Retraction

THE REPORT "PREVENTION OF CHEMOTHERAPY-induced alopecia in rats by CDK inhibitors" (*1*) harbors a fundamental inaccuracy. Although the chemical structure of compound **4** is correct as presented, we have not been able to reproduce the biological activity of this compound in the neonatal rat model of chemotherapy-induced alopecia. Thus, we must retract our results. We are continuing to investigate several compounds from another structural class of CDK inhibitors that block chemotherapy-induced alopecia in this model.

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Letters to the Editor

Letters (~300 words) discuss material published in *Science* in the previous 6 months or issues of general interest. They can be submitted by e-mail (science_letters@aaas.org), the Web (www.letter2science.org), or regular mail (1200 New York Ave., NW, Washington, DC 20005, USA). Letters are not acknowledged upon receipt, nor are authors generally consulted before publication. Whether published in full or in part, letters are subject to editing for clarity and space.

The Discovery of the Electric Shock

IN A MODERN WORLD OF RUBBER SOLES, linoleum floors, and the dry air of central heating, the small pain of an electric discharge spark is an everyday occurrence. It is difficult to imagine the excitement the phenomenon caused when first discovered in the 18th century. It went so far that professional performers carried out experiments with static electricity at fairs and in pubs (*1*, *2*). The static charges were mostly created with rubbed glass tubes or so-called electricity machines.

Stephen Gray (1666–1736) was the first to demonstrate that a human being can be electrified. He showed that a boy, suspended from the ceiling by strings of "Hair-line" or silk, could be made to attract "Leaf-brass" after having been exposed to a rubbed glass tube (*3*, p. 39–40).

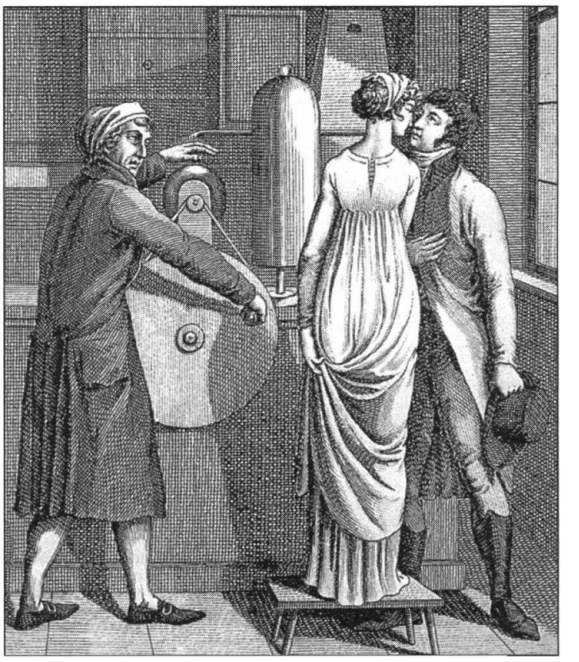
In 1734, Charles Dufay published a paper in which he wrote, "I suspended a Child on Silk Lines, and made all the surprising Experiments described by Mr. Gray. But having tried the Experiment upon my own Body in the same manner, I observed several things very remarkable... if another Person approach me, and pass his Hand within an Inch or thereabouts of my Face, Legs, Hand or Cloaths, there immidiately issues from my Body one or more pricking Shoots, with a crackling Noise that causes to that Person as well as to my self, a little Pain resembling... the burning from a Spark of Fire..." (*4*, p. 261–262).

A few months later, Gray very courteously gave Dufay full credit for discovering the electric shock (*5*, p. 17).

In 1766, Anna Williams (1706–83) published a book, *Miscellanies in Prose and Verse* (*6*). In a note to the poem "On the Death of Stephen Grey, F.R.S." (*6*, pp. *42–43*), she writes: "The Publisher of this Miscellany, as she was assisting Mr. Grey in his experiments, was the first that observed and notified the emission of the electrical spark from a human body." It is clear that Anna Williams is very much aware of the importance of what she claims as her discovery. She has not merely "observed"; she has also "notified."

Most papers and books on Gray published over the years (*7–12*) make a brief reference to Williams, but none point out the puzzling fact that she claims the honor of a scientific discovery that Gray publicly acknowledged to have been made by Dufay.

Anna Williams came to London in 1730. In 1740, she went blind. Her fate caught the attention of Samuel Johnson, and she lived in his home for many years. In a letter from 1754, Johnson writes: "she understands chimistry and many other arts with which Ladies are seldom acquainted" (*13*, p. 232–233).



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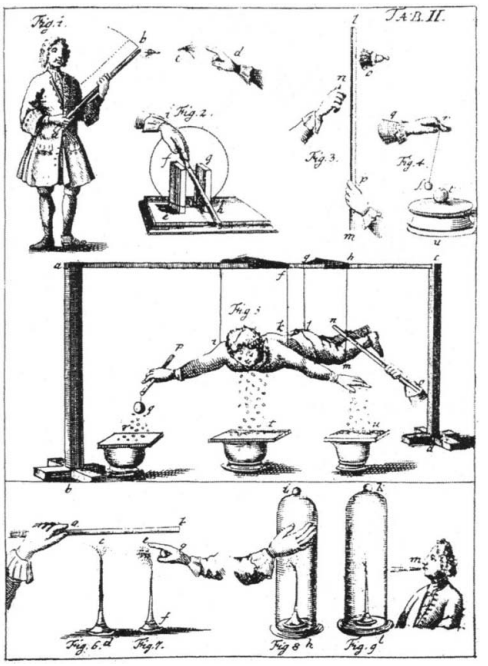
A popular experiment with "*homo electrificatus*" was to electrify a woman and have a man approach her for a kiss (*16*, *17*). Anonymous copper-plate engraving (circa 1800).



