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Science in the Midst of Theosophy: The Central Hindu College of Benares (1898–1916)

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INTRODUCTION

The central hindu school, previously known as the Central Hindu College (C.H.C.), embodies the rich educational and cultural heritage of Banaras (Varanasi). Renowned as one of the holiest cities of the Hindus, Varanasi has a longstanding tradition of learning, which the Central Hindu School still upholds. C.H.C. was founded in 1898 by the British-Irish theosophist Annie Besant (1847–1933) in reaction to the British Government's refusal to provide India with the education that had contributed to the development of Western nations. Besant and other nationalists of India realized that the objectives of colonial education in India and the national requirements were in perpetual conflict with each other. Born on October 1 1847, in London, the early public life of Besant in Britain was of a social reformer championing the cause of women's rights and birth control, better conditions for workers, free school meals and proper education for people with low incomes. She was also a science teacher, freemason, freethinker, trade unionist, Fabian socialist, atheist believing in scientific materialism, and eventually ended up becoming a theosophist (West 1933: 1–2; Lubelsky 2012: 190–213). Besant's career thus gradually evolved through successive stages of traditional faith and rational doubt, of gross materialism and subtle theosophy. In India, apart from her educational activities, she was also involved in politics, joining the Indian National Congress and becoming its first woman president. She also helped launch the Home Rule League to campaign for democracy in India and dominion status within the British Empire during World War I (Bakshi 1990).

There was an atheistic phase in Besant's life marked by the belief that religion failed to provide help or opportunities for human advancement (Besant 1893: 141–175). She thus turned to science, viewing it as the only possible solution, and dedicated herself to study science subjects. Edward Aveling, a famous spokesman for Darwinian evolution and author of numerous scientific

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books, tutored Besant. She obtained a B.Sc. and later a Bachelor of Medicine from London University. She qualified as a science teacher in no less than eight different sciences and was rated "First class" in organic chemistry, mathematics, theoretical mechanics, magnetism and electricity, botany, general biology, animal physiology, and acoustics. Besant also took top honours in botany, advanced physiology, mathematics, and advanced chemistry. (Besant 1893: 246–247). Besant did not just study science but also began teaching science, for during this phase of her life, science to her was the gospel of truth. She produced numerous small manuals based on the classes she taught, aiming to popularise science (Jinarajadasa 1947: 4–5). We see, therefore, that she had good scientific training. In 1890, Besant met Helena Blavatsky, a Russian spiritualist and cofounder of the Theosophical Society, which sparked her interest in Theosophy and occultism (Lavoie 2012; Lubelsky 2019).[1] Besant's conversion to theosophy in 1889 disappointed many of her progressive friends, including George Bernard Shaw. However, in an era where mystical inclinations were common, even among scientists like Thomas Alva Edison, Oliver Lodge and William Crookes, her conversion did not make her particularly unusual (Morrisson 2007; Ball 2013).

Besant's venture of propagating theosophical ideas eventually took her to India in 1893. Her earlier activities, however, were confined exclusively to the socio-religious and educational field. Soon after coming to India, she placed theosophy in close relation with the thoughts and speculations of Hinduism. Under Besant's leadership, the Theosophical movement became openly allied to, if not identified with, the late nineteenth-century Hindu revivalist movement (Jones 2006: 167–179). The Hindu revival, as its name implied, sought to revive Hindu faiths and ideals, which many socio-religious reformers like Besant believed were in a decadent state. However, it was essential to ensure that this revival of Hinduism did not contradict science or natural law. If all truth resided in the scriptures and science is also true, then no contradiction could exist between them. The demand of the time was a "demonstrated" and "demonstrable" religion – a religion that could be tested and verified by the same or similar kinds of evidence upon which science works. The Theosophical Society sought to offer

1 The Theosophical Society was founded in New York in 1875 as a product of the esoteric new religious movement. Among its founders were Helena Blavatsky, a Russian mystic, and Henry Steel Olcott, an American author and philosopher. Drawing on a wide array of influences, including older European philosophies like Neoplatonism and occultism, as well as aspects of Asian religious traditions such as Hinduism and Buddhism, Blavatsky shifted the focus of occultism towards Eastern thought and helped in turning many Europeans and Americans towards Eastern religions. In 1879 Blavatsky and Olcott went to India; where they established Theosophical Society headquarters at Adyar, near Madras. The society soon developed a strong following in India.

precisely this form of validation for Hinduism (Pal 1917: 102). Under Besant's guidance, the Society, as we will see in this paper, did not treat science as an opposing authority to religion but rather as an integral component of the broader religious truth embodied within Hinduism.

But Besant realized the difficulty of building up sturdy socio-religious idealism in the Hindus under the colonial education system created in India by the British Government. She was of the opinion that the education provided by government schools and colleges was overtly theoretical and barely touched the intellectual or moral lives of the students. This colonial education, which takes no cognizance of religious education, was attributed to the rise of scepticism among Hindu youths and, hence, the fallen state of Hinduism (C. L. Singh 2019: 255–271). The C.H.C. was Besant's first step in the direction of imparting religious education to Hindu boys and girls (Besant 1903); (Besant 1917: 116–137). At C.H.C., we will see that Besant embodied the teaching of the Hindu religion in its moral education curriculum. The impulse she gave has influenced hundreds of schools in India to make religious teaching and worship an integral part of education (A. R. Iyer 1947: 78).

However, as an educationist, Besant also saw the neglect of science and technical education in the colonial education system. In fact, the Indian intelligentsia, by the late nineteenth century, was able to understand the critical role of scientific knowledge in national development, particularly in the industrial and agricultural progress of a country (C. P. Singh 2012: 99–100). They were influenced by the view that the wealth of a nation was closely linked to the advancement of scientific institutions and the ability to foster technological innovation (D. Kumar 2006). Moreover, the great powers of that time were those nations that had undergone rapid industrialization, which was made possible because of the science and technical education system they developed in their countries. The things that make a nation great argued Besant, were,

> not the learned professions or Government service, but scientific agriculture, well-devised manufactures, thoughtfully planned arts and crafts, and the innumerable forms of workmanship that go to the building up of national wealth (quoted in Annie Besant Besant 1942: p. 428).

Besant thus envisioned C.H.C. as an institution where students could receive an education that integrates moral and religious teachings rooted in the scriptures of Hinduism with the best scientific knowledge of the West (CHCM: October 1905: 243). The education at C.H.C. was thoroughly Hindu and Oriental in nature yet refined and meticulously shaped by Western scientific knowledge (Trilokekar 1947: 62–63). Besant's vision was to create a new generation of Indians well-versed in modern scientific knowledge and traditional values, capable of contributing to the nation's progress and upholding its rich heritage (A. R. Iyer 1947: 144–145). Sri Prakash (1890–1971)[2], son of a close associate of Besant and theosophist Bhagwan Das, who had his schooling at C.H.C., recalls that the students were taught the literature of the East and the West alike and while modern science was a part of their educational syllabus, the teaching of ancient religion, philosophy and ethics also formed an integral part of the education (Śrīprakāśa 1954: 26). Thus, C.H.C. was designed to provide a broad-based education from its inception. The college encompassed a broad array of subjects, including physics, chemistry, and mathematics, as well as technical training, literature, philosophy, ethics, religious instruction, scouting, and physical education (Choudhary 1984: 479). To advance science education, C.H.C. set up chemistry and physics departments, each furnished with well-equipped laboratories. The C.H.C. prepared students for the M.A. and M.Sc. and lower examinations of Allahabad University until 1917 (*ibid.*).

The most significant development in the history of C.H.C. came in 1916 when it was merged into Benares Hindu University (B.H.U.). In 1905, when Madan Mohan Malaviya, a prominent figure notable for his role in the Indian independence movement, proposed the establishment of a residential Hindu University in Benares with the objective of "*Promotion of Scientific, Technical and Artistic Education combined with Religious Instruction and Classical Cultures*", the colonial Government imposed many conditions that needed to be met before the scheme could be implemented. One of the conditions was to have a financially stable and efficient college with sufficient staff to serve as the nucleus of the proposed Hindu University (Dar and Somaskandan 1966: 230–231). The incorporation of C.H.C. into B.H.U. was a natural progression, reflecting the shared vision of Malaviya and Besant for establishing a Hindu University in Benares. Thus, C.H.C., becoming the constituent college of B.H.U., enabled the newly founded university to utilize its resources, including its physical and chemical laboratories, until more proficient laboratories were built (Parmanand 1985: 499). Next, we will see the early years of science education at C.H.C., which focused mainly on chemistry and greatly captivated the interest of the theosophists.

1 SCIENCE EDUCATION AT THE CENTRAL HINDU COLLEGE OF BENARES

As has already been described, C.H.C. established the mathematics, physics, and chemistry departments from its very foundation in 1898. However,

2 Sri Prakasa was born in 1890 at Varanasi to Bhagwan Das. He attended Central Hindu College and later graduated from Cambridge, where he was a classmate of Jawaharlal Nehru. In his early years, he was actively involved in the Indian independence movement and was imprisoned for his activities. After India's independence, he served as an administrator and cabinet minister.

