passion was gardening, and he took good care of our sprawling garden. He was the

big family cheerleader. He disciplined me to work hard and never stopped me from having fun. He had an excellent intuitive sense and timing to go with it; this made him very understanding of people and their needs. He related well with all the people. He was a matter-of-fact person who cared deeply about people. He was very conscious of how individuals felt and did his best to nurture them. Figure 4 shows a 1974 photograph of Someshwar Bhaiya with Rajni Bhabhi (sister-in-law), We all remember him and miss him.

Figure 4. A 1974 photograph of Someshwar Nath Bhargava and Rajni Bhargava, *Source*: Taru Bhargava

Reminiscences by Rameshwar Bhargava (email: rnbhargava39@gmail.com)

Someshwar, My elder brother and a True Partner

Someshwar was about 20 months older than me. Our camaraderie began in 1946 when we joined the Government Intermediate College (GIC) in Allahabad. He entered in the 5th Class while I was in the 3rd Class. Together, we would walk about a mile back and forth to our school. Thus, we had plenty of time to talk with each other. Remarkably, he would always advise me to be aware of the undesirable students in the school and make sure that I concentrated on my studies.

In 1948, the UP (United Provinces, now Uttar Pradesh) government decided to '*play catch up*' for students who had started schooling after 1947, India's independence from British rule. I was lucky to get a double promotion from the 4th to 6th Class, while Someshwar moved to the 7th Class. This created only a one-year difference in our classes and brought us closer, as I would be studying whatever he had studied the previous year. My curiosity and working with him on my homework helped me, particularly in subjects such as mathematics and science. While he was preparing for the final examination for High School (i.e., 10th class), we would sit, for hours, and solve many mathematics problems together.

In January 1949, our entire family moved from our ancestral home at 123 Shanker Lal Bhargava Road in Kydganj, Allahabad, to 28 Thornhill Road (now Dayanand Marg). This transition did not change our routine of attending GIC together as we walked there through Alfred Park (Company Bagh). In his 8th Class, Someshwar received the "*Best attendance record*" Award for not missing a single morning roll call. Figure 5 shows a 1950 photograph of the two of us.

In 1951, we both joined the National Scouts troop, which was just across our home on the property of the Servants of India Society. I remember that Mr. Sri Ram Bajpai was the National Commissioner of Scouting, and was also our Mentor, along with Mr. H.N. Mishra, who was our scoutmaster. For the next four years, we spent our evenings learning all about scouting, while also playing

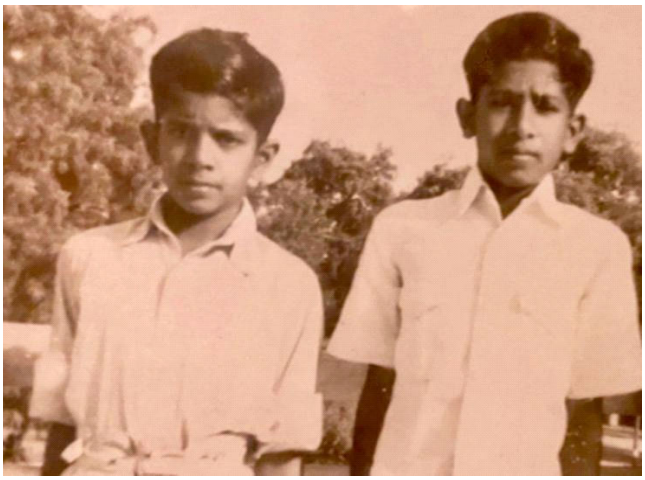

Figure 5. A 1950 photograph of Someshwar Nath Bhargava (on the right) with Rameshwar Nath Bhargava at 28 Dayanand Marg, Allahabad. *Source:* Archives of Rameshwar Bhargava

Football, Hockey, and Cricket in the same ground as an entertainment and team sport. Annually, we had our cultural shows co-directed and ably acted by my elder brother Someshwar.

In December 1953, our scouting troop participated in the National Scout Jamboree at Secunderabad, Hyderabad (now in the State of Telangana). As part of the troop, Someshwar, Pradeep (younger brother), and I participated in numerous weekly activities, with Someshwar leading many different campfire activities. This was the first time 20 of us stayed together in a large tent. Before joining the Jamboree, we had a memorable sightseeing tour, mainly traveling by train, to Bombay (now Mumbai), Ajanta & Ellora Caves, Aurangabad, and Hyderabad.

