Academic Genealogy of Neurosurgery via Department Chair

Robert Ziechmann, Haydn Hoffman, Lawrence S. Chin

■ BACKGROUND: **An academic genealogy describes mentoring relationships in an academic discipline. In this study, we outline an academic genealogy of neurosurgery department chairs in the United States beginning with the founding members of the field.**

■ METHODS: **The biographic information provided by the Society for Neurological Surgery provided the basis for our genealogy. We also performed a literature review with PubMed using the term *neurosurgery department history*. Our data was manually uploaded to an online database called Academic Tree. Within this platform, mentor and trainee relationships were indicated to produce an academic genealogy.**

■ RESULTS: **Our search yielded a total of 377 chairs and 368 mentoring relationships across 98 neurosurgery departments. The largest family tree in our academic genealogy was that of Harvey Cushing, with 177 department chairs. Harvey Cushing was also the individual who trained the most number of department chairs (22). The institution that trained the most department chairs was Brigham and Women's Hospital (26). Only 23.6% of department chairs completed residency training at the same institution where they became chair.**

■ CONCLUSIONS: **The academic genealogy in this study allows for any neurosurgeon trained in the United States to put his or her training into historical context. It also provides a reference for bibliographic research to quantitatively describe the influence of individuals and institutions on the field.**

INTRODUCTION

Less than a century ago the first meeting of the Society of Neurological Surgeons (SNS) was held in Boston, Massachusetts.[1] The founding members included Harvey Cushing and Charles Frazier, who had dedicated their careers in the previous decades to neurosurgery, but most attendees were general surgeons who were interested in the emerging field. Today, nearly every member of the field can trace his or her academic lineage to these founders through the department chair of their residency (or in earlier cases, fellowship). We have traced the major threads of the academic genealogy of neurosurgery via each department chair where neurosurgeons have trained.

Our study includes an online database hosted by Academic Tree, which can be accessed at academictree.org/neurosurgery. Academic Tree began with an academic genealogy for neuroscience known as NeuroTree, and the site now hosts projects for dozens of academic fields.[2] As with these other genealogies, our project offers an opportunity to learn about the broader historical context of one's training. We began this study with the neurosurgery department chair because neurosurgical training, like all surgical training, has its origins in the apprenticeship model of Cushing's mentor, William Halsted. This provides a minimum framework to add other forms of mentorship including fellowship and residency program directors.

In addition to a historical framework, this study provides data for further analysis in terms of trends in publications and, through these trends, insight into how different individuals and institutions approach clinical, translational, and basic science problems. Differences ascribed to academic genealogy have previously been reported in the extent to which high-grade gliomas are resected and by the degree to which vascular neurosurgeons favor endovascular versus open surgical approaches.[3,4] This academic genealogy provides an accessible, user-friendly source to further explore these and other relationships.

Key words
- Academic
- Chair
- Genealogy
- Neurosurgery

Abbreviations and Acronyms
SNS: Society of Neurological Surgeons

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Citation: World Neurosurg. (2019) 121:e113-e118. https://doi.org/10.1016/j.wneu.2018.09.023