Figure 1: The Central Hindu College, now known as Central Hindu School with a statue of Annie Besant. Photograph © The author.

the chemistry department of the college was most efficient which largely owes to the affiliation of C.H.C. to Theosophy.[3] Besant, who had a keen interest in chemistry, appointed Arthur Richardson, a very well-trained man in chemistry, as the Professor of Chemistry. Richardson, a staunch theosophist, was also the first Principal of C.H.C. Born in 1858, Arthur Richardson belonged to a well-known Quaker family. He first studied chemistry under Alexander Crum Brown, F.R.S., who was the Professor of Chemistry at the University of Edinburg, but in 1876, when Edmund Albert Letts was elected to the Professorship of Chemistry at the University of Bristol, he entered Bristol as a student under Letts (Collie 1913: 766–767). In 1883, Richardson spent a year working under Johannes Wislicenus, a German chemist most famous for his work in early stereochemistry, at Wurzburg University. In 1886, he obtained a PhD in chemistry from Freiburg University in Germany and then returned to University College Bristol as an Assistant Lecturer. Later, he was made an Associate and remained there until 1896 (*ibid.*).

It is worth mentioning that at Bristol, Richardson assisted eminent chemist William Ramsay, FRS, who later discovered the noble gases and won the Nobel Prize in Chemistry in 1904. Ramsay, who served the University College, Bristol, as the Principal from 1880 to 1887, built an excellent chemical laboratory in the

3 It is to be noted that theosophy also seeks to understand the nature of existence and the universe for which it often employed physics and chemistry (Asprem 2013)

college where Richardson conducted many research (Richard 1917: iii–viii). His research mostly centred around the action of light on various substances, and he published many papers on this subject. His best work was measuring light intensity by the expansion of chlorine when exposed to sunlight, and he constructed an automatic registering apparatus that could continuously record the actinic intensity of the light under all weather conditions throughout the year. Several other papers of Richardson were of considerable interest and deserve to be mentioned here. His papers on the actions of light on the hydracids in the presence of oxygen, the decomposition of silver chloride under the influence of light, and the action of heat on nitrogen peroxide were praised by the leading chemists of the time.[4] As a chemist, Richardson was far more interested in the mechanism of reactions than in the manufacture of new substances; nevertheless, he was an expert chemist, and many of his apparatus were remarkable. On account of his years of professional experience in chemistry, he was elected a Fellow of the Chemical Society of London in 1885 (Collie 1913: 766–767).

We, therefore, see that, before coming to Benares, Richardson had made a name for himself in chemistry. He left Bristol in 1896 and moved to India, associating himself with the Theosophical Society and Esoteric Buddhism. Richardson gave up the remainder of his life to work connected with teaching and managing Central Hindu College in Benares as its first Principal and Professor of Chemistry. Soon after joining C.H.C., Richardson built the rudiments of the chemical laboratory, which was gradually equipped with the necessary apparatus and instruments for carrying out research. It is important to mention in passing that William Ramsay, during his visit to India in 1900–1901, which was sponsored by industrialist Tata, who was seeking his advice to establish a premier institution of science in Bangalore, had a special interest in visiting C.H.C., where his old assistant Richardson was a Principal. On his visit to the college, Ramsay gave a lecture and saw the laboratories built by Richardson (Tilden 1918: 252).

Ramsay carefully inspected the laboratory and science teaching at C.H.C. In a written note, he expressed his warm approval, declaring that boys thus trained would become men able to improve the industries of India (CHCM: February 1901: 32). Ramsay delivered a lecture on "Argon and other Constituents of the

4 For example, "Determinations of Vapour-Pressures of Alcohols and Organic Acids, and the Relations Existing Between the Vapour-Pressures of the Alcohols and Organic Acids," *J. Chem. Soc. Trans.* (1886: 49, 761–76) DOI: 10.1039/CT8864900761; "Action of Heat on Peroxide of Nitrogen," *idem* (1887: 51, 397–403) DOI: 10.1039/CT8875100397; "Action of Light on Amyl Alcohol," *idem* (1896: 69, 1349–52) DOI: 10.1039/CT8966901349; "The Action of Light in Preventing Putrefactive Decomposition; and in Inducing the Formation of Hydrogen Peroxide in Organic Liquids," *idem* (1893: 63, 1109–30) DOI: 10.1039/CT8936301109; "The Action of Light on the Hydrides of the Halogens in Presence of Oxygen," *idem* (1887: 51, 801–6) DOI: 10.1039/CT8875100801.

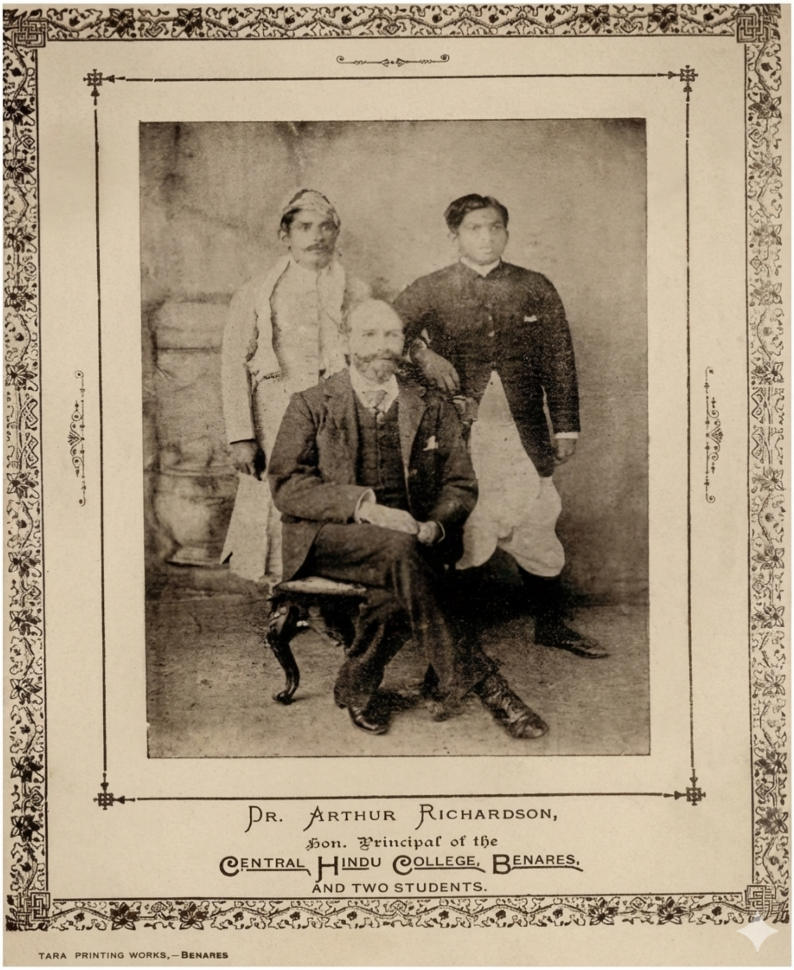


Figure 2: Portrait photograph of Arthur Richardson with students. Source: The Central Hindu College Magazine.

Atmosphere" on January 11 1901. He began by discussing the concept of elements as understood in ancient civilizations like Greece, Egypt, and India before transitioning to the modern definition of an element as a substance capable of forming compounds. Moving on to the seventeenth century, Ramsay focused on Robert Boyle, known as "the father of modern Chemistry," followed by highlighting the pioneers in the study of the atmosphere, such as Joseph Black, Rutherford, Cavendish, and Rayleigh. Ramsay also vividly narrated how he found five new gases – helium, neon, argon, krypton, and xenon – which occupy a place in the periodic table. The lecture was illustrated using vacuum tubes containing the newly discovered elements, with Richardson acting as demonstrator (*ibid.*). William

Augustus Tilden, a British chemist and a friend of Ramsay who accompanied him on his tour of India, was impressed by the arrangements made for teaching science at C.H.C. In his own words, the college was "the great educational centre established by Mrs. Besant for the sons of affluent and devout Hindus" (Tilden 1918: 252).

In early 1903, Richardson conducted research on chlorine water distillation in his college laboratory and published his findings in the *Journal of the Chemical Society*, a leading scientific journal devoted to original research in chemistry (Richardson 1903: 380–390). This experiment of Richardson's was praised by William Ramsay, who, just a year later, won the 1904' Nobel Prize for the discovery of noble gases. Ramsay characterized Richardson's research as "a very pretty piece of work and quite flawless" (CHCM: June 1903: 123). Richardson's achievement is particularly noteworthy considering the challenges he faced, including the need to purify materials, the lack of adequate apparatus, and numerous interruptions, as the college's chemical laboratory was still in its formativel stages at that time. Overtime, however, Richardson developed C.H.C.'s chemical laboratory significantly, making it one of the most advanced in North India. Numerous experiments were conducted under his direction, including his 1908 study on the reaction between calcium carbonate and chlorine water, published by the Royal Chemical Society, which received commendation from the scientific community in Britain (Richardson 1908: 280–288).

