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Bhera, Punjab: A Crucible of Scientific Awakening in Early 20th Century British India

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ABSTRACT

The history of scientific development in British India is often viewed through the lens of major metropolitan centers and colonial institutions. However, a closer examination reveals that smaller towns and regional intellectual hubs also played a crucial, albeit often overlooked, role in fostering scientific inquiry and producing eminent scholars. This article investigates the unique historical position of Bhera, a town in Punjab, Pakistan, at the turn of the nineteenth and early twentieth centuries, as a significant birthplace of scientific talent and modern education. Through a review of biographical accounts and historical records, this study highlights the contributions of pioneering figures such as Ruchi Ram Sahni, Sir Shanti Swaroop Bhatnagar, Dayaram Sahni, Birbal Sahni, and M.R. Sahni, all of whom had profound connections to Bhera and collectively shaped the landscape of science in India. The study elucidates the factors that contributed to Bhera's intellectual vibrancy, including familial legacies and a burgeoning interest in modern education, thereby challenging a purely metropolitan-centric narrative of scientific progress in the subcontinent.

Keywords: Albeit often overlooked, role in fostering scientific inquiry and producing eminent scholars.

INTRODUCTION

The narrative of scientific advancement in colonial India is frequently dominated by the establishment of major universities, research institutions, and the contributions of scientists operating from prominent urban centers like Calcutta, Bombay, and Madras. These metropolitan hubs, often directly influenced by British educational policies, indeed served as crucial nodes for the dissemination of Western scientific thought and the training of early Indian scientists. However, such a focus risks obscuring the significant, albeit less recognized, roles played by smaller towns and regional intellectual environments in nurturing scientific talent and fostering a spirit of inquiry. At the turn of the nineteenth century and into the early twentieth century, a period marked by profound socio-political and intellectual transformations across British India, certain localities emerged as unexpected wellsprings of modern scientific thought.

Punjab, a region historically known for its agricultural

prowess and martial traditions, also witnessed a gradual but impactful embrace of modern education and scientific disciplines. Within this context, the town of Bhera, situated in the Shahpur district (now in Pakistan), stands out as a remarkable, yet often unsung, cradle of scientific awakening [3, 35]. It was from this relatively unassuming town that a constellation of distinguished scientists, educators, and intellectuals emerged, leaving an indelible mark on various fields, from physics and chemistry to archaeology, palaeobotany, and geology. These individuals not only excelled in their respective disciplines but also played pivotal roles in establishing scientific institutions and fostering a scientific temper across the subcontinent.

The emergence of such a concentrated cluster of scientific luminaries from a single small town raises intriguing questions about the local conditions, familial influences, and broader societal dynamics that facilitated such intellectual flourishing. Was it the presence of enlightened

families who championed modern education? Did specific local educational initiatives contribute to this phenomenon? Or was it a unique confluence of historical circumstances that allowed Bhera to become a crucible for scientific talent?

This article aims to explore the multifaceted role of Bhera, Punjab, as a significant center for the birth and development of science in early 20th-century British India. By focusing on the biographical trajectories and scientific contributions of key figures associated with Bhera, this study seeks to:

1. Identify and detail the lives and scientific achievements of prominent individuals with strong connections to Bhera.
2. Analyze the potential factors within Bhera's socio-cultural and educational landscape that may have contributed to its unique intellectual output.
3. Position Bhera's contribution within the broader historical narrative of scientific development in colonial India, challenging the exclusive focus on metropolitan centers.

Through this detailed examination, we hope to shed light on the rich and diverse origins of scientific inquiry in India, recognizing the often-overlooked regional contributions that collectively shaped the nation's scientific heritage.

METHODOLOGY (Historical Approach and Data Synthesis)

This study employs a historical and biographical research approach, synthesizing information from various primary and secondary sources to reconstruct the intellectual environment of Bhera and trace the scientific lineages connected to it. The methodology involved a systematic review and analysis of published biographical accounts, academic papers, historical records, and autobiographical sketches related to the prominent scientists associated with Bhera.

Data Sources:

The primary data sources for this study include:

- **Biographical Memoirs and Obituaries:** Official biographical accounts and obituaries of key figures like Ruchi Ram Sahni [4, 9, 20], Dayaram Sahni [1, 2, 16],

Birbal Sahni [21, 30], M.R. Sahni [29], and Sir Shanti Swaroop Bhatnagar [8, 19]. These provide insights into their early lives, education, career trajectories, and scientific achievements.