*Journal homepage: **www.journals.elsevier.com/world-neurosurgery***

*Available online: **www.sciencedirect.com***

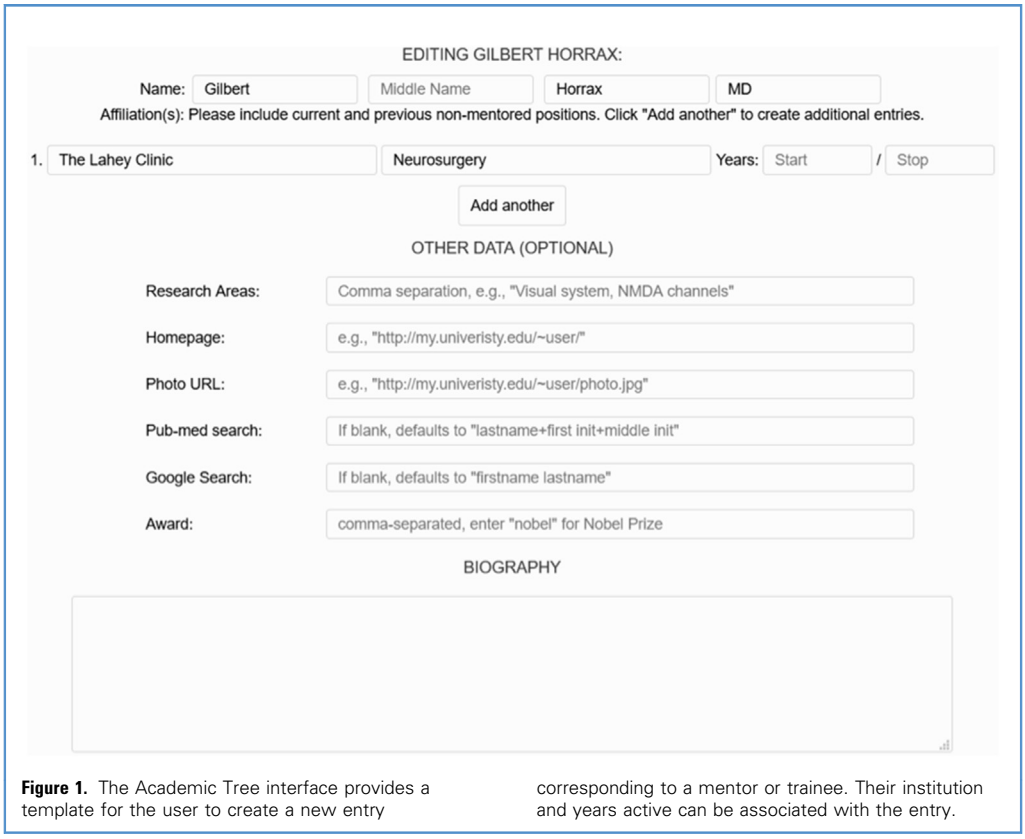

Figure 1. The Academic Tree interface provides a template for the user to create a new entry corresponding to a mentor or trainee. Their institution and years active can be associated with the entry.

MATERIAL AND METHODS

The biographic profiles maintained on the website of the Society of Neurological Surgeons served as the groundwork for this academic genealogy.[1] When possible, dates and training connections were confirmed through histories published by individual neurosurgery departments or via the department website.[5-23] A literature review was performed with PubMed using the term *neurosurgery department history* to obtain additional information regarding the careers of mentors and their trainees. We then used the Academic Tree interface to enter biographic and bibliographic information pertaining to department chairs and their trainees. An example of 1 entry is shown in Figure 1. The interface included the ability to tag particular research interests and to link to a specific PubMed profile. We began by entering the "founders" of the field, as defined by attendance at the first SNS meeting. We then identified their trainees and repeated this process in a chronologic fashion. For those who trained in the modern era, we considered a trainee a descendant of a department chair if the trainee completed his or her residency training program with that chair. For those who trained before formalized residency programs, we considered the trainee a descendent of the chair and program where they first had a formal neurosurgical training experience (typically in the form of a fellowship), unless the SNS biography specifically mentioned 1 experience being formative.

