
Letters to the Editor

Corrections on Mac Lane's Article

Saunders Mac Lane's memories of mathematical life in Göttingen immediately after January 30, 1933 (*Notices*, vol. 42, October 1995, 1134–1138), when he was a foreign student there, are inevitably interesting, as he is one of the few surviving mathematicians from that time. However, either Professor Mac Lane, or more likely the *Notices* editor responsible, should have done a better job of editing these reminiscences. To wit:

“Richard Pohl” should be Robert Pohl.

“Hans Freudental” should be Hans Freudenthal.

“Edward Tornier” should be Erhard Tornier.

“Karl Ludwig Siegel” should be Carl Ludwig Siegel.

Under the picture (p. 1137) “Schwertfager” should be Schwerdtfeger (his first name was Hans).

“Erna Barrow” should presumably be Erna Bannow, who, incidentally, later followed Witt to Hamburg, became his first doctoral student (degree awarded in 1939), and married him in 1940.

In this context it is not worth mentioning the missing accents on Brüning and Pólya or the curious spelling “Bertold” for Bertolt (Brecht).

Mac Lane also gets some historical things wrong.

(i) Moritz Geiger did *not* serve in the First World War—he was dismissed on September 26, 1933 (one month after Mac Lane's departure).

(ii) Mac Lane must have misunderstood Martin Kneser about his father-in-law. It was a great-great-grandmother of Hasse who was Jewish (her name was Itzig). I was shown this documentation by Martin Kneser in 1988. The “non-Aryan rules” for being a member of the NSDAP were far stricter than for anything else and required no non-Aryan ancestor alive in 1800. Hasse's great-great-grandmother in question was born in 1775. The story of Hasse's application for Nazi Party membership is very complicated. Suffice it to say here that he had a brother, Albrecht Hasse, living in Berlin who had been allowed to join the Party, and so Helmut Hasse had reason to believe he might be able to do so as well.

(iii) Max Dehn was *never* in Berlin as a professor, but was “habilitated” in Münster, and then was successively in Kiel, Breslau, and Frankfurt (where he succeeded Bieberbach in 1921). He fled in 1939, first to Denmark, and in a very arduous way finally came to the United States.

(iv) Richard Brauer was *not* in Berlin; his elder brother, Alfred (a well-known number theorist, though not as famous as his younger brother), was. When Richard emigrated in October 1933, he was a professor at Königsberg. Mac Lane may have been confused by the fact that both Alfred and Richard did doctoral dissertations in Berlin.

(v) I believe Hans Freudenthal left Berlin in 1931. He certainly did only narrowly escape the Nazis, but that was in Holland.

(vi) Hanna Neumann was not Jewish (her maiden name was vonCaemmerer). In January 1933 she met Bernhard Neumann, who was Jewish and who emigrated in August of that year to England. She became secretly engaged to him in 1934; she passed the *Staatsexamen* while still at Berlin and in 1937 actually started work on a

doctorate at Göttingen, to be supervised by Hasse. She did not leave Germany until July 1938 and married Bernhard secretly later that year. For more detail, her obituary in volume 17 of the *Journal of the Australian Mathematical Society* should be consulted.

(vii) Concerning the story about Pólya, since various versions of it circulate (e.g., see also p. 26 of the recent book *George Pólya, Master of Discovery*, by Harold and Loretta Taylor), the truth is perhaps worth presenting. On January 18, 1921, Pólya wrote Bieberbach (then in Frankfurt) a lengthy letter from Zürich (a copy is in my possession) in which the incident alluded to by both Mac Lane and the Taylors (following a taped interview with Pólya's nephew) is described. Incidentally, the context of this letter is that Pólya might be considered (the chance, in fact, was very remote) as Bieberbach's successor when he went to Berlin. Presumably Pólya in 1921 is rather more accurate about something that happened in 1913 than other people's secondhand memories many years later. So far as I know this is the first time this story has become public. Christmas 1913, Pólya was traveling from Zürich to Frankfurt and had an exchange of words with the young man sitting opposite him in the train compartment over Pólya's trunk, which had fallen down. Pólya, who was in an "overly irritated state", challenged the fellow to a duel. He refused, where upon Pólya punched him. It turned out that his unwilling opponent was the son of an important man and a student in Göttingen. Pólya had to leave Göttingen as a consequence. Pólya says, "privately the story is also not worth a defense." Thus, there were no anti-Semitic remarks as in the Taylors' version, and Pólya was the one who demanded a duel rather than the other way around. Pólya blames himself completely for the incident. Incidentally, Pólya does mention anti-Semitism elsewhere in the letter, so there is every reason to believe this version. Of course, neither Mac Lane nor Martin Kneser could have known about this.