Someshwar passed his High School Board Examination in the summer of 1952. In July 1952, he joined Allahabad Agricultural Institute, Naini (later known as Sam Higginbottom University of Agriculture, Technology and Sciences), about 4 miles from our home in Allahabad. He would bicycle daily, a major physical feat. In fact, I frequently had to help him complete home assignments at night. This continued for the next four years as he completed his Intermediate (12^{th} class) Exam, and then his BSc degree in Agronomy.

In 1956, Someshwar joined MSc in Agriculture Botany while I was in my second year of BSc, studying Physics, Chemistry, and Mathematics. The overlap of our undergraduate and master's degrees thus continued at Allahabad University until I left, in 1960, for graduate studies in Physics at the Columbia University in the City of New York.

In 1958, Someshwar had topped in his final MSc (Agriculture Botany), while I had completed my MSc (previous) in Physics. In addition to our academic studies, we both had deep interests in Sports. We both had won the university championship in doubles table tennis, and, in addition, I had won the singles title. *Now, a story.* We both had applied to receive the Chancellor's medal for the '*Best all-round Student in the University'*. During the interview, Someshwar was asked whether the committee should nominate him or me. He was forthright and told them to choose me; the committee concurred, and I received the Chancellor's Medal that year. Such sacrifices come from a true partner.

Someshwar's support for me (the younger brother) lasted throughout his lifetime. Although, primarily, he stayed at Allahabad while I stayed in New York, we exchanged hand-written letters every week, now a lost tradition! Upon my first return to India in July 1965, Someshwar was so anxious to meet me that he took pains to travel 20 hours by train to Bombay and meet me at the Santa Cruz Airport. He made sure that my journey from Bombay to Allahabad was most comfortable.

The overlap of our lives while growing up in the formative school years and undergraduate and graduate classes in the university taught us how to handle each moment honestly, truthfully, and gracefully. Living with mutual trust, which supersedes communication skills, made us good friends and companions. In fact, in the later years, most of Someshwar's friends happened to be my classmates. Sharing the room, the dresser, and the study desk united us to respect and tolerate each other's behavior. I always admired his views when I was younger, but he knew my needs without being explicitly expressed by me. We enjoyed comedy movies on Sundays at the local cinema hall (movie theatre), particularly that of Laurel and Hardy. I would provide physical help in his garden planning or any household work. In the late 1950s Someshwar and I kept the accounting for our father, as well as the distribution of household expenses.

Our daily life in Allahabad from 1946 to 1960 was so intertwined that we behaved more like twins, a life not easy to expect without unconditional love and sacrifice. Throughout his life, Someshwar helped every member of our family. The family has missed Someshwar's extreme care and concern.

CONCLUDING REMARKS

Here, we first present a list of Someshwar Nath Bhargava's research students (A) and collaborators (B)

and what they did in their lives (provided by R.S. Pandey) - since for Dr. Bhargava this was the conclusion and desire of his life – training and seeing students prosper in their lives. Lastly, we end by a comment (C) about the similarity Govindjee has observed between Someshwar Bhargava and his mentor Professor R.N. Tandon.

A. Research Students

There were six research students (for their research findings, readers are requested to read the cited papers).

Ajay Pal Singh had left Allahabad after obtaining his DPhil under Dr. Bhargava. After his graduation, Ajay served as an Agriculture Scientist in a Government of India position. He contributed three important research papers with Dr. Bhargava; chronologically, they are : Bhargava and Singh (1975) on *Aspergillus* rot of mango; Shukla et al. (1977) on stalk-end rot of *Aegle marmnelos*, and Chandra et al. (1978) on toxicity of *Aspergelli* on fungi causing fruit rot. Ajay Singh retired long ago as Director of the Indian Sugarcane Research Institute, Lucknow.