Once an individual entry was created, we linked mentors and trainees through another template (Figure 2). The connection was categorized as division chief, fellowship/program director, research mentor, or research assistant. Both department chairs

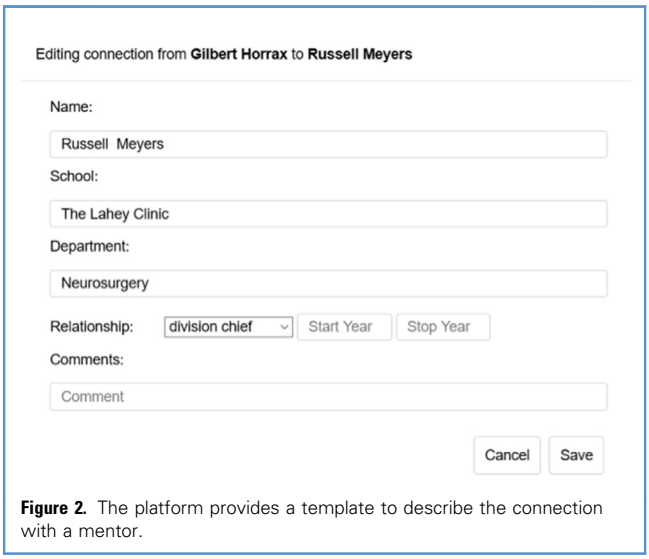

Figure 2. The platform provides a template to describe the connection with a mentor.

and division chiefs were listed as department chairs due to the format of the platform; all entries refer to department chairs unless noted. Further detail can be added about where and when the training took place.

As the database grew, a graphical representation of the academic genealogy was produced. Figure 3A–F represents the trainees of Harvey Cushing, William Mixter, Charles Frazier, Charles Elsberg, Ernest Sachs, and Alfred Adson, who ultimately rose to the position of neurosurgery department chair or division chief.

The database we describe is accessible to the public and, as with the other academic trees, the project relies on community-based efforts to maintain the integrity and accuracy of the data. Users are encouraged to report inaccuracies (as well as privacy concerns) via the built-in error reporting system.

RESULTS

We uploaded information for a total of 377 neurosurgery department chairs to the academic tree, with 368 connections between them. There were 98 neurosurgery departments represented in our analysis.

The genealogy of training beginning with Harvey Cushing accounted for 177 department chairs, which was the greatest out of all genealogies we constructed (Figure 4). He was followed by William Mixter (44), Charles Frazier (41), Charles Elsberg (36), Ernest Sachs (29), and Alfred Adson (9). Each genealogy included active department chairs except Adson's. The first generation of each genealogy is represented in Figure 3. The institution where the most department chairs trained was Brigham and Women's Hospital, where 26 trained. This was followed by Massachusetts General Hospital (25) and Columbia University (21). Figure 5 illustrates the top 15 institutions ranked by number of department chairs trained. Harvey Cushing was individually responsible for training 22 department chairs, which was the greatest out of all neurosurgeons in our analysis. Figure 6 shows the remaining top 20 neurosurgeons who individually trained the greatest number of department chairs. Out of the 377 neurosurgery department chairs included in the academic tree, 89 of them (23.6%) completed their residency training at the same institution they became chair, while 247 of them (65.4%) did not.

DISCUSSION

Previous research has described portions of the academic genealogy of neurosurgery but has been limited to individual departments or department chairs.[1-3,6,7,9-15,17-22,24] To the best of our knowledge, this report is the first to provide a comprehensive description of these relationships across departments and through the history of the specialty. As previously stated, this genealogy will allow any trainee to trace his or her academic lineage through his or her department chair to the founding members of the profession. For nearly half of the field today, that founder is Harvey Cushing as his genealogy accounts for 46.9% of department chairs in our analysis. The proportional contribution of each of the lineages we have described may, of course, change as currently all but 1 of the founders' lineages have active department chairs.