- **Academic Articles and Books:** Scholarly works focusing on the history of science in India, particularly those that mention the contributions of individuals from Punjab or specific regions [8, 9, 10, 14, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34].
- **Archival Records and Reports:** References to archaeological reports [2, 15, 16, 17] and historical gazetteers [35] that provide context about Bhera and its surrounding region.
- **Personal Accounts and Reminiscences:** Autobiographical sketches or memoirs that offer firsthand perspectives on the social and intellectual climate of the time [4, 22, 23, 34].
- **Online Resources:** Websites and digital archives that compile historical information about the region and its notable personalities [5, 7, 18].

Analytical Framework:

The analysis followed a multi-layered approach:

1. **Individual Trajectories:** For each prominent scientist, their early life, educational background, professional career, and specific scientific contributions were meticulously documented. Particular attention was paid to any direct or indirect links to Bhera, whether through birth, family residence, or early education.
2. **Familial and Educational Context:** The study explored the role of specific families (e.g., the Sahni family) in promoting modern education and scientific pursuits. The influence of educational institutions, both local to Bhera and in larger cities like Lahore (e.g., Government College Lahore), on these individuals was examined.
3. **Socio-Historical Context:** The broader socio-political and intellectual environment of Punjab under British rule was considered. This included the emergence of a new educated class, the establishment of educational infrastructure, and the growing interest in Western scientific disciplines.

4. **Synthesis and Interpretation:** The individual narratives and contextual factors were synthesized to identify common threads and unique aspects that might explain Bhera's disproportionate contribution to science. The findings were then interpreted to assess Bhera's significance within the larger historical narrative of science in India.

Limitations:

While this study endeavors to provide a comprehensive account, it acknowledges certain limitations inherent in historical research. Reliance on existing records means that some aspects of Bhera's intellectual life might remain undocumented. The focus is primarily on individuals who achieved national or international recognition, potentially overlooking other local contributors. Furthermore, the interpretation of historical influences relies on inference and synthesis of diverse accounts. Despite these limitations, the systematic approach to data collection and analysis aims to provide a robust and evidence-based understanding of Bhera's unique role.

Findings/Results (Pioneering Scientific Minds from Bhera)

Bhera, a town with a rich historical past, emerged as a remarkable intellectual crucible that produced several pioneering figures who significantly contributed to the establishment and advancement of modern science in British India. The intellectual legacy of Bhera is most prominently embodied by the Sahni family and its extended connections, alongside other notable personalities.

Ruchi Ram Sahni (1863–1948): The Patriarch and Science Educator

At the heart of Bhera's scientific awakening was Professor Ruchi Ram Sahni [4, 9, 20]. Born in Bhera in 1863, he was a visionary science educator, meteorologist, and a prominent public intellectual in Punjab. His early education in Bhera laid the foundation for his later pursuits. Ruchi Ram Sahni's career at Government College Lahore, where he taught physics and chemistry, was instrumental in shaping a generation of Indian scientists [9, 20]. He was a pioneer in demonstrating scientific experiments in vernacular languages, making science accessible to a wider audience. His meteorological work provided crucial data for the region. Beyond academia, he was deeply involved

in social and political reform, advocating for education and self-rule. His home in Lahore became a hub for intellectual discourse, attracting many aspiring scientists and thinkers. His influence extended through his children and relatives, instilling a deep appreciation for scientific inquiry and modern education [4, 20].

Sir Shanti Swaroop Bhatnagar (1894–1955): The Architect of Indian Scientific Research

Though not born in Bhera, Sir Shanti Swaroop Bhatnagar had significant early life connections to the region, and his family was associated with Bhera [8, 19]. Born in Bhera's vicinity, his early education was influenced by the intellectual environment of Punjab. Bhatnagar went on to become one of the most towering figures in Indian science, often referred to as the "father of research laboratories" in India. His monumental contributions include the establishment of the Council of Scientific & Industrial Research (CSIR) and numerous national laboratories, which laid the foundation for organized scientific research in independent India [8, 19]. His work in physical chemistry, particularly in colloids and emulsions, earned him international acclaim. His journey from the regional influences of Punjab to becoming a national scientific leader exemplifies the potential that existed in these local intellectual environments.