Dina Nath Shukla completed his DPhil, in 1979, under the guidance of Dr. Bhargava, and had registered for DSc under his guidance. However, due to the sad demise of Dr. Bhargava in 1983, this thesis was submitted under another professor in the Department of Chemistry. D.N. Shukla had also initiated the well-known Ganga Water Pollution Control Exhibition in 1981 during the festivals of '*Maghmela*'and '*Kumbhmela*' on the banks of the river '*Ganga*' (Ganges), supported generously by the University of Allahabad. He was a very brilliant scholar and was associated for a long time with Dr. Bhargava. See his extensive publications under References: Bhargava et al. (1979) on foot and stem rot of Salvia; Pandey et al. (1979, 1980a) on fruit rot of *Phylanthus*; Pandey et al. (1984) on a fruit disease of Aonla; Shukla et al. (1980a) on chemical control of *Aspergilus* rot of mango; Shukla et al. (1980b) on pod rots of pea, red gram and Brassica; Shukla et al. (1980c) on root and footrot of *Eruca sativa*; Shukla et al. (1980d) on post infection changes in brinjal; Shukla et al. (1980e) on chemical control of diseases caused by *Fusarium*; Shukla et al. (1980f) on losses of protein content due to fungal attack on plants; Shukla et al. (1981a) on new diseases of pulses and oil crops; Shukla et al. (1981b) on new spot diseases of medicinal plants; Shukla et al. (1981c) on fruit rot of Kuchla; Shukla et al. (1981d) on new fusarial fruit rot; Shukla et al. (1982a) on Darluca -a hyper parasite; Shukla et al. (1982b) on fungi isolated from seeds of spices; Shukla et al. (1982c) on two new root-rot diseases of spices; Shukla et al. (1982d) on fungi causing seed rot in spice plants; Shukla et al.(1982e) on a new ear rot of barley; Shukla et al. (1982f) on an anomalous sexual condition of maize; Shukla et al. (1982g) on a new foot rot disease of wheat; Shukla et al. (1982h) on a new foot rot of figs; Shukla et al. (1983a) on studies on *Sclorotium* sp. in soil; and Shukla et al. (1983b) on chemical control of *Bytrodipolodia* rot in banana.

After Dr. S.N. Bhargava passed away in 1983, Dr. Shukla was appointed as a Lecturer in Agriculture Botany at Allahabad University. Here, he carried out the Academic legacy of Dr. S.N. Bhargava; he retired from the Department of Botany as Professor and Head in 2018, but, to our sorrow, he expired in 2021 during the epidemic of Covid.

Ravi Shankar Pandey (see above for his detailed Reminiscence) completed his DPhil under the valuable guidance of Dr. S.N. Bhargava and fortunately, for him, before a month of his demise, R.S. Pandey was awarded his doctorate. His research work was based on physiological and pathological studies on some preharvest and postharvest diseases of fruit crops. During his research, Dr. Bhargava had emphasized to him the importance of discovering new fungal pathogens and then to study their myco-pathological characters in relation to the diseases of agricultural importance. In order to control the fruit rots, under investigation, Ravi Shankar attempted to use leaf extracts of medicinal plants, e.g., *Tulsi* (Indian Basil) and peppermint as natural fungicides, and obtained good promising results. At the end of his research career as a Senior Research Fellow of CSIR, he was selected in the Uttar Pradesh (UP)

Provincial Civil Service (PCS), and he left the University of Allahabad in 1984. After completing this service, he retired in 2017 as Director of the Information & Public Relation Department of the UP Government. He is now living in Lucknow. During his stay in Dr. Bhargava's laboratory, he did extensive research with him and with Dr. Shukla; these are published in several papers. See e.g., Arya et al. (1981), Bhargava et al. (1979); Pandey et al. (1979) and Pandey et al. (1980a, 1980b) on a new fruit rot of *Phylanthus*; Pandey et al. (1980d) on the control of fungal diseases of apple fruits; and Pandey et al. (1984) on fruit diseases of Aonla. Also see, under D.N. Shukla description of his papers where Shukla was the first author: Shukla et al. (1980a, 1980b, 1980c, 1980d, 1980e, 1981a, 1981b, 1981c, and 1981d).

