Recognizing African-American contributions to neurology: The role of Solomon Carter Fuller (1872–1953) in Alzheimer’s disease research

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Abstract
Solomon Carter Fuller (1872–1953) is widely acknowledged as the first African-American psychiatrist but underappreciated as a pioneer of Alzheimer’s disease. He immigrated to the United States from Liberia at age 17 and excelled in his medical career to become associate professor of both pathology and neurology at Boston University by 1921. He was one of five research assistants selected by Alois Alzheimer to work in his laboratory at the Royal Psychiatric Hospital in Munich, an experience that arguably paved the way for trailblazing research in Alzheimer’s disease. Dr Fuller was the first to translate much of Alzheimer’s pivotal work into English, including that of Auguste Deter, the first reported case of the disease. He published what is now recognized to be the first comprehensive review of Alzheimer’s disease, in it reporting the ninth case ever described. His achievements, in a period when African-American physicians were under-represented, merit greater recognition.

1 | INTRODUCTION
Racial inequality remains a considerable problem in society worldwide. For Black and African-American individuals, it is a sobering and painful reality that has persisted for almost six decades since the Civil Rights Act was passed in 1964. However, in recent months, a rising crescendo of protest against racial discrimination has emerged in the United States and internationally. It has become a modern-day social renaissance, not only seeking to bridge the gap between races but also to rediscover and recognize previously neglected Black, Asian and minority ethnic (BAME) influences in society.

Medicine is no exception: The role of BAME physicians in pioneering disease research is rich but relatively under-recognized in modern medical literature. Dr Solomon Carter Fuller, the focus of this article, is widely acknowledged as the first African-American psychiatrist and, alongside his contemporary Alois Alzheimer, a trailblazer of dementia research. Yet at the time of writing (August 4, 2020), a simple PubMed search for “Solomon Carter Fuller” or “Solomon Fuller” in the “Title” field yielded a mere 2 results, compared with 41 when replaced with “Alois Alzheimer.”

By delving into his life, experiences, and contributions to neurology, this brief biography seeks to unravel the obscurity that has veiled the accomplishments of Solomon Carter Fuller in Alzheimer’s disease research, and in doing so aims to mark a step in the broader recognition of the influences of physicians of ethnic minority background in medical advancement.

2 | METHODS
A literature search of the following databases was performed to identify pertinent articles relating to the life and/or work of Solomon Carter Fuller: PubMed, Cochrane Database of Systematic Reviews, MEDLINE, EMBASE, and Google Scholar. All databases were searched
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The Journal of the Alzheimer’s Association

Research in Context

1. Systematic review: The author reviewed existing literature using traditional (e.g., PubMed and MedLine) sources and meeting abstracts. Primary sources, published by Dr Fuller, were identified and reviewed where available and digitized. Several key secondary sources were used to support interpretation of Dr Fuller’s published material and are appropriately cited. Despite this, detailed knowledge of the life and works of Solomon Carter Fuller remains limited and merits recognition given his contributions to neurology.

2. Interpretation: In being arguably the most concise yet holistic review of Dr Fuller’s life and academic achievements to date, this article highlights the need for further medico-historical research into Dr Fuller’s life and research in Germany.

3. Future direction: This article seeks to provide a basis for greater recognition of physicians of BAME background in medicine, and prompt reflection of racial discrimination faced by these physicians.

from their date of inception to August 2020, with selected references exported and formatted using EndNote X9. Specific search terms and Boolean search modifiers included “Solomon Carter Fuller” and “Solomon Fuller.” No restrictions on language or publication date were placed.

3 | BIOGRAPHY

Dr Fuller (figure 1) was born on August 11, 1872 in Monrovia, Liberia; his paternal grandfather had emigrated from the United States to Liberia upon buying his and his wife’s freedom from slavery. His father, a coffee planter and government official, oversaw Fuller’s education on the plantation during his formative years, although it was his maternal grandparents, both medical missionaries in Liberia, who were thought to have influenced Solomon’s interest in medicine.1

