WILLIAMS COLLEGE

Forensic Science and Reproductive Technologies

I The Sloan Grant to Williams College

In 1985, Larry Kaplan, professor of Chemistry at Williams College, got a call from his Dean that the Sloan Foundation wanted a scientist and a nonscientist representing Williams to attend a week-long workshop at M.I.T. The Dean told Professor Kaplan that his colleague, Professor Rosemary Tong from the Department of Philosophy would also be attending. They found themselves, as he remembered in 2015 when he was interviewed, being introduced to “a whole lot of tech stuff.” But as a result of the Sloan NLA initiative, he saw an opening for Prof. Tong and himself. He easily envisioned adding new technological tools to “Chemistry and Crime“, a chemistry course for non-science majors he had begun teaching in 1981. In conjunction with Professor Tong, he proposed that they develop a comprehensive, team-taught course in Reproductive Technologies in which he would provide the scientific and technological components and she would explore the ethical and legal issues involved.

II Reproductive Technologies

The scope of reproductive technologies was expanding at the time Rosemarie Tong began collaborating with Larry Kaplan. There were the old technologies (contraception, sterilization, and abortion) and the newer technologies (*in vitro* fertilization, surrogacy, cloning, and gestational motherhood). The course was taught against a background in a then new field of bioethics and from an even newer perspective, that of a feminist bioethicist. Tong was determined to stretch the non-science/non-technical students who took her course at Williams. Young people were motivated by the fact that they and people they knew were going to be using the newer technologies.

Both remember (being interviewed in 2015) how much the philosopher and the chemist enjoyed alternating every two or three lectures and, even as much, attending one another’s. While Kaplan was teaching the science of the new technologies, Tong raised the ethical and philosophical implications which were either reproductive aiding or reproductive controlling. In addition to formal lectures, students met in discussion sections, where it was not inappropriate (as it might have been in most science classes) to explore students’ beliefs and opinions on issues such as forcing third-world women to have Depo-Provera implants in their arm so that they would not have more children; even whether birth-control pills should be made available to American women on welfare.

Ultimately, Kaplan and Tong wrote a book, *Controlling our Reproductive Destiny: A Technological and Philosophical Perspective*, published by MIT Press as part of the Sloan book series. But their collaboration had even more lasting consequences. When Rosemarie Tong moved on to more comprehensive universities (where she had students from health and human services), she founded a Medical Humanities Program in which she continued teaching a variation on the course. But, even more profoundly, she recalled decades later, her collaboration with Larry Kaplan "molded my interest as a scholar." From a research scholar in feminist thought, she became a Distinguished Professor in Health Care Ethics where, for the remainder of her career (she retired in 2014), she found herself "doing energetic teaching across the disciplines."

III Forensic Science

Professor Kaplan had introduced "Chemistry and Crime," his non science majors course in chemistry, as a means of extending Williams students' science (not technological) literacy. This occurred, as he remembers, before forensics became a popular subject; even before the TV show CSI. As he developed the course, he decided to introduce key concepts with case studies, leading with *questions* instead of *answers*. Traditionally, he would have started a standard chemistry course with a theoretical concept and then added a few cases to illustrate the concept. The Chemistry of Crime grew quickly to 120 students every semester. Prof. Kaplan eventually became a regional and national consultant on teaching forensic science as a means of introducing concepts in science and technology to majors as well as non-science majors. With a grant from the National Science Foundation, he has offered week-long workshops designed to train college and university faculty in forensic science. The NLA grant gave him an opportunity to add additional technology (drug testing) to his Forensics lab.

In his teaching and in the Workshops, Larry Kaplan refers to the Reproductive Technology course in discussing presumptive drug detection in urine. As he explains, the same technology used for detecting hormones, such as luteinizing hormone for predicting ovulation and HCG for predicting pregnancy, has become widely used for detecting a variety of drugs or drug metabolites.

