

DID EINSTEIN ESPOUSE HIS SPOUSE'S IDEAS?

In the April 1988 issue (page 124) K. Suchy comments on Albert Einstein's statement in a letter to his then-fiancée, Mileva Marić: "How happy and proud I will be when the two of us together will have brought our work on relative motion to a successful conclusion." As John Stachel wrote in his "Einstein and Ether Drift Experiments" (May 1987, page 45), "this comment raises the intriguing question of the nature of Marić's role in their collaboration." For me this statement is the proof of something I had suspected ever since Ronald Clark's *Einstein: The Life and Times* (World, New York) appeared in 1971.

Clark tells us that "the men and women against whom [Einstein] was brushed by the chances of everyday life, were only too ready to admit that relativity was beyond them... with Mileva the situation was different, for was she not a physicist like her husband? Had she not, in fact, got just enough 'little learning' to enter the new world he had created if only he would spare the time to explain things? The answer was 'No,' but she would never believe it."

But what was this "little learning" Clark speaks of? As it happens, Mileva received essentially the same education in physics that her husband received. Both completed the course work at the Zurich Polytechnic Institute; Albert barely satisfied the requirements for the degree, while Mileva never completed a thesis—at least not one that carried her name. With or without her degree, Mileva Marić must have been a unique woman. To this day women do not come to physics in large numbers. When I was working on my doctorate at the University of Maryland in the early 1960s, though we had some 500 graduate students in physics, there were (most unfortunately) only about three who were women. But for a woman at the turn of the century, of apparently modest means, to have had the drive to seek out an education in physics, surely she must have been remarkable.

Stachel goes on to say that Ein-

stein's "letters to her contain references to joint study of books, requests for her to look up data, and one or two other mentions of joint work; but these letters give no indication of any ideas she contributed to their work." Yet only ten letters from Mileva to Albert Einstein from this period have been found. One may wonder if there were other letters that for some reason were not so carefully retained.

I cannot help but see Mileva and Albert Einstein working as a team, hoping together to achieve the kind of husband-and-wife recognition that had come to Marie and Pierre Curie. Mileva Einstein and Marie Curie were in fact good friends, sufficiently close that the two families went on holiday together in the Swiss Alps. I cannot imagine these four people together, considering Mileva's own drive to obtain an education in physics, without the idea of some shared fame coming to her mind. And yet one cannot watch theoretical physics easily, the way one could see the two Curies year after year at work on the chemical separation of radium from tons of pitchblende. Mileva undoubtedly would have seen the wisdom of building the reputation of her husband at her own expense, if need be, so that he could obtain a university post. But once he obtained such a post and such recognition, the lack of that shared dream could have come back to strain their marriage.

Albert Einstein and Mileva finally separated in the summer of 1914. Their years together saw Einstein's greatest achievements: His physics was filled with daring concepts of space and time distorted, of gravitation's being only a distortion of the space-time metric, of photons that truly were packets of energy—not just as a mathematical device, as Max Planck thought, but as a reality. And his work was filled with the immediate implications of the most recent and detailed findings of the current physics. But after his marriage to Mileva ended, his physics became conservative. He added the cosmological constant to his equations so that they would predict the physics every-

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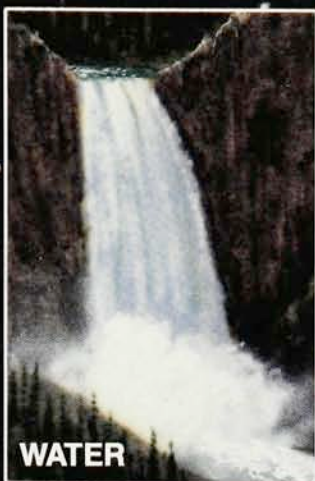
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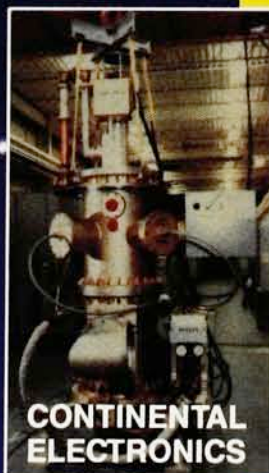
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one expected for the universe, and as a consequence he missed predicting the Big Bang. He became not the leader of avant-garde physicists, but in time the odd man out in his position against the new quantum theory. But more than all of this, he seemed never to be able to enjoy his own success the way other physicists have theirs. He spent the rest of his life working almost as if he still had to prove himself. I cannot help but feel that the literature searches, the background material and, most importantly, those most basic capricious ideas that were the turning points of relativity theory came from Mileva, while the mathematics and proofs came largely from Albert.