As with other published academic genealogies, we were interested in academic fecundity. In this case, fecundity was defined as the number of department chairs trained. This number serves as a rough approximation of the number of neurosurgeons trained by their respective programs, as well as the academic output. Further research would be needed to describe these relationships because of the variation in size and academic output of neurosurgery departments.[25]

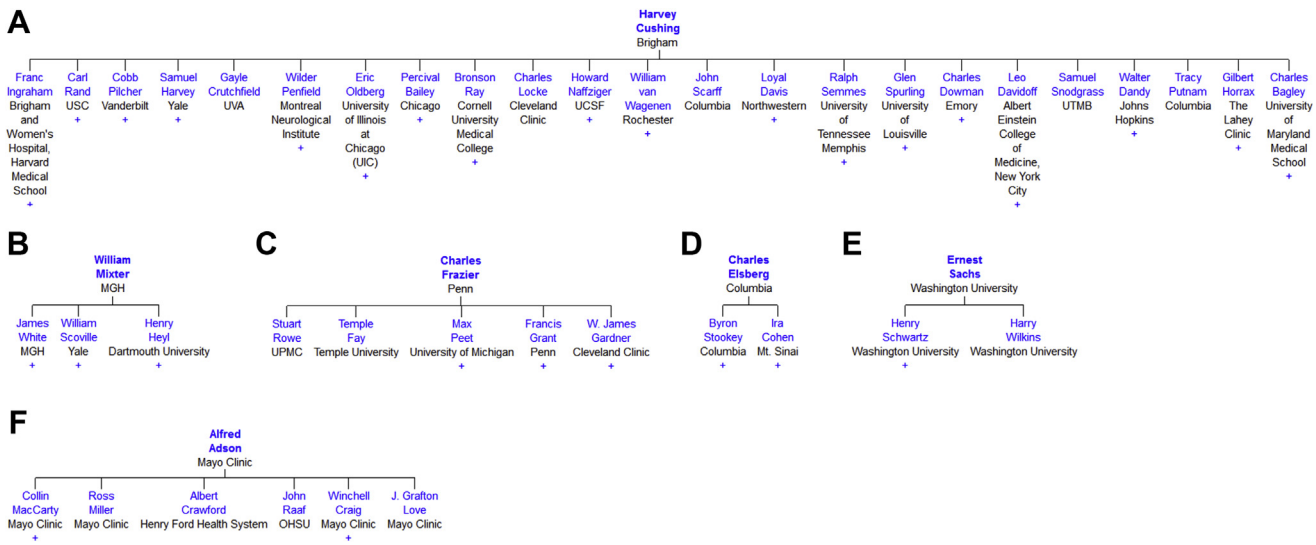

Figure 3. Founders of neurosurgery and their trainees who became department chair or division chief.