In this connection, one must also mention Mac Lane's letter in the same issue of the *Notices*, when he hints

that his "good friend" Gerhard Gentzen "disappeared" when the Russians arrived in Prague. In fact Gentzen refused to voluntarily give up his university position in early April 1945; arrested in May, he was placed in a detention camp, where apparently he was murdered by Czech (not Russian) soldiers.

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P.S. In Mac Lane's recent piece in the *Mathematical Intelligencer* (vol. 16, no. 3 (1994), 9-10) an error relevant to this letter also occurs. The "mathematical anti-Semite" who said "Princeton ist ein kleines Negerdorf" was not in Berlin and was not insignificant. He was the great geometer Wilhelm Blaschke, who was in Hamburg.

Innovations in Mathematics Education

The AMS has been presented with an opportunity for positive action and change by Steven Krantz. He has presented readers of AMS publications with a collection of singularly unprofessional diatribes opposing change in the way we teach mathematics and attacking those who promote change. The most recent, in "Math for Sale", the editorial in the October 1995 issue of the *Notices*, carries the authority of the Society, since it was written by an editor and published by the Society.

Do you know that the Society has a Committee on Education? Do you know what it is doing? You can find out by going to the AMS home page on the World Wide Web. Do you know that the Society has a listserv for discussion of calculus reform issues? Will you find reference to it on the AMS home page? Not as this is being written. Is the Society serious about addressing problems in the teaching of mathematics?

I believe that the Society and its membership have a vital interest in questions about teaching mathematics. The questions are difficult, and points of view vary, but there is strong evidence to suggest that general improvement is possible.

I propose that the AMS take a stronger, more visible role in the discussion of the problems of teaching mathematics. I suggest the following action:

1. The *Notices* editorial board should invite a series of feature articles highlighting the kinds of change which are being implemented. There are many serious mathematicians who have taken a deep interest in this activity in recent years. Why have they done that? Why do they continue to do it? Is it, as Professor Krantz suggests, because that's where the big bucks are? I don't think so. Let's find out.

2. The Society should schedule mediated discussions at AMS meetings on the issues of change. The participants should represent various positions on the questions of change, and these should not simply be panel discussions. They should also not degenerate into debates, since debate implies confrontation, and in debate, victory tends to go to the glib participant. The goal should be information for the membership. I suggest discussion mediated by persons who are trained for that activity.

3. The Committee on Education should better highlight the Society's activities related to education at its Web site, and the Committee on Education should attempt liaison with other organizations interested in the same problems.

Seven years ago Jerry Uhl and Horacio Porta decided to try using new tools and ideas in teaching calculus to undergraduates. The Calculus&Mathematics project was born. I came along shortly after they started. We tried these things and were very excited by what we saw: first-year undergrads (and not just honors students) talking about mathematics in ways we hadn't seen before, students taking charge of their own explorations into mathematics, and students who could and did explain in their own terms what the calculus does and is. We were hooked. We have continued to invent and pursue change, and we are still excited by what we see happening.

Changing the way we teach mathematics is a serious enterprise and should not be demeaned by an opinionated, uninformed member of the *Notices* editorial board. Much of what

is going on is being done by mathematicians with long and respected service to the profession and to the Society. Those people deserve the support and respect of the organization, not what Steve Krantz would give them.

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Comments on Lorch's Letter

Obituaries published in JDMV have recently become a topic in letters published in the *Notices of the AMS* and the *Mathematical Intelligencer* [1], [2], [3]. We do not want to contribute to this discussion, which appears overly emotional and, by the quality of the arguments used, not suited for publications addressing a scientific community. Since our obituary [4] for Vojislav G. Avakumović has been dealt with at length, we feel obliged, however, to explain at least a few relevant facts.

