Editorial

Why Jules Gonin Achieved His “Audacious Goal Initiative”—and Why He Is a Model for the Present Day
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The journal Science gained national attention in March 2015 with a news feature on the winner of the National Eye Institute’s Audacious Goal Initiative competition. The National Eye Institute’s winning choice was “to regenerate neurons and neural connections in the eye and visual system.” The article, entitled “Second Sight: Eye Transplants Are Science Fiction. A Team of Researchers Wants to Change That,” implies this goal is within reach in the foreseeable future.

Rolling back the calendar 100 years, we find in ophthalmology the achievement of another audacious goal. In the early 20th century, the foundations for the modern techniques of cataract surgery, corneal transplant surgery, and treatment of glaucoma and strabismus were in place already, but the idea that a detached retina could be reattached, made to stay in place, and resume its normal function was an audacious notion on a par with any Jules Verne fantasy. Yet an obscure young ophthalmologist in Lausanne, Switzerland, believed that a functioning retina could be reattached permanently, and he determined both the cause of spontaneous retinal detachment and its treatment. The chronicle of Jules Gonin’s (1870–1935) great discovery is one of the oft-told tales in the history of ophthalmology, and there are lessons to be learned from it that apply today.

Success, and so it was for Gonin, starting with his upbringing. By nature and by nurture, he was well prepared. His father was a classics scholar and printer, his mother the daughter of a pharmacist, and together they encouraged his interest in science, particularly his passion for butterflies, which he collected and sketched until the end of his life, with increasing skill. His parents oversaw his education at the College Galliard, the Cantonal gymnasium, and the Ancienne Académia in Lausanne, and they approved his choice of medicine as a career.

While a medical student at the University of Lausanne, he served as locum tenens to the resident officer at the Asylum for the Blind (Hôpital de Asile des aveugles). Marc Dufour (1843–1910) was the first professor of ophthalmology in Lausanne (1890) and the chief at the hospital. He became Gonin’s mentor and role model. Dufour had trained in ophthalmology with Liebreich in Paris, Horner in Zurich, and von Graefe in Berlin and had also studied pathology in Paris and Wurzburg. He took Gonin on as his assistant in 1896 and opened doors for him to meet the leading ophthalmologists of the day.

In 1904, Dufour focused Gonin’s attention on the subject of retinal detachment by assigning him coauthorship of the chapter on diseases of the retina in the great Encyclopédie Francaise d’Ophthalmodogy. Gonin’s review of the pertinent literature confirmed what he and Dufour already knew: the pathogenesis of idiopathic retinal detachments was essentially unknown, and no effective treatment existed. A number of hypotheses had been advanced, but there was no supporting evidence. Ernst Coccius and others had observed retinal tears soon after the introduction of Helmholtz’s ophthalmoscope in 1850, but the consensus was that a tear was a secondary occurrence.

Even before they began their encyclopedia article, Gonin and Dufour had looked carefully for tears in their idiopathic retinal detachment patients. They could positively identify tears in 60% of these eyes, and “in other cases the difficulties of ophthalmoscopic examination let us assume the tears could be present.” They had a technological advantage over many of their contemporaries: although many still used the direct reflecting ophthalmoscope derived from Helmholtz’s instrument, Gonin and Dufour depended on a modified indirect ophthalmoscope (Fig 1A) based on Reute’s “inverted image instrument,” which offered a more complete and better illuminated view of the peripheral fundus where many of the tears occurred (Fig 1B).

By this time, pathology was appreciated for revealing the pathogenesis of disease processes, which often gave insights as to cause. Microscopes were being manufactured as fine scientific instruments by the late 19th century, but meaningful histopathologic examination still awaited the development of the microtome, paraffin embedding, and synthetic aniline dyes. All these had become available by Gonin’s time. Thus, the tools were in place when Dufour suggested to Gonin that, in anticipation of the 1904 International Ophthalmology Congress in Lucerne, he examine histopathologically the 70 enucleated globes with retinal detachments that Dufour had accumulated in

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his years of practice. Among these, Gonin identified 3 that were “spontaneous or idiopathic detachments of recent occurrence,” and he saw retinal breaks in each one. If there was a eureka moment for Gonin, this was it. He committed himself to proving that retinal tears were the cause of idiopathic detachments and to developing a treatment using thermocautery (ignipuncture) to seal them.