IV The Innovation Goes Deep into the Theory and Practice of Teaching Non Majors

The course for non-majors that Larry Kaplan teaches, now 35 years after the initial offering, matches students' interests with students' capabilities and demonstrates what it is that forensic scientists *do*. His *mantra* is to start with a question – in the case of the Kennedy assassination, for example, was there (as was once thought) a "magic bullet" that could account for the effects? And its corollary: How can we find out how many bullets were fired at JFK on that fateful day in Dallas? From which questions he

invites his students to consider how they would judge – from a collection of bullet fragments – whether the fragments had been fired from the same gun? Or the same batch of bullets? There were, as it happens, a number of fragments retrieved from the site of the assassination. And students proceed to learn how to tell – through chemical analysis – whether they had come from the same bullet, no less the same gun.

Once the class is motivated to find the answer(s), it is not difficult to persuade them they have to know something about atomic structure, so that as researchers they can characterize trace elements.

In the same way, he would explain that investigators trying to determine the age (authenticity) of the Shroud of Turin, would have to know something about radio carbon-dating, which, in turn requires a knowledge of neutrons, electrons, and protons. This route to atomic structure, he would argue, is a far better way to reach non-majors than *starting* -- as his colleagues would feel obligated to do even when teaching non-majors – with atomic structure. Kaplan compares his approach to what was at the time a well-known wine commercial which stated “We will serve no wine before its time.” The analogue for chemistry and more broadly science instruction would be “We introduce no concepts until they are needed to understand a question.”

To illustrate this point, Kaplan taught a unit in the Chemistry of Crime which revolved around the question of how Napoleon died. Of “natural causes” or was he drugged or poisoned? In order to proceed analytically, students must understand the scientific and technological aspects of drug and poison detection and identification – key investigative tools in forensics. Later, the class studies blood typing and DNA profiling. All the while, Kaplan insists he is teaching forensic chemistry the way scientists do research chemistry, namely starting his students with a problem and challenging them to determine which tools they will need to solve the problem; in turn, mastering these.

V Labs

At the outset, Kaplan did not have a laboratory program for “Chemistry and Crime.” He relied, rather on demonstrations in class. But after a few years, he felt it would be better for the students to have hands-on experience with the tools and techniques of forensic science to better understand the underlying concepts. He set up a series of experiments that could be performed by students on a voluntary basis, experiments such as fingerprinting and/or alcohol detection in breath. But when 90 students of the 120 enrolled wanted to do experiments, it became obvious to Kaplan that a full-fledged four-hour weekly lab, was appropriate for even the non-science majors in the class.

Still later, more experiments were added as Kaplan staged crime scenarios and, as part of processing the crime scene, students collected evidence. In the lab, they

proceeded to analyze that evidence, along with additional evidence submitted by the "police" as new suspects were either implicated by the analysis of the evidence or otherwise identified by the police.

At a summary meeting of recipients of New Liberal Arts grants (*Science,* News 7 Comment.13 April 1990, p. 157) that featured Larry Kaplan's course, John Truxal, co-NLA director, described the use of modern technology as a vehicle for motivating students and guiding them.

> Traditional science for nonscientists courses are usually non-mathematical, watered-down versions of the normal introductory courses…Introductory courses are designed to give future majors everything they need to continue on to more advanced classes. *But a student, who is only going to take one physics or chemistry or biology of geology course needs* both *much less and much more*. (Italics added).

Larry Kaplan's course, as he intended it in the 35 years he has taught "Chemistry and Crime" is exactly that, much less and much more.

VI Coda

During their two-part Interview in the Fall of 2015, Professors Tong and Kaplan reflected on the impact of the courses they developed with support of the Sloan Foundation's New Liberal Arts program. They believe, as has been documented here, that the courses they taught at Williams, Kaplan's in forensic chemistry, Tong's (in conjunction with Kaplan) on reproductive technologies, changed the direction of their teaching lives. But except for the impact those courses had on the students in those classes, did not have a significant impact on the Williams College curriculum.