1. Lorch [3] criticizes the fact that we do not supply information on the life circumstances of Avakumović during the German occupation of Yugoslavia. The reason for this is very simple: we do not know anything substantial about this period of his life nor does any friend or family member we were able to ask; all of them, including his wife, met Avakumović only after the war. He himself talked about his life at various occasions, but he did not mention this particular period either. Thus, all we can say is that Avakumović moved from the family estate in Semlin to Belgrad, where he lived in [the] house [owned by his brother], who was then ambassador of Yugoslavia to the United States. We can infer, though, that he was suffering like everybody else under the German occupation—a well-known fact of history which we have no intention to defend.

2. Lorch finds “quite a few personal and political remarks” in our text. Those which could be called “political” in the widest sense of the word are exactly two. The first one mentioning Tito is quoted by Lorch as follows: “Das Kriegsende brachte mit der kom-

munistischen Machtergreifung unter Tito in Jugoslawien auch für die Familie Avakumović tiefgehende Einschnitte” [4, p. 145]. Lorch does not quote, however, the explanation that follows: “Der Vater starb, die Familie verlor durch Enteignung den größten Teil des Besitzes, der Bruder emigrierte nach London.” We maintain that expropriation of the family, emigration of the brother, and denial of the right to emigrate to Avakumović's wife and children could be rightly termed “deep incisions in the life of the family”, but it escapes us how this could be read as “derision of the post-war Tito regime in Yugoslavia.”

The second remark mentions “die weltoffene Liberalität, die er (Avakumović) seiner noch von der Donaumonarchie geprägten Erziehung verdankte.” We have experienced Avakumović's “weltoffene Liberalität” many times in personal encounters, and this personal trait could easily and convincingly be related to his education, which happened to take place in the days of the Habsburg monarchy—that is what we are saying, and we do not see what is wrong here.

3. Lorch's criticism culminates in the passionate question, “What impression of history are the authors attempting to convey?” This reveals a basic misconception of what an obituary should be about: we see it as information for the mathematical community, concentrating on mathematical achievement and leaving a little room for homage paid by the authors, usually friends or students. Correctness of the facts communicated is a necessity; a critical evaluation of life and achievement in the context of the scientific and political background of the century certainly [is] not—it is beyond what a mathematician can usually do and must be left to the professional historian. In this respect we fully subscribe to the sober statements in [5].

Concerning Avakumović's mathematical achievements we feel it necessary to emphasize again that we hold them in high esteem. Of his 31 papers, published between 1935 and 1956, at least two (reference numbers 11 and 30 in [4]) have been truly influential and have earned a distin-

guished place in the history of their subject.

4. With no visible relation to their respective arguments, both Booss and Lorch feel obliged to remark that J. Brüning had some presumably important task in the restructuring of science in [the] former GDR after 1990, entrusted to him by the German federal government. Booss describes this task as “the liquidation of the academy of sciences of the former GDR.” Lorch refers to Booss (in a postscriptum) but does not hesitate to magnify the “official responsibilities” into a full-fledged “restructuring of the former German Democratic Republic.” Well, the fact is that the academy was indeed dissolved but, in its substance, by no means liquidated (a strong and lively Karl-Weierstrass-Institut, as its mathematical part, exists to this very day), and it is also a fact that Brüning had no part in these decisions. He was serving, though, on a committee appointed by the state of Berlin to rebuild the mathematics department of Humboldt-Universität. Every colleague can easily inform himself about the outcome.

One wonders about the motives of scientists who find it necessary to abuse the facts—readily available as they are—in such an irresponsible way.

References

- [1] L. LORCH et al., *Notices AMS* 41 (1994), 571–572 and 1101.
- [2] B. BOOSS-BAVNBEK, *Memories and memoirs*, *The Mathematical Intelligencer* 17 (1995), 15–20.
- [3] L. LORCH, Letter to the Editor, *Notices AMS* 42 (1995), 845–846.
- [4] J. BRÜNING and W. EBERHARD, Zum Gedenken an Vojislav Gregor Avakumović, *Jber. d. Dt. Math.-Verein.* 95 (1993), 141–152.
- [5] JAMES A. JENKINS, Letter to the Editor (with Editor's Note), *Notices AMS* 42 (1995), 847.

