

¹The newsletter title has been changed from **Aphasia Insights to Plasticity Insights** to encompass brain function and plasticity as the foundation of all learning as well as recovery.

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From: Brenda Milner, Dr. <>
Sent: Tuesday, April 18, 2023 1:50 PM
To: Tom Broussard <>
Subject: Brenda Milner's article re: science and scientists

Hello Tom:
unfortunately, at the venerable age of 104, Dr. Milner no longer provides such services as she is also retired from McGill University. Thank you for your understanding & good luck with your projects!

Aphasia Nation, Inc. is committed to educating the wider public about stroke and aphasia and the "Aim High for Aphasia!" international Aphasia Awareness campaign.

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Plasticity Insights!¹

Brenda Milner: Aphasia, Patient H.M. and a Hero of the Engram.

By Tom Broussard, Ph.D.

This is the next in a series of articles about the science and scientists behind the brain, stroke, aphasia, plasticity and recovery.

Brenda Langford Milner (July 15, 1918) [CC](#) [GOQ](#) [FRS](#) [FRSC](#) is a British-Canadian [neuropsychologist](#) who contributed to the research of [clinical neuropsychology](#). Milner was a professor in the Department of Neurology and Neurosurgery at [McGill University](#) and professor of Psychology at the [Montreal Neurological Institute](#) ([Wikipedia](#)).

Dr. Milner was born on July 15, 1918 in [Manchester](#), England. Her father [Samuel Langford](#) was a musical critic, journalist, and teacher. Her mother Leslie Doig Langford, was musically talented too but Brenda was not interested in music. She was tutored in [mathematics](#) and the [arts](#) and graduated with a B.A. degree in [experimental psychology](#) in 1939 ([Wikipedia](#)).



@The Neuro (Montreal Neurological Institute-Hospital) Newsletter

**Brenda Milner
(July 15, 1918)**

Brenda met [Peter Milner](#) in 1941 and married in 1944. They left for Canada where Peter, an electrical engineer, had been invited to work on atomic research. They travelled to Boston on the [RMS Queen Elizabeth](#) together with other "[war brides](#)". Upon arrival in Canada, she began teaching psychology at the University of Montreal ([Wikipedia](#)).

Brenda Milner had graduated with a M.A. in experimental psychology at Cambridge and became a Ph.D. candidate in physiological psychology at [McGill University](#) under the direction of [Donald Hebb](#).

While working on her Ph.D., Milner and Hebb presented research on a patient who had undergone a [medial temporal lobectomy](#) with subsequent memory impairment. That drew the attention of [Wilder Penfield](#) ([Wikipedia](#)).

Milner moved to the McGill [Montreal Neurological Institute](#) (known as "the Neuro") under the supervision of Penfield (Xia, 2006). She studied the behavior of [epileptic patients](#) treated with [ablation](#) of brain tissue to treat uncontrolled seizures.

She earned her Ph.D. in experimental psychology in 1952 with her dissertation on the [cognitive effects of temporal lobe damage in man](#).

Milner's paper provides a chapter entitled, "Aphasia and the Left Temporal Lobe" (Milner, 1952) and recorded the need for "precise information concerning the location of a speech area" for surgery without undue damage within the temporal lobe.

Penfield mapped the area for subsequent brain surgery by applying electrical stimulation on various folds in the exposed brain to know if it hit the speech area or not ([Penfield & Rasmussen, 1950](#)).

As Penfield remarked, "touches the cortex with a stimulating electrode and, since the brain is not sensitive, the patient does not realize that this has made him aphasiac until he tries to speak, or to understand speech, and is unable to do so" (Penfield, 1975, pp. 51).

Milner's study noted that applying the electrode created aphasia for the patient that stopped once the electrode was removed. As a result, any subsequent surgery in the area near to the anterior cortex "can safely be made without causing more than a transient aphasia" patient (Milner, 1952).

As Milner reviewed the effects of Penfield's surgeries, Penfield presented two cases of surgery about the medial temporal lobe. As a result, he received a call from a neurosurgeon, [Dr. William Scoville](#) from Hartford, CT. about one of his patients (patient H.M.) with similar memory impairments (Squire, 2009). Milner was invited to study H.M. in 1955, and that was the beginning of almost five decades of study with H.M., mostly by Milner but with other colleagues too.

Patient H. M., [Henry Molaison](#), became the most famous memory patient and "the most studied individual in the history of neuroscience" (Dittrich, 2016). He was born in Manchester, CT. on February 26, 1926 and died on December 2, 2008. He had [grand mal seizures](#) that started at 16 years old.

Dr. William Scoville conducted surgery to remove both medial temporal lobes,

including the hippocampus, to help stop the seizures. The surgery was partially successful in controlling H.M.'s seizures but left him with severe amnesia and no short-term memory (Milner, 2016). The search for Lashley's ever illusive [engram](#) had started again.



Wilder Penfield in tie/vest & Brenda Milner (early 1970's)

Engram was coined by [Richard Semon](#) (1859-1918), a German zoologist and an evolutionary biologist as described in [The Mneme](#) (Semon, 1921).

An engram is described as an "entity that reflects the neural substrate of stored information resulting from past experience and bestowing upon organisms the ability to express memory in their behavior" (Josselyn, 2017).

Milner realized that short-term memories are localized in the hippocampus, which had been removed in H.M.'s surgery. As noted in the article, [Heroes of the Engram \(2017\)](#), Milner is now one of the seven heroes of the engram that include; [Richard Semon](#), [Wilder Penfield](#), [Karl Lashley](#), [Donald Hebb](#), [James V. McConnell](#), and [Richard F. Thompson](#) (Josselyn, 2017).

As Thompson stated, "The discoveries we have made will be listed in the textbooks as facts not associated with names, and this is as it should be. Unlike other approaches to knowledge, science knowledge is cumulative" (Josselyn, 2017).

Brenda Milner stood on the shoulders of other scientists looking for and finding the engram of memory.

Signed: *The Johnny Appleseed of Aphasia Awareness*

The author is a three-time stroke survivor and has aphasia as a result of the strokes. He continues to recover his language skills.

He is Founder and President, Aphasia Nation, Inc., a non-profit organization whose mission is educating the wider public, national and international, about aphasia and plasticity, the foundation of all learning.

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