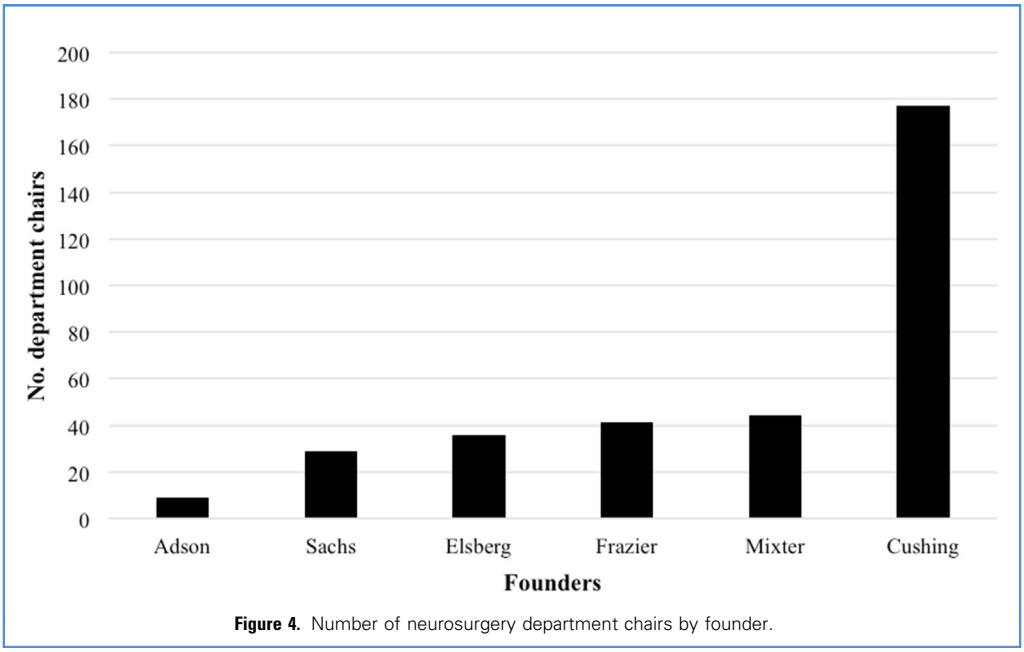

Figure 4. Number of neurosurgery department chairs by founder.

The institutions that produced the greatest number of department chairs in our analysis were the Brigham and Women's Hospital (n = 26), Massachusetts General Hospital (25), and the Neurological Institute of New York/Columbia University (21). Reviewing only current department chairs, as a recent study reported, the greatest number had done residency training at Massachusetts General Hospital (8), University of California, San Francisco (8), and University of Michigan (6).[24] That study also found that those who would become chair had a greater academic output as measured by the h-index.[5] Institutions with

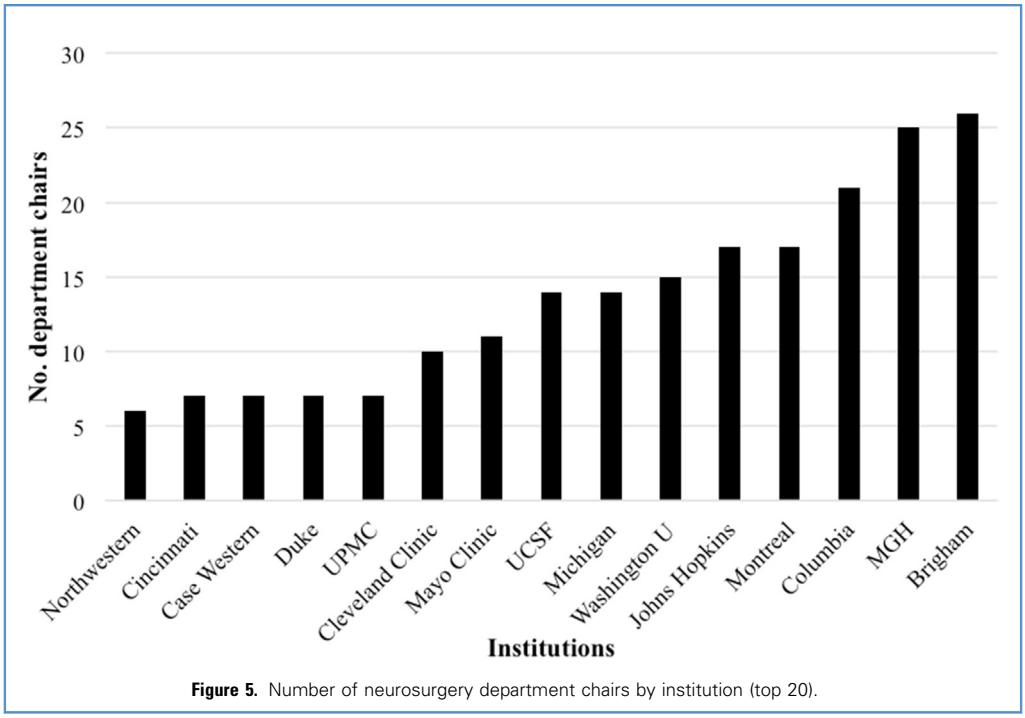

Figure 5. Number of neurosurgery department chairs by institution (top 20).