Dayaram Sahni (1879–1939): The Pioneer Archaeologist

Rai Bahadur Dayaram Sahni, a nephew of Ruchi Ram Sahni, was another distinguished scholar whose roots traced back to Bhera [1, 2, 16]. He became a pivotal figure in Indian archaeology. As an officer of the Archaeological Survey of India (ASI), he played a crucial role in the early excavations of the Indus Valley Civilization. He was the first Indian officer to supervise excavations at Harappa in 1920-21, preceding Sir John Marshall's more extensive work [15, 17]. His contributions were instrumental in bringing to light the ancient urban civilizations of Harappa and Mohenjo-Daro, fundamentally reshaping the understanding of India's ancient past [15]. His work, often conducted under challenging colonial conditions, demonstrated the burgeoning capability of Indian scholars in scientific and historical research [14]. His obituary in *Current Science* [1] and *Nature* [16] acknowledged his significant contributions to archaeology.

Birbal Sahni (1891–1949): The World-Renowned

Palaeobotanist

Professor Birbal Sahni, son of Ruchi Ram Sahni, stands as one of India's most eminent scientists, achieving international recognition for his groundbreaking work in palaeobotany [21, 30]. Born in Bhera in 1891, his early exposure to science was undoubtedly nurtured by his father's progressive outlook. He received his higher education in Cambridge, UK, where he specialized in botany and palaeobotany. Upon his return to India, he dedicated his life to establishing the discipline of palaeobotany. He was elected a Fellow of the Royal Society (FRS) in 1936, a rare honor for an Indian scientist at that time [30]. His research spanned various aspects of fossil plants, from the structure and affinities of ancient conifers [24] to the flora of the Rajmahal Hills [25] and the Himalayan uplift [26, 27]. He also contributed to archaeological studies, examining antiquities from sites like Khokra Kot [26] and the technique of casting coins in ancient India [28]. His most enduring legacy is the establishment of the Institute of Palaeobotany in Lucknow (now the Birbal Sahni Institute of Palaeosciences), a world-renowned center for palaeobotanical research. His scientific biography highlights his profound impact [21].

M.R. Sahni (1899–1982): The Distinguished Geologist

Maharaj Krishna Sahni (M.R. Sahni), Birbal's younger brother, continued the family's scientific tradition, becoming a distinguished geologist and palaeontologist [29, 31, 32, 33, 34]. He also received his education in Cambridge and later joined the Geological Survey of India. His research focused on various geological formations and fossil records across India and Burma, contributing significantly to the understanding of the subcontinent's geological history [29, 31, 32, 33]. His work on the morphology of chalk terebratulids [29] and the palaeogeographic revolution in the Indo-Burma region [30] are notable. M.R. Sahni's autobiographical sketch provides insights into his scientific journey [34]. The Sahni family's consistent pursuit of scientific excellence across generations, originating from Bhera, is a testament to the intellectual environment fostered within their lineage.

DISCUSSION

The collective emergence of such a remarkable cohort of scientists from Bhera at the turn of the 19th and 20th centuries is not merely a historical coincidence but points to a unique confluence of factors that transformed this

relatively small Punjabi town into a crucible of scientific awakening.

The "Bhera Connection": Factors for Intellectual Flourishing

Several interconnected factors likely contributed to Bhera's disproportionate contribution to science:

1. **Enlightened Familial Legacies:** The most prominent factor is undoubtedly the influence of families like the Sahnis. Ruchi Ram Sahni, a pioneer in science education, actively fostered an environment of intellectual curiosity and modern learning within his family and beyond [4, 9, 20]. His dedication to making science accessible and his own engagement with meteorological research set a powerful precedent. This familial emphasis on education, particularly in scientific disciplines, created a fertile ground for subsequent generations to pursue rigorous academic and research careers. The consistent output of scholars across different scientific fields from the same family (Ruchi Ram, Dayaram, Birbal, M.R. Sahni) is a rare phenomenon.

2. **Early Exposure to Modern Education:** While specific details about Bhera's early educational institutions are limited in some references, the fact that these individuals received foundational education in or around Bhera suggests the presence of schools that instilled a basic understanding of modern subjects. The broader context of British educational reforms in Punjab also played a role, gradually introducing Western curricula and scientific concepts [4].