Dig Vijay Singh Khati joined research under Dr. Bhargava in 1980, but he left the laboratory, before completing his DPhil, as he was selected for an administrative position in the Indian Forest Services (IFS) of the Government of India. He retired as Director of the Rajaji Tiger National Park, in India, and has now settled in Dehradun. Dr. Khati has also published several papers: Bhargava et al. (1979); Pandey et al. (1979, 1980a, 1980b) on a new fruit rot of *Phyllanthus sp*.; and Shukla et al. (1980c, 1980d, 1980e, 1981a, 1981b, 1981c, 1981d), as mentioned just above under D.N. Shukla. We specially mention Khati et al. (1980) where he focused on linseed being a special host for *Sclerotium rolfsii*.

Dhananjay Kumar Dwivedi worked as a research student under Dr. Bhargava but due to untimely demise of Dr. Bhargava he submitted this DPhil thesis under Dr. Bihari Lal. The topic of his doctoral thesis was "*Studies on fungi isolated from seeds of spices*". The fungi, he studied, were species of *Aspergillus*, *Rhizopus*, *Fusarium*, *Alternaria*, *Myrothecium*, *Pestalotia*, *Curvularia*, *Cadosporium*, and *Botrytis*. D.K. Dwivedi isolated these fungi from seeds of many different plants of Indian spices. Further, he provided key information on the pathogenic characteristics of the above-mentioned fungi and suggested ways to control them. His research findings are published in several papers: see Arya et al. (1981); Dwivedi and Bhargava (1982); and Shukla et al. (1978c, 1978d, 1980a, 1980b, 1982c, 1982d, 1982e, 1982f); see description of these papers given just above under D.N. Shukla. D.K. Dwivedi was then selected as a Lecturer in Botany in a Government College, in Rajasthan. After retirement he is now living in Bharatpur, Rajasthan.

Sushama Singh was Dr. Bhargava's last D Phil student, but she transferred to work under Dr. Bihari Lal after Dr. Bhargava had passed away. She published one paper : Shukla et al. (1980 f) which dealt with losses of protein content due to fungal invasion in some plants.

B. Other Collaborators

Others who are co-authors of research papers with Dr. Bhargava include Dr. N. Singh and Dr. A. Arya.

Narendra Singh worked as a research student of Dr. Mahesh Prasad Tandon; he is now settled in Baroda, India. He has published several papers in plant pathology with Dr. Bhargava. See: Shukla et al. (1978a, 1978b, 1982a, 1982b, 1983a,1983; their description are under D.N. Shukla) and Singh and Bhargava (1982; this was a study of wheat varieties that were affected by Karnal bunt).

Arun Arya, who was under Dr. Bihari Lal, worked on four different pathogenic species of *Phomopsis*; he had studied their cultural characteristics and suggested ways to control the fruit crops from these fungi. After completing his D Phil he became a Lecturer of Botany in M.S. University Baroda, and then Professor & Head of the same Department; he has also retired now. Further, Arun Arya published his work in: Arya et al. (1981), already described above, and in Bhargava and Arya (1983), which was a good review of the post-harvest fruit rots and the associated biochemical changes.

C. What was common between Someshwar Bhargava and his teacher Ram Narayan Tandon?

As Govindjee recalls Professor Ram Narayan Tandon (1903-1999; see Raychaudhuri 2000) was called Tandon Saheb by all the students, research associates and the junior faculty in the Botany Department of the University

of Allahabad. Govindjee was a student there from the mid 1950 to the mid 1954, and then a Lecturer in Botany from the mid 1954 to the mid 1956. He was quite familiar with the teaching and research of Tandon Saheb and remembers that Dr. Tandon was both a great mycologist and a plant pathologist. Tandon Saheb had been teaching in the Department since 1927 and retired in 1965. Both Govindjee and Someshwar learned a lot from Tandon Saheb- who was always very serious with his students- whether in his class, in his laboratory and even outside the Department. Someshwar's extraordinary research with Tandon Saheb is already described above in this article. However, what impresses us most is the similarity some of us see between the two. Both were dedicated teachers and researchers; they were discoverers of new fungal species, with some being new taxa; they provided detailed description of key fungal diseases of important crops, and of vegetable & fruit plants—all important for India; both were uncompromising in their principles – keeping high standards; and, on top of it all, both showed 'love' and 'affection' to all they came across. However, in Govindjee's opinion, the student Someshwar surpassed in many ways his seniors and teachers, especially in the personal and human issues.

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