At age 17, Fuller left Liberia for the United States and attended Livingston College in North Carolina, a historically Black private institution founded to support higher education among African Americans. Graduating with a BA degree in 1893, he subsequently began his medical career as a student at Long Island College Hospital in Brooklyn, New York.2 Just 6 years earlier, the college had admitted Dr Susan Smith McKinney, the third African-American woman to hold a medical degree in the United States and the first in the state of New York for post-graduate study.3 Dr Fuller completed his medical education at Boston University with an MD in 1897 at 25 years of age. Here too, he joined illustrious company. In 1864, preceding Dr Fuller’s birth, Dr Rebecca Lee Crumpler graduated from New England Female College, an antecedent component of Boston University, to become the first African-American physician in the United States.4

Dr Fuller went on to complete a 2-year internship at Westborough State Hospital, Massachusetts.2 His interest in the study of neurological and psychiatric disease, and their neuropathological basis, led him to conduct post-mortem examinations voluntarily during this period. Through doing so, Fuller was appointed Hospital Pathologist and Instructor of Pathology at Boston University following his internship in 1899.2

Three years later, at age 30, Fuller joined Professor Edward Dunham at Bellevue Medical College, New York, with the aim of enhancing his technical histological skills and obtaining further post-mortem examination exposure. Dunham was a leading pathologist in the United States at the time, having spent 1 year working in Robert Koch’s laboratory in Berlin, where he established the use of sulfuric acid as a test reagent in the identification of Vibrio cholerae, a test known today as the “Cholera-red” or indole reaction.5

Dr Fuller’s important role in Alzheimer’s disease research began to unfold in 1904, when he was one of five foreign laboratory research assistants selected by Alois Alzheimer to work at the newly created Royal Psychiatric Hospital at the University of Munich, then headed by renowned psychiatrist Emil Kraepelin. Information regarding Dr Fuller’s life and work in Germany is limited and may reflect the general air of invisibility and anonymity that research assistants worked within at the turn of the 20th century.1 Further medico-historical research is warranted to fill this gap in our knowledge of Fuller’s life, not least because it covers a defining period in his career. Such information may shed light on Fuller’s interactions with Alzheimer and his reception and treatment being an African-American academic working in Germany.

Nevertheless, in addition to working with Alzheimer, Dr Fuller also worked to broaden his grasp of microbiology at the university’s Institute of Pathology with Professors Otto Bollinger and Hans Schmaus. The former had researched extensively in veterinary medicine and the latter was more focused on spinal cord pathology.2

The secondment in Germany was short-lived but impactful; Fuller returned to Westborough Hospital in 1905, continued his role as neuropathologist, and founded and edited the “Westborough State Hospital Papers,” a journal that published local research activity. His interest in the eponymously named Alzheimer’s disease, coined by Kraepelin in 1910, led him to write extensively and become a leading authority on the subject.

In 1919, at age 47 years, Fuller resigned from Westborough Hospital and dedicated his time to medical education at Boston University. He became associate professor of neuropathology that year and 2 years later associate professor of neurology. Despite holding these positions and being the only African American on the faculty at the time, Fuller found himself on the receiving end of racial discrimination. He was paid less than his fellow white professors and not formally acknowledged on the university’s payroll.6 From 1928 to 1933, he acted as chair of the Department of Neurology yet was not actually afforded the title. In fact, his retirement in 1933, at age 61, came after a junior white assistant professor was promoted to full professorship and appointed the official departmental chair, a move Fuller felt may not have occurred.
had he been white. In his own words, Fuller commented, “With the sort of work that I have done, I might have gone farther and reached a higher plane had it not been for the colour of my skin.”

Upon his retirement, Fuller was given the title of emeritus professor of neurology at Boston University, although he continued to practice neurology and psychiatry in Massachusetts and for a period in Pennsylvania. He began to suffer increasingly from diabetes, such that by 1944 he had lost his eyesight completely. At age 81 in 1953, Dr Fuller died of diabetes and gastrointestinal malignancy. Shortly before his passing, he was visited by the neurologist Dr James Ayer who remarked, “though blind, his memory was excellent, his speech flawless, his interests alive. He knew he had not long to live, but accepted the fact in his usual, philosophical manner, like the perfect gentleman he was.”

4 | CONTRIBUTION TO NEUROLOGY

Dr Fuller’s contribution to neurology and, more specifically, Alzheimer’s disease, is understated and more impressive given the odds he faced as an African American in what was then a primarily white male–dominated profession.