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From Barbados on Ethnicity

I wish to applaud Raymond Johnson for his informative and thought-provoking article "Conference for African American Researchers in the Mathematical Sciences at MSRI" (*AMS Notices*, December 1995). The socio-mathematical agenda of the conference and the personal commitment on the part of the participants are a source of encouragement and inspiration. There are interesting similarities and differences in a number of university/mathematical issues here in Barbados and some of those highlighted in the article. At the outset, I hope my letter makes a small contribution to sustaining the positive momentum generated at the conference.

Upon hearing the country name "Barbados", one probably imagines a tropical, sundrenched island paradise. While this picture is quite accurate, there are a few facts about the country which are of particular significance. Upwards of 90 percent of the total population here is of African descent, and essentially all of my students share this identical lineage. It is not at all uncommon to hear the label "Afro-Caribbean" when they are referring to themselves. As in North America, there exists a pervasive quest, particularly in young people, to seek identity, community, and affirmation in a rapidly changing society. Of course, such a desire is by no means unique to mathematics students. The "community concept" (p. 1496) is positive, defining, and a prominent feature of both the very small mathematics group at this campus and the almost infinitely larger group of African American students and researchers in North America. I find it encouraging that my observations in Barbados on this issue were distantly confirmed by participants at the conference.

Johnson writes about the mentorship concept (p. 1498). As a white Canadian male mathematician, the information I read on this topic has made me wonder to what extent and on what personal level my students can identify me as a mentor. Our campus is small, and as a country Barbados is minuscule. It is not difficult to imagine that the mentorship program here could well make a fine contribu-

tion to a student's mathematics education. For a variety of reasons though, very few mentees seek out a mentor who works in the natural sciences, and fewer yet in mathematics. A participant at the conference at MSRI, when commenting on one of its successes, revealed that, "...meeting people who could help me attain my goals of becoming a Ph.D. in mathematics. Gaining inspiration from those who have succeeded" (p. 1497). I ask again whether mathematics students here experience an "osmosis effect" with regard to motivating their potential in mathematics by way of any of their interactions with me? If they don't, are any of the reasons for this due to my ethnicity?

There are a number of indicators suggesting that Barbados will mature sufficiently over the next few years and hence attain formal developed-nation status within a decade or so. Implicit in this assertion is the necessary consumption of computer technology and ultimately a greater dependence on the expertise of its people in basic sciences and mathematics. In this sense and numerous others, the reality here and that in North America are vastly different. However, the issue of the environment in which one learns mathematics is universal. In Johnson's paraphrasing of some questions due to Lenore Blum, he recounts a particular aim of the conference (p. 1496). I also paraphrase by suggesting, as they do, that we "...create an environment where [West Indians] have a chance to do and learn mathematics in a way that most successful [white] male mathematicians take for granted" (p. 1496).

Each year a few of our final-year students make plans to pursue graduate studies in mathematics and computer science at a North American university. I was surprised, and felt somewhat naive, when several of these students revealed that an important factor that would influence their choice of school is its reputation as a "black university". The importance of an ethnically similar and accepting [university] community is emphasized in several places in Johnson's article and in mine. The comments on this issue from the conference, as well as from my own stu-

dents, will definitely enhance my understanding of and sensitivity to just how important the notion of community really is.

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Teaching from a Twentieth-Century Perspective

Recent letters and articles in the *Notices* seem to imply that calculus reform is the work of mathematical charlatans after soft money and superficial results. In your January 1996 issue, we were told by Greenman that "Mathematics is losing its soul. Its priests are pawning it off to a different god." In an editorial in an earlier issue of the *Notices*, Krantz declared that "It is time for pure mathematicians to close ranks and stand up for the integrity of our discipline." Indeed, as evidenced by the renewed popularity of traditional textbooks, the ranks may be closing already—reform might soon become a thing of the past.

If so, then McCallum's letter in your January 1996 issue may be prophetic where it states that "the academic mathematical community is in danger of having many of its responsibilities taken away from it, particularly its teaching responsibilities." Our students understand less and less of our traditional curriculum, and our graduates are less and less able to find meaningful work. More and more, the mathematical ideas used by scientists, businessmen, and engineers are being taught by scientists, businessmen, and engineers. If our response is to bury our heads in the sand, then it is only a matter of time before society buries the rest of us as well.