After Dufour’s death in 1910, it was left to Gonin to convince the world. It took him nearly 20 more years to do so. Two major societal and cultural advances helped to make this possible: the internationalization of science and medicine and the education and empowerment of women. The first International Ophthalmology Congress was held in Brussels in 1857 and met at approximately 5-year intervals thereafter. From the 1904 meeting in Lucerne until the 1933 meeting in Madrid, retinal detachment was a key topic. Gonin’s work was initially met with skepticism, but he progressively gained supporters who confirmed his findings. At these meetings, Gonin’s extraordinary talent for languages and his ability to speak several of them fluently added to his effectiveness.

In the late 19th and early 20th centuries, Switzerland was unusual in being open and welcoming to women who wished to train in medicine. It was one of Gonin’s female students, Noëlle Chomé-Bercioux (1898–1990), who proved invaluable in helping to establish his methods on the standard of care for retinal detachments. In July 1929, she filled in for her exhausted chief at the critical Thirteenth International Ophthalmological Congress in Amsterdam, ably describing his surgical methods and results. She was the first female ophthalmologist in Lausanne, and she remained associated with Gonin until his death in 1935. Chomé-Bercioux gave tours and demonstrations to ever-increasing numbers of visiting ophthalmologists, freeing her mentor to concentrate on his work. More importantly, with her background in mathematics and engineering, she brought precision and order to his disorganized files of 38,000 private patients.

Other influential women were, not surprisingly, his family members. Gonin’s wife, the former Helene Roud, lovingly and unobtrusively handled his correspondence and manuscript preparation, working from his dictation. His daughter Gabrielle played a major role in the preparation of his classic text Le Décollement de la Rétine published in 1934, the year before his death.

As Gonin’s success in treating retinal detachments achieved growing recognition, the number of patients referred to him continually increased. His associates at the university and in his private clinic arranged their practices to allow him to concentrate on these patients, making him perhaps the first true retinal specialist. He operated on senile cataracts only when they became mature. When not in the clinic, he
pursued his studies in “a tiny, untidy laboratory no larger than a cupboard.”14

The story of Jules Gonin’s triumph in achieving his audacious goal initiative may, by today’s standards, seem quaint, the product of a cottage industry. But his straightforward approach was used effectively by others who made important discoveries in that era, including x-rays,15 the electrocardiography,16 insulin,17 and penicillin.18 Moreover, Gonin’s approach anticipated the methods of contemporary science: his focus on a particular tissue and disorder, his development of a support team, his use of the latest technology, the superb articles that documented his progress and his final great monograph, and his use of national and international meetings to disseminate his findings and ideas.

It is true he did not have to confront some of today’s challenges. For instance, the nature of his research did not require applying for major funding to support state-of-the-art laboratories with technical staffs. His clinic and “cupboard-sized laboratory,” which were self-funded, sufficed for his needs. Nor had medical ethics progressed to a point where developing animal models or seeking permission from an institutional review board were a requirement. And his training in medicine and ophthalmology fully qualified him for his work, without the need for a PhD.

Still, the basic qualities required of a physician-scientist in Gonin’s generation are essentially the same as those needed to help us meet today’s audacious goal initiative challenges. Although they are subjective and somewhat varied, there is a remarkable consensus among scientists and educators about what these qualities are:19–22: a high level of intelligence, analytical thinking, and problem-solving skills; creativity; a vision to be achieved; the ability to articulate it and a passion to pursue it; perseverance, patience, and resilience; self-confidence and the ability to take risks; a faculty for self-examination and the capability to adapt; interpersonal skills in leadership and working in teams as well as networking and forging links with collaborators; technical, scientific, and numerical skills; attention to detail; and a bit of luck.

Many scientists succeed with only some of these skills. Gonin possessed them all, and that is why he achieved his audacious goal of finding the cause and treatment for retinal detachment and why he can serve as a role model for visual scientists taking on audacious goals now and in the future.

References