According to my speculative picture of these events, when they separated, there was nothing more that she could do with whatever ideas still haunted her mind. And he, for all his ability, had to be content with continuing to sift through all the old ideas, forever searching for originality to come out of slight changes in his equations.

In February 1919 the marriage of Albert and Mileva ended in an amiable divorce. Mileva received custody of the children, child support and alimony. And in an added clause of the divorce decree, Albert Einstein agreed to pay Mileva every krona of any future Nobel Prize he might be awarded. He could keep the glory, but (in a settlement that would make an LA divorce lawyer blush) she had the prize. I find it difficult to resist the conclusion that Mileva, justly or unjustly, saw this as her reward for the part she had played in developing the theory of relativity. It would have been a good bargain for her to make, for who would ever believe that she had anything to do with the development of the theory? It might have been a good deal for Albert as well, for had she made such a claim, the scandal could have curtailed his career. For whatever reason, he kept this agreement secret for many years.

Hardly anything remains now to help us piece together what did occur then. There are only the odd statements that suggest that Albert was himself too poorly informed about matters he should have regarded as the most exciting ideas of his time, considering his interest. How could he have pursued his interest in relativity for years with no knowledge of the Michelson-Morley experiment or (until quite late) of the work Hendrik A. Lorentz had done? What were the things that Mileva researched? What discoveries did she make? I doubt we will ever know, yet perhaps, perhaps

the theory of relativity did begin in the mind of Mileva Einstein.

EVAN HARRIS WALKER
Walker Cancer Research Institute
Edgewood, Maryland
5/88

STACHEL REPLIES: Mileva Marić was certainly a "unique woman," who must have possessed the considerable "drive" needed around the turn of the last century to take a young woman from a small town in the Balkans to the physics section of the Swiss Federal Polytechnical School (ETH). The real problem is to characterize accurately what made her unique, and to understand what happened to that drive after she got to the ETH—a problem that I certainly will not attempt to solve here. However, two points should be borne in mind in approaching this problem:

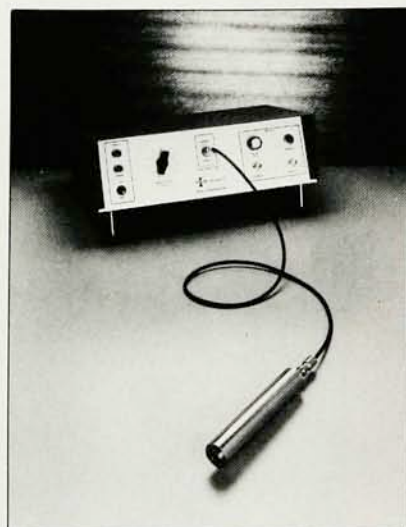
▷ The cause of Einstein-Marić (as she was known according to Swiss custom after her marriage), and, more generally, of understanding in greater depth the problems that confronted women trying to start a career in science at the turn of the century, is not well served by exaggerated claims for her abilities. She was not the first woman who studied physics (to say nothing of other subjects) at the ETH. A number of women graduated before 1900. Marić did not graduate because she twice failed to pass the final examinations.

▷ To rescue Einstein-Marić from the obscurity to which she has been consigned so long and unjustly, it is not necessary to deprecate Einstein's intellectual abilities. Rather, one must try to understand the role of each in the other's life on the basis of a careful study of all available evidence, taking into account all relevant factors in their relationship, including its psychological, sociological and intellectual aspects.

Einstein certainly will not emerge from such scrutiny as a plaster saint, but there is no evidence to indicate that he will emerge as an intellectual plagiarist. On the basis of their early correspondence, I think it is clear that she played a crucial role in his emotional life—as he did in hers. But up to now, at least, there has been no evidence that she played a similarly crucial role in his intellectual development or scientific accomplishments.