In 1907, following his return from Munich 2 years earlier, Fuller published a case series describing the neuropathological features on autopsy of patients diagnosed with conditions including “dementia paralytica”, “dementia senilis,” and chronic alcoholism. In it he reported abnormal neuronal appearances and the presence of neurofibrils in cases of “dementia senilis” and “dementia paralytica”, while also recognizing the influence of Kraepelin and Alzheimer in furthering his career in Germany and their input in dementia research to date.

Four years later, in one of the first studies to appraise the role of senile plaques in aging, Fuller supported Alzheimer’s observation in refuting the role of arteriosclerosis in plaque formation and questioned the importance of plaques and neurofibrillary pathology as hallmarks of Alzheimer’s disease.

Dr Fuller’s seminal piece came in 1912 when he published, in two parts, the first comprehensive review of Alzheimer’s disease at the time. As well as reviewing 11 known cases and translating Alzheimer’s original case in English for the first time, he also described the ninth recorded case of the disease. Dr Fuller’s patient was a 56-year-old man with a 2-year history of memory impairment, receptive dysphasia, and apraxia. Autopsy revealed “regional cerebral atrophies,” a degree of large vessel arteriosclerosis, extensive plaque presence, and intracereellar “Alzheimer degeneration,” comprising a “tangled mass of thick, darkly staining snails and whirls of the intracellular fibrils,” reflective of neurofibrillary tangles.

In the same year, Samuel Fuller and his colleague Henry Klopp described a case of suspected Alzheimer’s disease that did not exhibit intracellular neurofibrils on autopsy, yet bore senile plaques and clinical similarities to previously diagnosed cases. In recognizing the case as “an example of the group now designated as Alzheimer’s disease,” Fuller and Klopp unequivocally accepted Alzheimer’s disease as a clinical entity but stopped short of regarding it distinct from senile dementia altogether. To this end they judged Alzheimer’s disease to be an atypical type of senile dementia. Fuller’s academic interests extended beyond neurology in that he published broadly on subjects ranging from pernicious anemia in the “insane” and the effects of belladonna on animal tissue, to melancholia and “manic-depressive insanity.” In a non-research capacity, Fuller was critical in establishing a foothold for African-American physicians in psychiatry through his selection and training of three young trainees at Tuskegee Veterans Administration Hospital, Alabama.

5 | DISCUSSION

Beyond an Honorary Doctor of Science degree awarded by Livingston College in 1943, Solomon Carter Fuller’s accomplishments in Alzheimer’s disease were relatively undervalued. In 1971, the Black Psychiatrists of America presented a portrait of Dr Fuller to the American Psychiatric Association, which recognized him as the nation’s first Black psychiatrist. Dr Fuller’s achievements were further celebrated in 1973 in a 1-day conference at Boston University. The following year, the Solomon Carter Fuller Mental Health Center was established via Massachusetts legislation to provide outpatient psychiatric services and facilitate research and education.

Unfortunately, despite Fuller’s work and subsequent post-humous recognition of African-American influences in neurology and psychiatry, there remains a racial disparity in the provision of mental health care in the United States. African Americans share a frequency of mental illness similar to that of their White counterparts, yet have reduced access to mental health services and appropriate treatments. Recognition of this inequality is particularly crucial...
outstanding physician who excelled in a country where his grandfather had been enslaved and obtained his freedom. His career trajectory may have been greater had he not been African American, yet this did not hold him back from becoming a pioneer in Alzheimer’s disease research.

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6 | CONCLUSION

The latter half of the 19th century was witness to a period of enlightenment in neurology that was propelled by celebrated figures including William Gowers, John Hughlings Jackson, and Alois Alzheimer. Dr Fuller is another such figure but whose name and achievements have largely been ignored by the annals of history.

Raised from humble beginnings in Liberia, Fuller overcame overwhelming odds in an environment hostile to African-American progress to become one of a select few to pioneer dementia research. His translation of Alzheimer’s work, combined with his own observations, arguably enabled the concept of Alzheimer’s disease as a novel clinical entity to spread throughout the English-speaking world. However, detail of Fuller’s experiences in Germany are limited and merit further research. In addition to barriers to academic progression, they appear to suggest a relucancy within society at the time to acknowledge African-American excellence in medicine.

Solomon Carter Fuller was a father and husband, a keen gardener, and master bookbinder. For the scientific community, he was an
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