3. **The Role of Government College Lahore:** Many of these figures, including Ruchi Ram Sahni himself, were associated with Government College Lahore, a premier educational institution in Punjab. This institution served as a vital bridge, attracting bright minds from smaller towns like Bhera and providing them with advanced scientific training and exposure to leading academics. The intellectual environment of Lahore, with its burgeoning academic societies and scientific discussions, further nurtured their talents.

4. **A Broader Socio-Political Context:** The late 19th and early 20th centuries in British India were characterized by a growing Indian intelligentsia keen on embracing modern knowledge as a tool for national progress. This period saw the rise of a reformist spirit and a desire to

contribute to global scientific discourse. Families like the Sahnis were part of this larger movement, recognizing the transformative power of science and education.

5. **Historical Significance of Bhera:** Bhera itself has a long and rich history, serving as a trade center and a point of cultural exchange [3, 35]. This historical depth might have fostered a certain intellectual openness and dynamism that, when combined with the advent of modern education, created a unique environment conducive to learning and inquiry.

Impact on Indian Science

The collective contributions of these scientists, rooted in Bhera, had a profound and lasting impact on the development of science in India:

- **Pioneering Science Education:** Ruchi Ram Sahni's efforts in science popularization and education laid the groundwork for future generations, making scientific knowledge accessible beyond elite circles [9, 20].
- **Founding Research Institutions:** Sir Shanti Swaroop Bhatnagar's role in establishing the CSIR and national laboratories was monumental, providing the institutional framework for organized scientific research in India [8, 19].
- **Unveiling Ancient Civilizations:** Dayaram Sahni's archaeological work at Harappa was crucial in bringing the Indus Valley Civilization to global attention, fundamentally rewriting India's ancient history [15].
- **Establishing New Disciplines:** Birbal Sahni's tireless efforts led to the establishment of palaeobotany as a distinct and thriving scientific discipline in India, with the institute he founded becoming a global center of excellence [21, 30].
- **Advancing Geological Knowledge:** M.R. Sahni's geological and palaeontological research significantly advanced the understanding of India's geological past and fossil records [29, 31, 32, 33].

These individuals, hailing from or deeply connected to Bhera, were not merely recipients of Western scientific knowledge but active contributors to its global advancement and its indigenization within India. Their work demonstrated that scientific excellence could emerge

from diverse geographical and social backgrounds within the subcontinent.

Bhera's Legacy in a Changing Landscape

While Bhera once shone as an intellectual beacon, contemporary discussions sometimes lament a perceived decline in its intellectual vibrancy, with some questioning if "modernity is depleting Bhera" [3]. This perspective suggests a contrast between its historical role as a birthplace of scientific minds and its current challenges. However, recognizing Bhera's past contributions is crucial. It serves as a reminder that intellectual centers are not static and that even seemingly unassuming towns can, under specific historical conditions and through the efforts of visionary individuals, become significant nodes in the broader tapestry of scientific development. The story of Bhera and its scientists challenges a purely metropolitan-centric view of scientific history, emphasizing the importance of regional intellectual ecosystems in fostering innovation and scholarship.

CONCLUSION

The town of Bhera, Punjab, stands as a compelling testament to the diverse origins of scientific talent and intellectual awakening in British India at the turn of the nineteenth century. Far from being a mere footnote in the history of Indian science, Bhera served as a remarkable crucible that nurtured and propelled a cluster of pioneering scientists, most notably from the illustrious Sahni family, alongside figures like Sir Shanti Swaroop Bhatnagar. Ruchi Ram Sahni's visionary efforts in science education, Dayaram Sahni's groundbreaking archaeological discoveries, Birbal Sahni's establishment of palaeobotany as a discipline, and M.R. Sahni's significant geological contributions collectively underscore Bhera's profound and often overlooked impact.

The emergence of such concentrated scientific excellence from a relatively small town can be attributed to a unique interplay of factors, including strong familial emphasis on modern education, the intellectual magnetism of institutions like Government College Lahore, and a broader societal drive towards scientific progress in colonial Punjab. By highlighting Bhera's unique historical role, this study challenges the prevailing metropolitan-centric narratives of scientific development in the subcontinent, advocating for a more nuanced and inclusive understanding of India's rich scientific heritage.

Recognizing and celebrating such regional intellectual centers is vital for appreciating the full scope of scientific evolution and inspiring future generations.

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