A donation from John Norman Collie, F.R.S., a Professor of Organic Chemistry at University College, London, greatly enhanced the C.H.C.'s chemistry laboratory. Collie, in 1903, provided a collection of mineral specimens, which proved helpful in teaching and experimental purposes (CHCM: August 1903: 166–167). It is to be noted that Collie also served as an assistant to William Ramsay and was a close friend of Richardson. Another professor of chemistry at University College, London, who significantly contributed to the chemical laboratory of C.H.C., was William Morris Travers. Like Richardson and Collie, he was also closely associated with Ramsay, with whom he helped determine the properties of the newly discovered gases argon and helium. Travers donated a large and valuable specimen of chemically pure zinc to the chemical laboratory of C.H.C. (*ibid*). At Ramsay's suggestion, Travers was later appointed the Director of the newly established Indian Institute of Science at Bangalore (Kostecka 2011). Richardson's brother, S.T. Richardson, who was also a chemist, donated a collection of valuable tools to the chemical laboratory, while his sister donated a spectroscope to the physics laboratory of the college (CHCM: August 1903: 167). Such donations from prominent scientists helped elevate the standards of science education at C.H.C.

The C.H.C. was affiliated with Allahabad University for B.A. and B.Sc. programs and managed a school providing education at the lower, middle, and upper levels. The upper division of the school, which comprised classes IX and X, offered literary and scientific courses, considering the students' interests and degrees offered by the college (CHCM: July 1905: 182). The introduction of the B.Sc. course in 1903 led to the expansion of buildings and laboratories. In 1903–04, the college expanded its facilities at the cost of Rs. 20,000 to offer larger and better laboratories for science students. The academic staff's residence was also constructed on land adjacent to the college to emulate the conditions of the English university (Government of the United Provinces of Agra and Oudh 1904: 1903–04: 45).

It is essential to mention that in Besant's vision of national education, the responsibility lies primarily with the people of India rather than the Government (Besant 1918*a*: 16). Therefore, C.H.C. depended on endowments and donations from rich Indians for infrastructure developments and staff salaries. In early 1903, during her fundraising trips, Besant persuaded Seth Dharamsey Morarji Gokuldas, a wealthy merchant from Bombay, to donate to the college. He contributed a substantial sum of Rs. 10,000, which was used to develop the chemical laboratory at C.H.C. The chemical laboratory was thus named the "Dharamsey Chemical Laboratory" after the donor's name. With Gokuldas's endowment, Richardson procured necessary equipment and appointed Mata Prasad as a Reader in the chemistry department (CHCM: September 1903: 191–192). In 1905, M. Damodar Kini, who studied chemistry at Madras University, joined the college as a Lecturer of Chemistry and Chandi Prasad, a graduate from Allahabad University, was hired as a laboratory assistant in the Chemistry Department (CHCM: July 1905).

Endowments also came from the Maharaja of Benares, Prabhu Narayan Singh, who had donated a building where Besant had shifted the college in March 1899. Maharaja of Kashmir, Pratap Singh, was also among the greatest patron of C.H.C. In late 1904, both Maharajas donated funds for laboratories and buildings, whereas Motilal Nehru of Allahabad, a Congress leader and the father of India's first Prime Minister, Jawaharlal Nehru, made an important contribution through whose donation a gas installation was added to the physics laboratory of the college (CHCM: January 1905: 2). During these days, Richardson was preoccupied with investigating the action of light through X-rays, while Damodar Kini was more interested in chemical experiments (CHCM: February 1905: 30). During the latter days of his life, Richardson, owing to his growing ill health and lack of opportunity, did little research, but he was always keenly interested in what was happening in the chemical world (Collie 1913: 767). He died on June 1 1912, in Benares, after a long physical suffering ("On the Watch-Tower" 1912: 635).

Although chemistry occupied the preeminent position at C.H.C., other branches of science also received fair consideration. By 1905, C.H.C. consisted of three Chemistry teachers, two Mathematics teachers, one Physics teacher, two English teachers, two Sanskrit teachers, and one Philosophy and Logic teacher (CHCM: February 1905: 46); (Government of the United Provinces of Agra and Oudh 1904: 87). The college appointed Prafulla Kumar Dutt, a post-graduate from Cambridge University, as the Professor of Physics. When C.H.C. was incorporated into B.H.U., Dutt became the Head of the physics department (Benares Hindu University 1916*b*: 80). Dutt is known for his experiments with vibrating pendulums and the spectrum of a candle. In the mathematics department, Krishna Chandra De, who obtained M.A. degree from Calcutta University, served as Professor, while Lakshmi Narayan, a B.A. from Allahabad University, was appointed as Lecturer of Mathematics. De was particularly interested in areas such as algebra and number theory. Both Krishna Chnadra De and Lakshmi Narayan later joined the mathematics department of B.H.U. (Benares Hindu University 1916*a*: 126). However, it is to be remembered that, despite this growing emphasis on science, students specializing in scientific subjects continued to receive moral and religious instruction, in keeping with the founder's educational ideals ("The Necessity of Religious and Moral Education," in CHCM: September 1903: 206–8; 1905: 221–4).

The high quality of science education at C.H.C. is evident from the fact that many of its students were awarded scholarships to study science and technology abroad. In 1903, two college students, Salig Ram Singh and Kashi Nath Mehta, were awarded the Japanese scholarship designated for the United Provinces by the Government of India (CHCM: June 1903: 124). In 1906, two more students from the college, Babu Lakshmi Chand and Saligram Sinha were given a Government Technical Scholarship of 150 sterling a year to go abroad and learn weaving. Saligram Sinha was given a similar scholarship to learn glass-making in Japan (CHCM: March 1906: 58). Such accomplishments reaffirmed the college's belief that the inclusion of religious and moral instruction within its curriculum did not impede the study of science and other secular branches of knowledge, contrary to the concerns voiced by many at the time of C.H.C.'s establishment.

The *General Report of Public Instruction for the United Provinces* for the year 1904–1905 describes C.H.C. as a very promising institution. The report notes a nearly 50 per cent increase in student enrolment, the high quality of science education, and the provision of special lectures on religious subjects in the college (Government of the United Provinces of Agra and Oudh 1906: 43). T. S. Lewis, Director of the Educational Department for the United Provinces of Agra and Oudh, also attests to the fine quality of science education at C.H.C. In the educational report of the province, Lewis writes,

> Excellent arrangements are made for the teaching of science, which is becoming more and more popular as a subject of study in the College, 77 per cent of the students who joined the first class last year have

> chosen the science course. (Editorial Board 1906: 72)

The college performed well in the B.A. and B.Sc. examinations, with 66 per cent of its students passing the exams administered by Allahabad University. It secured the second position among all affiliated colleges, with Aligarh College being the only one to perform better (CHCM: October 1906: 227). However, it is to be noted that, along with pure science, technical education, and traditional scientific knowledge of India, particularly medicine (Ayurveda) and astronomy-mathematics (*Jyotisha*), also secured a place in the pedagogical programme of the college. In the next section, we will seek to understand the place of technical education at C.H.C.

2 TECHNICAL EDUCATION: ITS DISCOURSE AND PROVISION AT C.H.C.

Since the 1880s, there has been a consistent public demand from the Indian National Congress and others for more government expenditure and facilities for technical education. It was argued that India was economically backward because there was no enthusiasm for economic progress, industrial development was neglected, and technical education was non-existent (P. Kumar 2017: 372–375; Dhar 2017: 213–233). Besant recognized the intrinsic relationship between technical education and industrialization as well. In a lecture titled, "India's Awakening," which she delivered at C.H.C., Besant said,

> The most important thing, which I have often urged, is technical education, and above all thorough education in agriculture.

She emphasized building up the wiser system of agriculture on the one hand and manufacturing industries on the other to meet the requirements of India (Besant 1918*b*: 119). In the pages of C.H.C.'s monthly periodical – *The Central Hindu College Magazine* edited by Besant herself – discussions on technical education and its relation to industrialization also surfaced. Despite being predominantly focused on theosophical themes, C.H.C. magazine had a dedicated section for science called "Science Jottings" which provided brief notes on various scientific topics and developments happening around the world.

In an article published in January 1903, a critical assessment of the British educational policy in India was made for its overemphasis on literary subjects and neglect of technical education. Indians were urged to embrace science education as it would pave the way not only to successful careers but also to the overall prosperity of the country (CHCM: January 1903: 3–4). During the colonial period, the technical workforce was imported from England for departments like public work, mining, and railways in India. The British Government made no significant effort to train the Indians in modern technology (Basu 1967: 361–374).

Thus, in this article, an appeal was made to educate Indians in technical subjects and manufacturing and not to leave the direction of industry to the people ruling India. The example of England lagging behind Germany in industrial development until the mid-nineteenth century due to inferior scientific training was taken to highlight the significance of technical education. The aim was to make Indians understand that the situation in India was even more critical, to a much greater extent than what was said about England (CHCM: January 1903: 3–4).