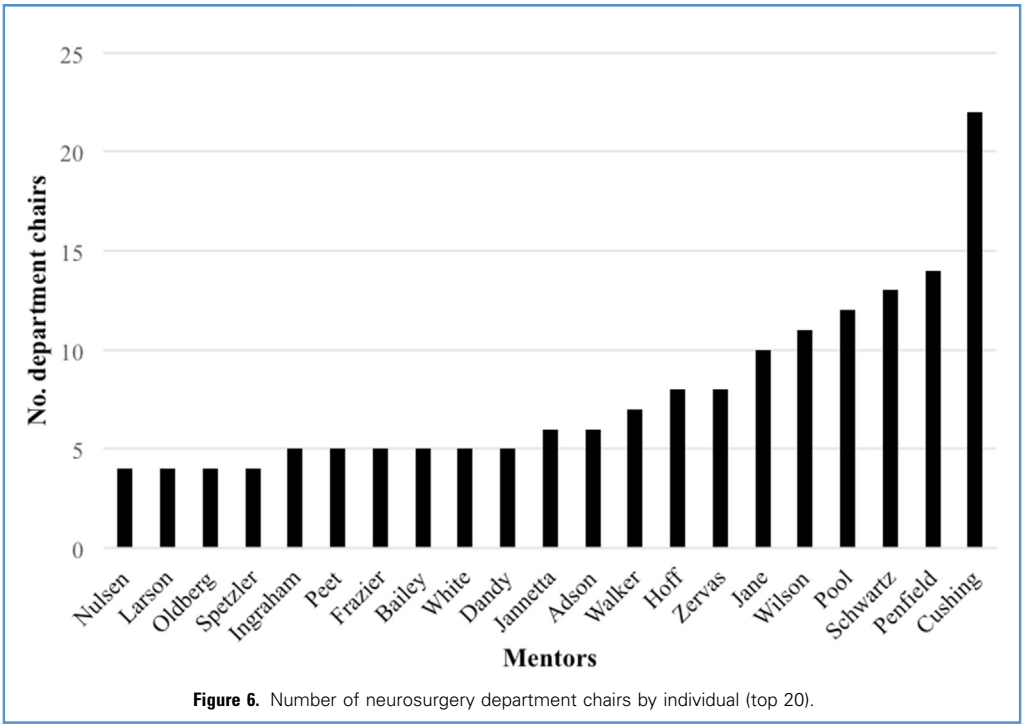

Figure 6. Number of neurosurgery department chairs by individual (top 20).

the greatest academic output between 2000 and 2009, however, were not necessarily those that produced the greatest number of number of chairs: the University of Pittsburgh, the University of Virginia, and the University of California, San Francisco.[25]

We found that only 23.6% of department chairs had done residency training at the institution where they would become chair. In the previously mentioned study of current department chairs,[24] 61% had either done residency training where they are now chair or had previously been staff at the institution where they would become chair. This suggests that the process by which neurosurgery departments recruit chairs has changed over time.

Limitations of our analysis include missing data from a few new programs, as well as some that are no longer in existence, which was not available at the time of data collection. A more comprehensive academic genealogy would include residency training outside of the United States, as well as the academic genealogy of neurosurgery subspecialties through relationships between fellowship directors and their fellows. The Academic Tree provides a platform for all of this information to be added. Our genealogy is also limited by incomplete or unavailable biographic data (e.g., in the case of the neurosurgical training of William Peyton from the University of Minnesota). Likewise, because Dr. Peyton started the University of Minnesota's program de novo, he is not considered a "founder" under our current methodology, although some may consider him one. The platform is open to user modification, and this information may be completed by visitors to the site. Future efforts might include adding chairmen from other countries who trained with the founders included in our genealogy. We look forward to community participation and hope that the tree will continue to grow well beyond this initial effort.

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Conflict of interest statement: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Received 3 June 2018; accepted 4 September 2018

Citation: World Neurosurg. (2019) 121:e113-e118.
https://doi.org/10.1016/j.wneu.2018.09.023

Journal homepage: ***www.journals.elsevier.com/world-neurosurgery***

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