The problem is that mathematics has refused to change for so long that it now must regard progress as a crisis rather than as an opportunity. In a world that has been revolutionized by twentieth-century mathematics and science, mathematicians are committed to ignoring the mathematics and science of the twentieth century. Economics has benefitted

greatly from game theory, but have our undergraduates? An undergraduate chemistry curriculum would be laughable if it did not include spectroscopic methods, but even the simplest concepts of spectral theory are withheld from our students. In fact, our students graduate having never encountered the classification of the simple groups, having never numerically verified an analytical result, and having never encountered fixed point theorems, spinors, the simplex method, the traveling salesman problem, graph colorings, Hilbert's tenth problem, the Riemann zeta function, knots, etcetera, etcetera.

"Students must learn the old stuff first," we say. "Such ideas are too advanced for them." Thus we continue to produce nineteenth-century mathematicians who are completely unprepared for the twentieth century. And thus we ourselves continue to be little more than nineteenth-century mathematicians with a twentieth-century specialty. In contrast, John Winthrop of Harvard began teaching the works of Newton less than fifty years after the publication of the *Principia*. Our second president, John Adams, testified that "Mathematicks and natural Philosophy attracted the most of my Attention" while in college, and many of our other founding fathers have made similar statements.

Like Winthrop, we must also find ways to teach mathematics from a modern perspective, and that means we must regard teaching as more than the ability to plod through a book section by section. It means more than adding a course or two or modifying a syllabus here or there. As some of us have discovered, mixing the new and the old leads only to compromise, superficiality, and a great deal of frustration.

Instead, we must learn to teach all of our courses from a twentieth-century perspective. Measure theory is the proper setting for defining integrals, so we should drop Riemann's definition altogether. He certainly will not mind if it means including more of his geometry or number theory. My own experience has been that both my popularity and effectiveness as a teacher have increased in direct proportion to my efforts to reach a mod-

ern perspective. Even freshmen seem to prefer Lesbegue's definition, even though it really "blows them away". They like iteration and fixed point theorems. They can handle supremums and infimums, and they prefer them to epsilons and deltas. They even get excited about integration by parts when it is used to derive a simple version of Heisenberg's uncertainty principle. And my students have been successful in obtaining positions in both industry and academia, primarily because they were willing to work very hard on very hard ideas when those ideas seemed modern and relevant to the world around them.

As I mentioned earlier, I sense a strong urge in the mathematical community to return to the status quo. We seem to be asking ourselves, "If we just do things the way we have always done them—with a few new wrinkles, of course—then are we really failing our students?" In a society that cannot engage in a meaningful discussion of its economic health, in a time when most of our students will never encounter the letters FFT, in an age when the technology we rely on is based on mathematics our graduate students will never see, and in an international climate where mathematicians and scientists rarely contribute to international opinion, I believe the answer is an undeniable "Yes, we are failing our students."

In fact, I cannot help but think of the Librarians of Alexandria, who, according to H. G. Wells, were within two hundred years of the Library's inception "...shy, eccentric, unpractical, incapable of essentials, strangely fierce upon trivialities of literary detail, ... For him no method of copying was sufficiently tedious and no rare book sufficiently inaccessible....For many precious generations the new-lit fires of the human intelligence were to be seriously banked down by this by-product." If we are indeed becoming the new Librarians of Alexandria, creating a vast wealth of knowledge that to the society we live in is increasingly strange and meaningless, then history tells us it will be our ruin.

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Erratum

The March 1996 issue of the *Notices* carried an article entitled "Downsizing at Rochester: Mathematics Ph.D. Program Cut". On page 303, the article states that, as part of the formulation of the Rochester Renaissance Plan, administrators interviewed three faculty from each department at Rochester. The article erred in saying that only two faculty from the Mathematics Department were interviewed; three mathematics faculty members were in fact interviewed. After the three interviews took place, the chair of the Mathematics Department asked the administration to interview a fourth member of the department, and although the administration agreed to do so, this fourth interview never took place.