M. S. Sharma Sundara Das, a member of the Theosophical Society and contributor to *The Central Hindu College Magazine*, was of the opinion that Western science and technology would lift India out of its perpetual backwardness. In an article, "Industries in India" published in 1903, he adhered to the utility of modern science to industry but also spoke a political language in voicing his critique of the colonial view on India's inability to engage in industrial pursuits. He felt it crucial to dismantle this colonial narrative by showcasing India's manufacturing achievements before British rule. Taking an idea from George Frederick Armstrong, a distinguished nineteenth-century English academic specializing in railway, civil, and sanitary engineering, Sharma suggested reshaping scholastic and educational ideas in India on scientific lines to make education of practical use (CHCM: January 1903: 12–13). In another article published in 1903, A. J. Wilson, the editor of the science section of the magazine, referenced Norman Lockyer to stress that without scientific knowledge, a country cannot survive as it is a harbinger of economic prosperity.[5] Wilson considered scientific knowledge, especially in its applied forms, as a precursor and a necessary condition for a nation's development and urged Indian institutions to teach science through hands-on experiments, observation, and research. Wilson writes:

> Leading statesmen more and more emphasize the necessity of the teaching of science by experiments, observation, and research and not from books. Sir Norman Lockyer epitomises their remarks in his Southport Presidential Address to the British Association. The struggle for existence now begins to be between nations, not between individuals, and in the struggle science and brains take the part of swords and sinews; for the battle is fought out in the school, the university, the laboratories and the workshop recognized that trade follows brain, and most successful students will be eagerly sought after by owners of large concerns, who wish to benefit by the latest results of scientific investigations.
>
> The economy combined with greater efficiency in all departments of state which would be secured if strictly scientific methods alone were

5 Norman Lockyer, KCB FRS, was an English scientist and astronomer. Lockyer also is remembered for being the founder and first editor of the journal *Nature*.

> employed would go for to provide funds for more Universities and for that organising of sufficient training which is such a pressing need (CHCM: November 1903: 254).

Thus, recognizing that industrialization was fundamentally tied to economic prosperity and the advancement of scientific and technical knowledge, C.H.C. emphasized the importance of providing practical and technical training to Indian youth. The college strongly advocated sending promising students abroad – to Western countries or Japan – or specialized education in applied sciences, with the expectation that they would return and serve as teachers for few years. Besant herself in consultation with The Board of Trustee of C.H.C. has directed the Managing Committee to special fund for this purpose, rightly feeling that the material prosperity of India depends on the training of her sons, to utilize the latent resources of the country, and to direct the many public works demanded for their enrichment. (CHCM: October 1906: 242). Besant also thought that sending of selected students abroad for higher training in science and technology should be one of the duties of the Indian universities, and these students should be bound to serve under the orders of the university for at least 15 years after their return. She also proposed the scientific departments of the affiliated colleges should be in the hands of foreign professors except in cases where highly qualified Indians, preferably trained abroad, were available. For Besant, Japan, not surprisingly, possibly be drawn upon in this respect (CHCM: February 1906: 47).

When Besant plan of sending students abroad did not successed, she made an effort to establish a Technical Institute in C.H.C. Besant visualized a Technical Institute with the additional goal of serving artisans and other weaker sections of society. The efforts of establishing technical training facilities began in 1903 when the local elite of Benares, Rai Ishvari Prasad Bahadur, and A.G. Watson, the supervising engineer of C.H.C., opened a workshop near the college. They aimed to develop this workshop into a technical school affiliated with the C.H.C. (CHCM: March 1903: 51). The workshop initially opened with three departments: blacksmithing, carpentry, and bicycle repair, equipped with some machinery and tools. Watson himself contributed financially to the workshop, and in March 1903, he had two subscriptions, one of Rs. 100 from W. Harding of Baroda and another of Rs. 30 from Babu Sundar Singh of Darjeeling were received. Rai Ishwari Prasad also raised funds to support the technical training of the artisanal class (*ibid.*).

The workshop expanded by purchasing machinery and tools from England and teak wood from Calcutta. Besant personally donated Rs. 400 to construct the building and provided useful tools for the workshop (CHCM: April 1903: 24). The growth of the college necessitated new buildings, which led Besant to travel to England, France, Germany, America, Cuba, and various places in India, including Kashmir, Multan, Jalandhar, Delhi, Coimbatore, Sindh, Bombay, and Madras. Her travels aimed to secure donations and subscriptions to ensure the proper functioning of C.H.C. Watson also organized three fundraising delegations: one in India and the other two in America and England. Due to these efforts, C.H.C. secured funds, and Technical School was started in 1905 (CHCM: June 1905: 135). A major donation came when Don Salvador de la Fuente y Romero of Cuba and Paris, passed away, and he named C.H.C. as the heir and executor of his properties in Cuba, England, and France in his will. The surplus of Rs. 250,705 was shared equally between C.H.C. and Adyar Library of Theosophical Society (CHCM: February 1905: 43).

The C.H.C. started offering technical training on a small scale in its Technical School with the aspiration of developing it into a full-fledged Technical Institute. At this juncture, the Swadeshi Movement in Bengal also started, which, among its many nationalist programmes, included promoting technical education to revive indigenous industries (Sarkar 1946). The Swadeshi Movement catalyzed Besant's old desire to serve the artisans. In November 1905, P.A. Tyagaarjan, one of the members of C.H.C.'s Board of Studies, voiced Besant's wish to upgrade the Technical School into a Technical Institute with first-class workshops where provision of technical training of weavers and artisans could be made (CHCM: November 1905: 272). He thought that once the scheme was implemented, many rich Indians like Jamsetji Tata would come forward to generously contribute the funds needed for the institute (*ibid.*).

Lands were acquired to build additional workshops, and funds were raised to upgrade the Technical School of C.H.C. Besant wanted the Technical Institute to be inaugurated by the hands of George V, Prince of Wales, who embarked on a tour of India between November 1905 and March 1906 (CHCM: December 1905: 277). They even wish to name it "Prince of Wales Technical College." The wish of Besant came true when, in February 1906, George V and his wife, Princess Mary, inaugurated the Technical Institute during their visit to Benares. The stated objective of the Technical Institute was "adding to literary and scientific culture the mastery of the practical arts and crafts which makes national wealth" (CHCM: February 1906: 30). The driving vision behind this initiative stemmed from the growing realization that India required a larger cadre of scientifically and technically trained individuals, rather than merely producing barristers and government clerks. In an appeal for additional funds in October 1906, the C.H.C. authorities urged that,

> Will not some rich Hindus send the necessary funds for buildings and machinery that we may send out from the C.H.C. men more useful to India than more vakils and more government servants (CHCM: October 1906: 227–228).

However, the Technical Institute of C.H.C. faced financial difficulties, as the prevailing political climate favoured promoting technical education more in Bengal, where the Swadeshi movement was in full swing. Nonetheless, the administrators at C.H.C. remained confident that patriotic commitment would ensure the Institute's eventual success. As reflected in The Central Hindu College Magazine:

> We have no political excitement to help us here as they have had in Bengal, so funds are more difficult to raise, but even without this stimulus there should be patriotism enough to place this much needed Institute on a firm base (*ibid.*).

The C.H.C's technical education curriculum, as it is inferred, drew mainly from the syllabus of the National Council of Education founded by Satish Chandra Mukherjee in 1906 to promote science and technology as part of a *swadeshi* (indigenous) industrialization movement (CHCM: November 1906: 267–269). On the lines of Bengal Technical Institute, founded by the Society for the Promotion of Technical Education on July 25 1906, C.H.C. also planned to offer technical education at three stages: primary, secondary, and collegiate. Their programme was also to prepare scientific textbooks in the vernacular (*ibid.*). However, the technical institute did achieve much success and remained more of a technical school, providing basic workshop training only.

Besant left Benares for Adyar after being elected president of the Theosophical Society in 1907, following the death of Henry Olcott. Around this time, she proclaimed Jiddu Krishnamurti to be the "World Teacher," a declaration that sparked controversy among theosophists, many of whom found it difficult to reconcile this claim with the fundamental philosophy of theosophy (Schüller 1997: 199). The controversy strained her long-standing relationships in Benares, leading several of her old associates, including Bhagwan Das, then the honorary secretary of C.H.C. to distance themselves from her and join hands with Madan Mohan Malaviya, which led to the foundation of Benares Hindu University in 1916 (Śrīprakāśa 1954: pp. 111–118). Besant's own scheme of establishing a national university in Benares, one that would devote "special attention to technical training and science applied to agriculture and manufacturers" (Ramaswami Aiyar 1992: 51–52), eventually converged with Malaviya's broader scheme for a Hindu University. Besant transferred C.H.C. to Malaviya, setting the foundation for B.H.U. Although the Technical Institute associated with C.H.C. did not achive much success, it nevertheless provided the conceptual and institutional groundwork for the establishment of the Benares Engineering College and the College of Science and Technology within B.H.U. about a decade later.

3 SCIENCE, THEOSOPHY AND HINDU REVIVALISM

THE C.H.C. PROVIDES US WITH A CASE of how scientific knowledge and the ideology of science were actively redefined in the colonies, challenging the notion of colonial science that considered modern science in colonies like India as a purely Western import.[6] In fact, it has been argued that the globalization of modern science entailed a process of its localization or domestication and its institutions within the colonies (Raina 2012: 346–366). This process, associated with decolonization, marked the early decades of the twentieth century in India when the discourse of national education not only reorganized the ideology of science but also deliberated on the nature of scientific education suitable for the country (Raina and Habib 2004: 44). Before we explore the entanglements of science, theosophy and Hindu revivalism at C.H.C., it is essential to discuss theosophical conceptualization of science, evolution, and education.