Gray's experimental procedures. Copperplate engraving from a 1744 text by J. G. Doppelmayr.

Why did Gray not discover the electric shock? Dufay, as he himself points out, used an identical experimental setup. Perhaps the explanation is that Gray, as the excellent scientist he was, had developed a "standardized" experimental procedure. He electrified his object and measured the degree of electrification by means of the leaf-brass. He must simply always have kept the glass tube between himself and the experimental subject. Bearing this in mind, it is plausible that an assistant could have discovered the phenomenon by accident as he/she adjusted the leaf-brass stand while Gray held the glass tube.

However, if Williams really discovered the electric shock while working with Gray, why did he not publish it? Was he unwilling to acknowledge his assistant's insight before it was too late? Gray was said to have a difficult character. His close acquaintance Desaguliers wrote of him: "I was unwilling to interfere with the late Mr. Stephen Gray, who had wholly turn'd his Thoughts that way; but was of a Temper to give it intirely over, if he imagin'd, that any thing was done in Opposition to him" (*14*, pp. 186–187).

An alternative explanation is that Anna Williams was simply a fraud; she may have observed "the electrical spark," but not until after Dufay, or she may not have been truly aware of its importance until after she had read his paper. If this is the case, she must be one of the earliest examples of a woman trying to "steal" scientific honor.

Perhaps the real truth lies somewhere in between. From the following passage in Boswell, one might infer a certain tendency in Williams to overestimate her own achievements: "['On the death of Stephen Grey'] appeared to me to be undoubtedly Johnson's. I asked Mrs. Williams whether it was not his. 'Sir (said she, with some warmth,) I wrote that poem before I had the honour of Dr. Johnson's acquaintance.' ... I mentioned it to Johnson...His answer was, 'It is true, Sir, that she wrote it before she was acquainted with me; but she has not told you that I wrote it all over again, except two lines'" (*15*, p. 26).

The full truth about Anna Williams's contributions to science will probably never be revealed, but—rightfully or not—it was important for her to let the world know that the "emission of the electrical spark from a human body" was her discovery.

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The Paucity of Grants Among Young Scientists

A RECENT NEWS FOCUS ARTICLE ("NIH grantees: where have all the young ones gone?", E. Goldman and E. Marshall, 4 Oct., p. 40) and Editorial ("Getting older," D. Kennedy, 11 Oct., p. 323) document and decry the dramatic decline in NIH grant support to scientists below the age of 35 during the past two decades. Let me raise some anecdotal evidence for another concurrent phenomenon that may have contributed to the problem.

I believe that some academic research groups in the top 20 U.S. research universities have grown disproportionately during the past 20 years. In my own discipline, chemistry, in the 1970s, a research group of 20 under a single P.I. would have been considered very large. Now plenty of "superstars" are the sole P.I.'s for groups ranging from 35 to 50 graduate students and postdocs. Universities and grant-giving institutions have tolerated or even promoted this tendency, while ignoring the heavy associated nonfinancial penalty. Converting this personal impression into hard figures could be accomplished quickly with little cost by requiring the top 20 research universities to determine the current size of the largest five research groups (responsible to a single P.I.) in each department of relevance to the NIH. If my impression is substantiated, then imposing an upper limit of 20 to 25 members per single P.I. might liberate several million dollars annually. To provide a true incentive, allow the "savings" to remain within the university by diverting them exclusively to peer-approved grant applications by young faculty members or for initial start-up funds for new junior faculty members.

The benefit of such a step goes beyond the financial "spread the wealth" factor to the impact it would have on the conduct of academic research in those universities that represent the pool from which the future superstars are generally drawn. Every P.I. will testify that the raising of funds, the writing of grant proposals, accounting requirements, and the myriad new bureaucratic burdens of the past 20 years have eaten into the productive time of senior investigators. Add to this the time dedicated by these superstars to increasing involvement with industry; the time demands of the many outside lectures, consultations, and travels in addition to the standard teaching and committee requirements of the university; and 5 to 6 hours of daily sleep and perhaps half a Sunday for weekly downtime: Barely 2 hours per day would be left for proper mentoring by senior investigators. For a research group of 30 graduate students and postdocs, this would leave 4 minutes per day per person.

If the top 20 research universities could be persuaded to carry out the suggested survey, why not go a step further and ask the members of the five largest research groups in each relevant department to estimate the weekly time available for one-on-one meetings with their P.I.'s? Indeed, why not attempt an experiment I have proposed twice before (*1*, *2*)? Most American universities now require detailed evaluations by undergraduates of their teachers. Why not institute the same procedure for graduate students and postdocs in terms of the mentoring qualities of their preceptors? I have outlined (*1*) a brief questionnaire that could be answered in a few minutes. After having done this experiment myself, I suggested it to the chairs of some major chemistry de-

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