The theosophical movement of the late nineteenth and early twentieth centuries sought to redefine the meaning of science, evolution, and education through a spiritual lens. Far from being limited to empirical or material domains, these concepts were reimagined as vehicles for moral and spiritual advancement. Theosophy as a pedagogical project comprises esoteric ideas, especially the stages of initiation, which were translated into institutional practices, particularly within the educational initiatives of Annie Besant in India. Through this lens, science becomes a broader field that embraces esoteric knowledge, evolution is understood as moral and spiritual ascent, and education emerges as a practical means of accelerating humanity's progress toward higher states of being (see Mühlematter 2023). Within the theosophical worldview, evolution was never confined to biological or Darwinian frameworks. Rather, it encompassed the multidimensional growth of the human being -physical, intellectual, moral, and spiritual. The doctrine of stages of initiation became a key tool for conceptualizing this growth. These stages adapted and hybridized from Hindu sources through the work of Indian theosophists such as Bhagwan Das, T. Subba Row and Manilal Dvivedi provided a map of human development that went beyond material progress. To "evolve" was to cultivate inner virtues, refine consciousness, and ultimately attain higher planes of awareness (*ibid.*). This evolutionary vision was teleological, aiming toward self-realization and spiritual mastery.

Importantly, theosophical conceptions of ''science" operated on a broader register than modern empiricism. Science, in this view, encompassed both empirical knowledge of the physical world and the "occult sciences" of spiritual law and initiation. Theosophists approached esoteric teachings with a kind of methodological seriousness, regarding them as rigorously structured systems

6 For colonial science, see Basalla 1967.

of knowledge. The stages of initiation themselves functioned as a scientific taxonomy of spiritual evolution, providing order, precision, and predictability to processes of inner transformation. This broadened concept of science also reflected the hybrid epistemology of the theosophical movement. By merging Western esotericism with Hindu philosophies and spiritual practices, theosophy constructed a comparative and universal ''science of the soul" (*ibid.*). For Besant and her contemporaries associated with the Hindu revivalism, this was not an abandonment of rational inquiry but its expansion, acknowledging dimensions of reality invisible to materialist methods. In this sense, as we will see shortly, theosophists at C.H.C. sought to reconcile modern science with "higher" spiritual truths as embodied in the Hindu scriptures.

Thus, Besant's educational initiatives in India, notably in the Central Hindu College of Benares embodied the theosophical project of spiritualized pedagogy. Besant's Sanatana Dharma Text Books and even science pedagogy integrated theosophical doctrines of initiation and virtue into the curriculum, making esoteric concepts accessible to a broad audience of students (see Besant and B. Das 1902). The education at C.H.C. seems became a structured program of moral and spiritual formation, designed to nurture the virtues corresponding to each stage of initiation. Discipline, ethical conduct, and cultivation of the inner life were central goals, equal in importance to intellectual training. By embedding spiritual ideals into institutional frameworks, Besant aimed to democratize access to esoteric knowledge and transform education into an evolutionary accelerator (Mühlematter 2023). This theosophical conceptualization of science, evolution, and education carried far-reaching implications. It suggested that educational institutions were not merely sites of professional training but laboratories of human transformation where education served a sacred responsibility of shaping young souls for their journey toward higher consciousness. However, at the same time, such a conceptualization raised questions and tensions. The hierarchical nature of initiation stages risked elitism, implying that some individuals or groups were "more evolved" than others. This tendency reinforced Brahmanical casteism and patriarchal hierarchies, which became evident in theosophical educational institutions such as C.H.C., where pedagogical practices were employed that reproduced and legitimized such social stratifications (see C. L. Singh 2018: pp. 1–18; Strube 2021: 1180–1189).

However, the science and technical education at C.H.C. was the practical move of adopting Western scientific knowledge as Besant, and others acknowledged the role science and its applied aspect, i.e. technology, could play in national development. Yet, both Besant and Malaviya, as cultural nationalists, do not want the epistemological and ideological invasion of modern science on Indian civilization. For Indian nationalists, the blind imitation of imported Western education would also mean, in effect, acknowledgement of their political and cultural defeat. This brought people like Besant and Malaviya, who were also committed to a programme of revitalizing the Indian knowledge system, treading close to a cultural revivalist edge. Besant repeatedly argued that Western thought and English education would not benefit India if it meant losing its own cultural identity (Besant 1916: 33). But she was in no way a conservative devoted to defending unreasonable beliefs of Hindu culture as a foul-mouthed chauvinist. What she wanted was best articulated in her lecture delivered at C.H.C. in 1904, where she said:

> Young Indians, looking at the luxury and splendour of western civilisation, its mastery of natural powers, its rich and varied resources, sometimes lose their heads altogether, and casting away all their old ideals, they try to become wholly western within and without. This is one extreme.
>
> Others think that the East is so superior to the West that the West can teach nothing, and, knowing but little of either, they plume themselves on their ancient glories and the memories of a splendid past, and look with youthful contempt on the methods and experiments of the West. This is the other extreme.
>
> What we need here, as elsewhere, is a middle course, the "golden mean," the wisdom which while prizing the past, is yet willing to learn from the present; which, while it remains predominantly eastern, assimilates all that is best in western thought and character; yet draws from other nationalities what they have of value, and weaves into its own eastern fabric the golden and silvern threads brought from other lands (Besant 1904: 3–4).

Attempts were thus made by educationalists like Besant and Malaviya to follow the "middle course" where the best of Western scientific, technical, industrial, and medical knowledge could be integrated into the Indian setting and context.[7] Besant in particular, wanted to make "Indian Ideals" the basis of Indian education by renouncing the "hybrid and sterile ideals of anglicised Indianism" while also intending "a glorious new body for the Ancient Spirit" (Besant 1930: 37–38). What India needed, she wrote in a letter to his theosophist friend Narendra Nath Dutt in January 1906, the development of a national spirit, an education founded on Indian ideals not dominated by the thoughts and culture of the West (Pal 1917: 344). She committed herself to reviving the "Ancient Ideals of Indian Education" to develop a system suited to India's needs. However, she recognized that her "Indian Ideal" must integrate Western sciences, not

7 For the integration of Ayurvedic practices with modern medical science, see R. Gupta 2022: 1–29.

as a contradiction but in harmony with knowledge of India. In a letter to Babu Hirendranath Dutt, a Trustee of the C.H.C. and leader of the National Education Movement in Bengal, written amidst the controversy sparked by her opposition to the Nationalist's decision to boycott government schools and colleges, Besant wrote:

> I have long been advocated the establishment of a national system of education, not in opposition to, but standing apart from, the Government and the Christian Missionary systems alike.... The need of India are among others, the developmemt of a national spirit, an education founded on Indian ideals and enriched, not dominated by the thought and culture of the West. This education on its literary side, should include the teaching of Indian literature as primary, and of foreign literature as secondary; the teaching of Indian history as primary, and of foreign history as secondary; the, and teaching of Indian philosophy as primary, and of foreign philosophy as secondary; the teaching of Hindu philosophy as primary, and of foreign philosophy as secondary. On its scientific side, it should include the science of the West, but should also encourage and teach much of the science, especially in psychology and medicine of the East; on its technical side it should embrace all the provisions for the industrial life of the country – industrial chemistry, agriculture, crafts of every kind, engineering and mineralogy, etc. (CHCM: February 1906: 45–46).

A training system built upon Western technical and scientific knowledge was acknowledged as an essential requisite in industrial progress, but it was considered pernicious unless it was accompanied by learning in Indian subjects. A proposal for an educational system where modern science would coexist with Indian knowledge in a complementary manner rather than in opposition resurfaced when Besant attempted to reform universities in India. In 1910, the C.H.C. magazine published a petition by Besant, supported by Viceroy Lord Hardinge, which was submitted to the King of England regarding establishing a new university in Benares. The scheme, titled "The University of India," is so important in indicating the outlook of Besant on the schema of national education she conceptualized for India that a portion of it is worth quoting here:

> The University shall have the powers following:
>
> To impart and promote the imparting of education, literary, artistic, and scientific, as well as technical, commercial and professional, on national lines and under national control, not in opposition to but standing apart from the Government system of collegiate education, attaching special importance to a knowledge of the country, its literature, history and philosophy, and designed to incorporate with best

> Oriental ideals of life and thought the best assimilate ideals of the West, and to inspire students with a genuine love for and real desire to serve the country.
>
> To promote and encourage the study chiefly of such branches of the arts, sciences, industries and commerce as are best calculated to develop the material resources of the country and to satisfy its pressing wants, including in scientific education generally a knowledge of the scientific truths embodied in Oriental learning, and in medical education, especially, a knowledge of such scientific truths as are to be found in the Ayurvedic and Hakeemi system (Besant 1947: 68).

We see that Besant placed an immense emphasis on all branches of science applied to industrial development; however, she also aimed to neutralize its moral, epistemological, and economic impacts. Her plan was a clear example of how Western scientific knowledge was culturally adapted and integrated into the Indian context. She set the stage for science and technical education to be taught in a way that aligns with and supports national values, interests, and identity. This approach not only facilitated the incorporation of modern science into the Indian educational system but also ensured that it would contribute to India's development on its own terms. Most importantly, the national education scheme formulated by Besant and other nationalists of her time, like Malaviya, facilitated the systematization of the traditional scientific knowledge of India. Such a programme was articulated at C.H.C. and later at a much larger scale at B.H.U., where the pedagogical programme included all sciences of the West, pure and applied, along with the mathematical, astronomical, and medical knowledge of India.

Attached to C.H.C. was the Sri Ranveer Sanskrit Vidyalaya, a college founded by Maharaja Ranbir Singh of Jammu Kashmir in 1883, where grammar, philosophy, poetry, algebra, Euclidean geometry and Vedas were taught (Kalla 1985: 77). Ranbir Singh himself was a scholar of Sanskrit and Persian languages.[8] Devoted to Sanskrit learning in all its branches, this school came under the management of C.H.C. when Maharaja Pratap Singh, son of Ranbir Singh, handed its custody to Annie Besant and Bhagwan Das (CHCM: June 1903; S. K.

8 Maharaja Ranbir Singh was noted as a scholar of classical Persian, and was also versed in Swedish and English. Maharaja Ranbir Singh established a Translation Bureau called "Daarul Tarjumah" under the patronage of a learned Hakim of Turkish Afghan ancestry, Hakim Agha Muhammad Baqir who also the Physician to the Maharaja. It was under this bureau that Ranbir Singh had *Tibb-e-Unaani* translated from Arabic and Latin into Persian and Dogri. He also donated to the Sanskrit education at Benares and provided scholarships to the Kashmiri students studied in the Sanskrit Vidyalaya at Benares (Kalla 1985; Zutshi 2011).

Singh 2020: 18–19). Sri Ranveer Sanskrit Vidyalaya was an oriental institution of the kind that emerged in the early days of British rule in India where, along with the study of traditional Hindu knowledge like Nyāya, Vyākara.a, Jyotiṣa, Vaidyaka (Āyurveda), and Vedānta, instruction in English and other secular subjects was also provided (CHCM: October 1905: 245). In 1900, it became the Sanskrit Department of C.H.C. and played a pivotal role in the revivalism of Ayurveda in north India. Many traditional Hindu medicine schools in north India, like the Ayurvedic Vidyalaya of Delhi and Jammu, accepted the curriculum prescribed by the Ranveer Sanskrit Vidyalaya (CHCM: February 1st 1905: 30).

Notably, the revival of Ayurveda in Benares was greatly attributed to the city's longstanding recognition as the eternal center of Hindu learning since ancient times (M. Sharma 2011). Benares enjoys a special prominence in the traditions of Ayurveda. It was reputedly here that Dhanvantari, "physician of the gods" and "father of Indian medical science", imparted his knowledge and skills to Suśruta, the author of the *Suśruta Saṃhitā* (Sukul 1974: 93–94)). Benares' Ayurvedic tradition is deeply intertwined with its standing as the most sacred city of Hindus, a view held and fostered by both Indians and Western Orientalists. Such an imaginary of Benares made it a stronghold of Hindu politicized identity (Freitag 1989; Dalmia 1997). Thus, it is no surprise that Besant and Malaviya chose Benares as the location for founding the centre of learning dedicated to Hindu studies. Besant, who wants scientific education embodied in Oriental medical education, especially knowledge of the Ayurvedic to be imparted in her scheme of national education, not only ensured the provision of Ayurveda at Ranaveer Pathashala but also associated Ayurveda education with the prosperity of Hinduism (*ibid.*; CHCM: May 1906: 112). The effort to revive Ayurveda culminated two decades later with the establishment of the Ayurveda College at B.H.U., where an attempt was made to revive Ayurveda in the light of modern medical discoveries of the West (R. Gupta 2022: 1–29).

The emphasis on Jyotiṣa was also clearly discernible at the Ranveer Sanskrit Pathashala. Jyotiṣa, a vital branch of the Hindu knowledge system, traditionally encompasses the study of astronomy, astrology, and mathematical computations based on the movements of celestial bodies to determine calendars, cast horoscopes, and identify auspicious moments for rituals (Lochtefeld 2002: 326–327). Interestingly, at C.H.C., Indian mathematical traditions embedded within Jyotiṣa came into productive dialogue with European mathematics. The encounter between these two epistemic traditions not only fostered pedagogical innovations but also reinforced a sense of cultural affirmation. It is important to note, however, that such an intellectual convergence was not unprecedented in Benares. As early as 1791, the establishment of the Benares Sanskrit College by the British Resident Jonathan Duncan had initiated experiments in integrating traditional Indian mathematics with European astronomy, mathematics, and mechanics as these branches of mathematics were taught at the college (Babu (2012: 49); For Benares Sanskrit College, see, Dodson (2011)). Erudite mathematicians of Benares such as Bapudev Shastri and Sudhakar Dvivedi, who were among the first generation of Indian mathematicians proficient in both Indian mathematical–astronomical traditions and modern scientific mathematics emerged as direct products of this educational experiment (R. C. Gupta 2002: 312–313). This cross-cultural engagement catalysed a broader intellectual trend in Benares, inspiring local scholars during the late nineteenth and early twentieth centuries to compose numerous treatises on Western mathematics and astronomy in Sanskrit and Hindi (Babu 2012: 49). Among them, Sudhakar Dvivedi, a Professor of Mathematics and Astronomy at Benares Sanskrit College who was also association with the Ranveer Sanskrit Pathashala was particularly noteworthy, as his works on mathematics and astronomy became standard instructional texts in C.H.C.

Pandit Jagannath Tripathi of the Ranveer Sanskrit Pathashala was one such distinguished scholar in the intellectual lineage of Bapudev Shastri and Sudhakar Dvivedi. His scholarly depth is evident from his commentaries on several astronomical and mathematical treatises of ancient and early medieval India. His English commentary on the Sanskrit astronomical text Bijaganita received particular acclaim (CHCM: December 1906: 306). In its appreciation of Tripathi's work, *The Central Hindu College Magazine* emphasized the significance of cultivating scholars well-versed in both European astronomy and mathematics, as well as in the classical Sanskrit tradition of astronomical study, for the advancement of mathematical sciences in India. The C.H.C. committed to prepare such versatile mathematicians, structured its Sanskrit Department to impart the mathematical knowledge embedded in Jyotiṣa while simultaneously acquainting students with the latest researches in the Western world. The C.H.C. magazine, hoping for this "happy combination," remarked:

> We trust that such a happy combination may enrich the world of science with the observations of the past, and bring honour and public acknowledgement to the man who has by study and ability been able to bridge the gulf that now grown between the old astronomical learning and the new. Only a man who is master of both can do this, and it is for this reason that this Central Hindu College lays stress upon its Samskrit Department, while striving to keep its students acquainted with the latest researches in the Western world (*ibid.*).[9]

9 It is indeed true that the college keep its students aware of the latest research in science taking place in the Western world. The science section of The Central Hindu College Magazine, *Science Jotting* edited by A. J.

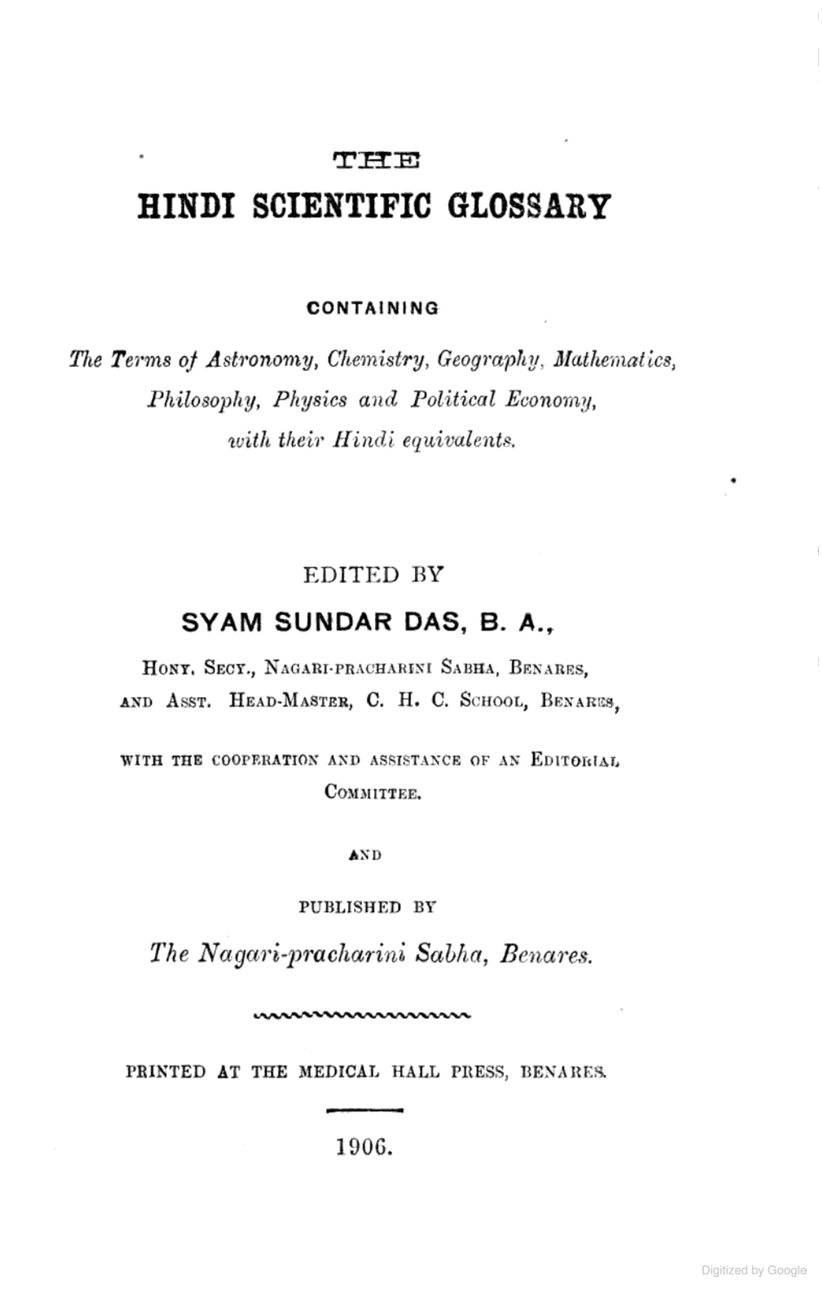
The emphasis on Ayurveda and Jyotisha within the programme of study at C.H.C. truly exemplified a pedagogical expression of cultural nationalism. The curriculum of the Ranveer Sanskrit Pathashala included not only classical mathematical texts but also Bapudeva Sastri's translation of the Surya Siddhanta and Siddhanta Siromani, and Sudhakar Dvivedi's translation of Lilavati, Bijaganita, and Pañcasiddhāntikā along with his commentaries and treatizes such as Deergha Vritta Lakshan, Goleeya Rekha Ganit, and Ganakatarangini. Other texts prescribed were Jyotish Tattra, a Hindi treatise on astronomy by Pandit Ganga Shankar of Benares, Arya Bhattacharya or Newton of Indian Astronomy by T. Ramalingam Pillai, and Exercises in Algebra by A.S. Shutic. The inclusion of such texts reflected the institution's broader objective of revitalizing indigenous scientific traditions while simultaneously engaging with global scientific knowledge. Equally significant was C.H.C.'s commitment to promoting science education in Hindi. When a series of linguistic efforts were underway to develop a scientific vocabulary accessible to Hindi-speaking students, Babu Shyam Sundar Das, Headmaster of the Central Hindu College School and Secretary of the Kashi Nagari Pracharini Sabha, spearheaded an ambitious project to coin Hindi equivalents for Western scientific terminology. Pandit Jagannath Tripathi of the Ranveer Sanskrit Pathashala, who assisted Das in this pioneering endeavour, drew attention to the publication of The Hindi Scientific Glossary in The Central Hindu College Magazine:

> I desire to draw very special attention to The Hindi Scientific Glossary, edited by Babu Shyam Sundar Das, and issued by the Nagari Pracharini Sabha. A band of earnest volunteer collaborators have worked hard for eight years to shape this book and to give to the Hindi-speaking public a scientific terminology in Geography, Astronomy, Political Economy, Chemistry, Mathematics, Physics, and Philosophy. The book is indispensable for all students and scholars, and marks a great step forward in the enriching of Hindi (CHCM: September 1906: 218).

Wilson published articles on scientific subjects and also reproduced notes from reputed journals like Nature. Under the section "Science Jotting," Wilhelm Röntgen's discovery of the X-Rays, The Linnean Society of London's discussion on J. C. Bose's investigations of Desmodium gyrans, Jagdish Chandra Bose experiments, telephonic communication from Copenhagen to Frankfurt, electro-magnetic wave experiments of Ferdinand Braun, research in scientific aeronautics by the International Committee for the Scientific Aeronautics of Berlin, discovery of radium by Madame Curie, Henri Becquerel experiments on uranium, John Dalton paper on atomic theory which he read at Literary and Philosophical Society of Manchester, Darwinian botanist Andrew Wilson discovery that flower help forward the production of seeds and the propagation of the species, Grant Allen research on insects, Humphry Davy paper on the nature of light and heat in which put forward the science of electricity as applied to chemistry and many more were discussed.

Titled *The Hindi Scientific Glossary* (S. S. Das 1906: see), this linguistic exercise was a strategic effort – epistemological as well as political – to render Western scientific terms meaningful and authoritative for Hindi speaking science learners. This project was influenced by linguistic nationalism, framed in conjunction with a revivalist movement. However, creating authoritative equivalences of Western scientific terms in Hindi involves inevitable tensions and challenges as Indian language activists were working within the constraint of colonial episteme (C. Singh 2021: 63–86). Similar tensions were evident at C.H.C., where aligning the Hindu scientific tradition – which, despite its metaphysical nature, had an organized understanding of specific aspects of reality – with the framework of modern science resulted in a series of evaluative oppositions. In the encounter between traditional and modern scientific systems and their techniques, voices of conservatism and assimilation were heard. This aspect was particularly distinctive of the socio-religious revivalist movement of the late nineteenth and early twentieth centuries (Strube 2023: 88–107).

Theosophy, which began as a late Victorian spiritualist movement, held that the nature of things is more profound than can be discovered by empirical science (Asprem 2013: 406–407). Besant herself, with C. W. Leadbeater, embarked on a research program of "clairvoyant chemistry" in 1895 to understand the relationship between Theosophical theories of matter and the new atomic science. They produced their findings in a book titled, *Occult Chemistry* where both claim to have used their psychic abilities to observe the atomic structure of various elements in the periodic table and certain compounds (Besant and Leadbeater 1908). This project of Besant was ambitious but controversial within the Theosophical movement as it sought to merge spiritual revelation with modern scientific inquiry. Besant's engagement with chemistry thus revolves around the epistemological, methodological, and ontological tensions – tensions that reveal the difficulties of sustaining a credible "science of the occult" (Asprem 2014: 444–480). She argued that trained clairvoyants could directly perceive atomic structures invisible to scientific instruments. Besant and her associate C.W. Leadbeater presented these observations using scientific terminology, claiming to confirm or even anticipate discoveries in physics and chemistry. But the *Occult Chemistry* project contains a deep tension between the methods of esoteric knowledge and the standards of modern science. Clairvoyant observation, being subjective and unrepeatable, violates the principles of verification and reproducibility that define scientific practice. However, Theosophists strategically adopted scientific language and imagery to legitimize their spiritual claims. By framing clairvoyant visions in terms of atoms, elements, and subatomic structures, Besant tried borrowing the prestige of science while redefining its concepts to fit theosophical metaphysical worldview. This created a hybrid discourse that appeared scientific but operated on mystical premises (*ibid.*).


THE
HINDI SCIENTIFIC GLOSSARY

CONTAINING

The Terms of Astronomy, Chemistry, Geography, Mathematics, Philosophy, Physics and Political Economy, with their Hindi equivalents.

EDITED BY

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HONY. SECY., NAGARI-PRACHARINI SABHA, BENARES,
AND ASST. HEAD-MASTER, C. H. C. SCHOOL, BENARES,

WITH THE COOPERATION AND ASSISTANCE OF AN EDITORIAL COMMITTEE.

AND

PUBLISHED BY

The Nagari-pracharini Sabha, Benares.

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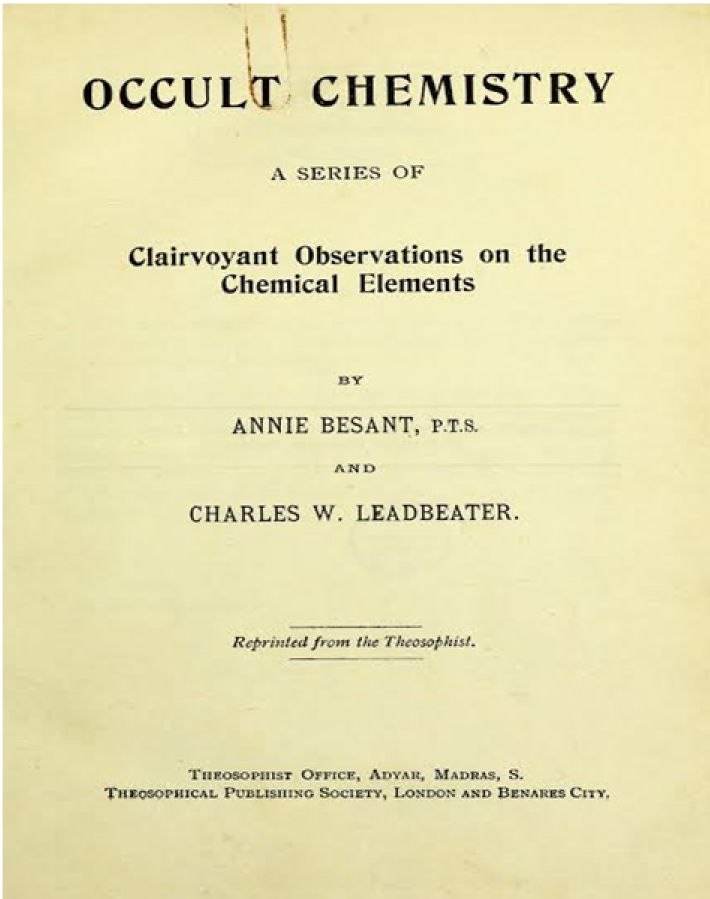
1906.

Figure 3: Cover page of *The Hindi Scientific Glossary* by Syam Sundar Das (1906).

Figure 4: Annie Besant with C. W. Leadbeater.

Thus, it is of no surprise that theosophy's early alignment with contemporary physics, especially with the ideas of ether and atomic structure became out dated as scientific paradigms changed. This dependence on provisional science exposed the instability of "occult science." *Occult Chemistry* as an illustration of a "gnostic science" ultimately was a failure as it sought harmony between spirituality and empiricism but produced epistemological contradictions. Besant's desire to integrate scientific rationality with metaphysical insight was in fact the persistent difficulty of reconciling revelation with reason.

The scientific consensus deemed Besant's chemical investigations a pseudoscience due to its inability to be verified within the episteme of modern science, nevertheless, we cannot deny that her interest in chemistry was sincere, and her work was pretty exhaustive. Most importantly, the research initiated by Besant and Leadbeater even occupied the attention of many contemporary scientists in chemistry and physics (Morrisson 2007). In an era when even science popularisers and established scientists were not immune to revivalist streaks of borrowing scientific terms to vindicate metaphysical aspects of Hinduism, it was no wonder that theosophical institutions like C.H.C. were party to this agenda. In any case, it is important to note that modern science was not viewed as a Western import in colonial India. The new scientific paradigms were quickly embraced, and numerous popular articles advanced the claim that Hindu scriptures anticipated many scientific inventions and discoveries of the West (D. Kumar


OCCULT CHEMISTRY

A SERIES OF

Clairvoyant Observations on the Chemical Elements

BY

ANNIE BESANT, P.T.S.

AND

CHARLES W. LEADBEATER.

Reprinted from the Theosophist.

THEOSOPHIST OFFICE, ADYAR, MADRAS, S.
THEOSOPHICAL PUBLISHING SOCIETY, LONDON AND BENARES CITY.

Figure 5: The title page of Besant's 1908 book *Occult Chemistry*, which she wrote with Charles W. Leadbeater.

1996: 195–209). The C.H.C. magazine also featured numerous articles showcasing the Hindu's contributions to exact, positive, and experimental science. However, when the metaphysical aspects of Hindu philosophy came into conflict with modern scientific discoveries, efforts were made to establish harmony between the two (Asprem 2013: 406–407).

Besant's clairvoyant observations on the chemical elements interested famous scientists like Oliver Lodge, F.R.S., who was Professor of Physics at the University of Birmingham. Lodge was deeply involved in exploring the intersection between science and spiritualism. He was convinced that the human mind could exert influence over physical matter, particularly through what he called "psychological agents." These agents, according to Lodge, were capable of manipulating matter in ways that could convey messages or information, such as through telepathy or other forms of communication (Bowler 2001: 96–97). Lodge's work in psychical research was controversial and earned the scepticism of the broader scientific community of the time. Nevertheless, C.H.C. magazine referred to Lodge's hypothesis, hoping to bridge the gap between modern science and the more speculative realms of the paranormal and supernatural faculty called "Siddhis" in Indian religion (CHCM: April 1902: 2). Lodge also proposed what he termed an "ethereal sense-organ," suggesting that the human eye—or, more broadly, human perception—might be capable of detecting subtle, non-physical objects or entities. In an article published in October 1903, the C.H.C. magazine dwelt upon Lodge's "ethereal sense-organ" to lend credibility to Besant's *Occult Chemistry*. His hypothesis that "electrons are the fundamental substratum of which all matter is composed" was considered to closely resemble the concept of *Prakṛti* described in the Sāṅkhya School of Hindu philosophy (CHCM: October 1903: 216).[10]

In another article titled "Meteorology of Ancient India," ancient texts like *Brihat Parashara* were discussed to support the claim that the meteorological knowledge of ancient India long ago identified concepts later illuminated by scientists such as Alexander von Humboldt. It was argued that the functions of modern weather instruments like the thermometer, barometer, and hygrometer were already known to ancient Indians who carefully observed the impact of stars, planets, and physical bodies on Earth's weather (CHCM: May 1906: 130–131). Most importantly, not only ancient Indian meteorological knowledge from Hindu Shastras on cloud formation, rain processes, seasonal cycles, the effects of lunar phases and days on weather, and astronomical calendar discussed in great detail, but also an appeal was made to conduct observations following the methods found in ancient Hindu literature, supplemented by the weather instruments of Western science. The purpose of the article was described as:

> The purpose of this article will be served if the authorities of the Central Hindu College will kindly arrange for taking observations on the lines found in our ancient Hindu shastras, aided by the instruments produced by western science for ascertaining the direction, velocity, etc., of the wind, and prepare forecast charts of the weather accordingly with a view to their verification by the actual conditions of the weather (*ibid.*: 131).

10 In the Sāṅkhya School, Prakṛti does not merely refer to matter or primordial nature but encompasses all cognitive, moral, psychological, emotional, sensory, and physical aspects of reality (Larson and Bhattacharya 1987: 65–66, et passim).

Besant herself wrote a series of essays titled "Hinduism: A Scientific Religion" published across several issues of The Central Hindu College Magazine, where she advanced a revivalist assertion that the scientific discoveries of the modern Western world did not stand in contradiction to the teachings and beliefs of Hinduism. Rather, she contended that Hinduism, in its essence, represented a harmonious synthesis of science, philosophy, and spiritualism (CHCM: June 1906: 136–137; CHCM: July 1906: 176–177; CHCM: August 1906: 204–205). According to Besant, it was Hinduism itself that provided a guiding framework for scientific inquiry, offering "the clue by which we may tread safely the labyrinth of science.". The article "The Shapes of Atoms," contends that the theories of German scientist Justus von Liebig and American psychologist William James were essentially a restatement of Advaita Vedanta, while terms like "*anu*" and "*paramanu*" from Hindu Shastra corresponded to atoms and sub-atoms in modern chemistry (CHCM: July 1906: 173). Even William Ramsay's discovery of the noble gases- helium, neon, argon, krypton, and xenon- were seen as being in harmony with or even confirming ancient Hindu knowledge. In February 1901, the "science Jottings" section of the C.H.C. magazine remarked:

> It is interesting to notice how these chemical investigations confirm the old eastern teaching that all goes by number and by weight in the manifested worlds. Here, we have an English scientists starting out to hunt for unknown elements, in full faith they must exist, because they were necessary to fill up gaps in a series. Many another discovery might be made, by following out hints in the sacred books (CHCM: February 1901: 45).

The Central Hindu College Magazine also featured a section, "Our Letter Box," where readers ask questions on various topics, including those related to the sciences. The following question from a reader and its response highlights the strong revivalist tendency to reconcile the metaphysical aspects of Hinduism with modern science.

> Q. We read in astronomy that the sun and moon are both uninhabitable, the former on account of intense heat and the latter on account of the absence of atmosphere; on the other hand we read in our Puranas of Suryaloka and Chandraloka. Which of these two contradictory statements is right?
>
> Ans. In the first place, Suryaloka and Chandraloka are not situated in the physical sun and physical moon; Suryaloka is on the manasic plane and Chandraloka on the higher astral. So there is no contradiction in the two statements. Further, astronomers do not know enough about the conditions of the sun and moon to make any positive statements about them which can be relied upon. Further still, as people

who go to these lokas are not in their physical bodies, the physical conditions there would not affect them (CHCM: October 1905: 249–250).

4 CONCLUSION

The central hindu college of benares exemplifies how modern science was not merely introduced into colonial India as a Western import but was reimagined and adapted within the Indian cultural framework. The science education at C.H.C. challenged the simplistic view of modern science as an exclusively Western imposition, demonstrating instead a complex interplay between modernity and tradition involving the processes of localization and naturalization, accompanied by contestation. Annie Besant's vision for national education embraced Western scientific knowledge as vital for material progress while simultaneously upholding and respecting ancient Indian cultural and educational ideals. Unlike colonial institutions, the philosophy that guided education at C.H.C. emphasized incorporating modern science and technology within a framework that honoured India's traditional values, particularly those rooted in Hindu Dharma. This approach ensured that the education offered was both modern and, at the same time, deeply rooted in the Hindu heritage of the country so as to address the needs of Indian society under British rule. Such an approach to education serves as a pedagogical departure from the colonial educational system. By harmonizing Western science with India's traditional knowledge, C.H.C.'s educational framework avoided the extremes of uncritical Westernisation and reactionary revivalism, offering a balanced and holistic approach to education.

By integrating the scientific learning of the Hindus as embodied in Ayurveda and Jyotisha with scientific knowledge of the West at C.H.C., Annie Besant created an educational system designed to meet the needs of an emerging nation. This system was not merely academics; it was indeed the political and cultural expression of nationalism that aimed to assert India's intellectual sovereignty against colonial dominance. While this integration also led to tensions, particularly when modern science came into conflict with the metaphysical aspects of Hinduism, it did not really result in a switch of consciousness. Indian nationalists managed to appropriate modern science and yet be a traditionalist. At C.H.C., as we have seen in this paper, religious and moral education was imparted alongside science education. This unique experiment proved to be successful and served as a model for many educational institutions established in late colonial India on "national" lines. The C.H.C.'s chemistry department was most successful, which greatly owes to its founder's theosophical interests. Under Arthur Richardson, a well-trained and accomplished chemist, the college developed a well-equipped chemical laboratory to ensure good facilities for teaching and research. Besant, with her vision of equipping Indian youth with practical skills for industrial and agricultural progress, also made some arrangements for technical training as well. This focus on technical education highlighted an early understanding of the role of scientific and technical knowledge in advancing industrial growth and national prosperity in India. The educational philosophy at C.H.C., reflected in its curriculum and institutional practices, contributed to the national dialogue on science and religion, striving to harmonize the demands of modernity with a deep appreciation of India's ancient heritage.

ABBREVIATIONS

CHCM "The Central Hindu College Magazine" (1901–06), *The Central Hindu College Magazine*.

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