Indeed, there is at least one significant piece of contrary evidence. Aside from one comment on a course she took, none of Marić's letters to Einstein touches on any substantive point in physics, while his to her are chock-full of substantive comments on books and articles on physics he

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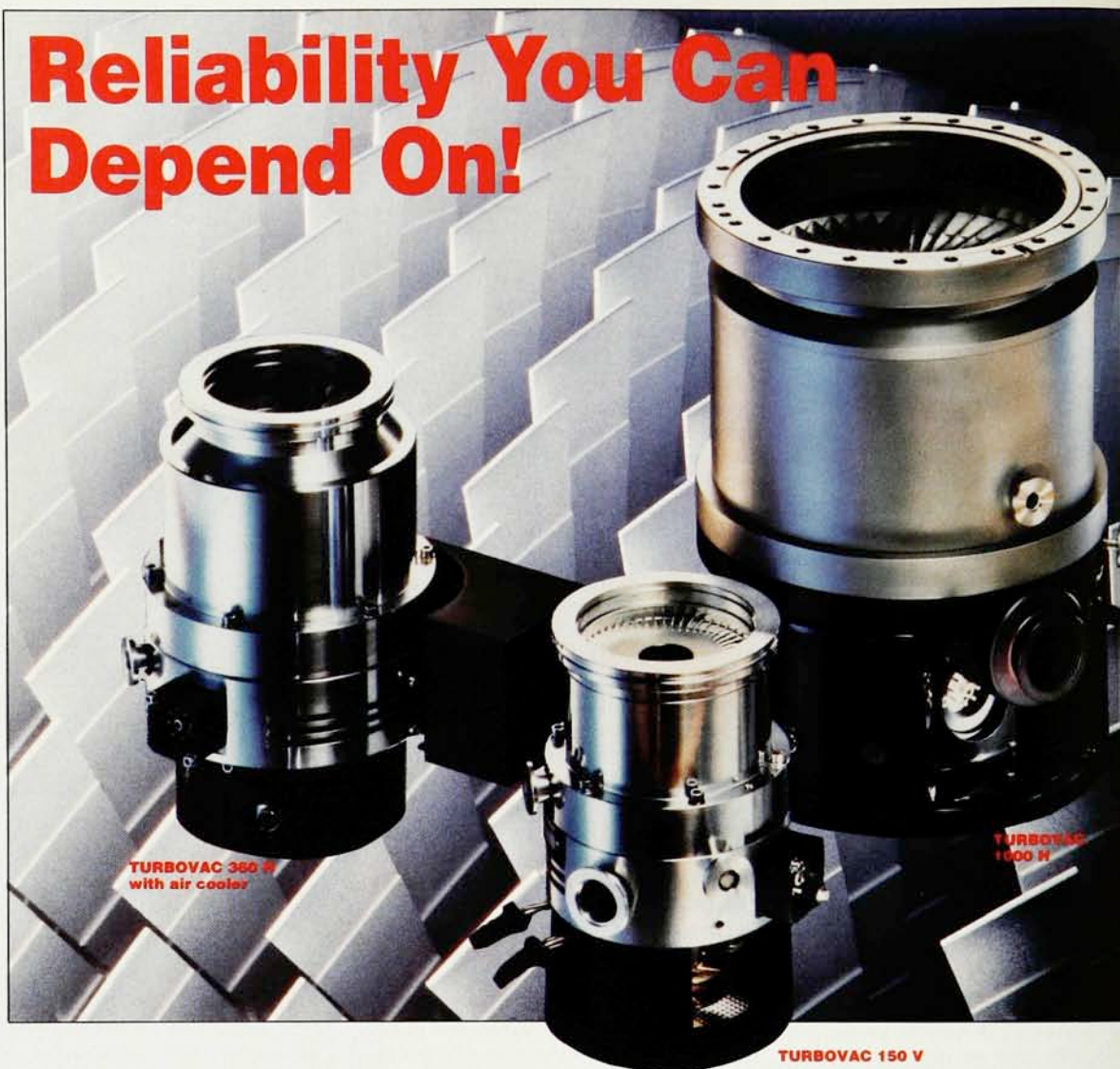
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has read, as well as on his own theoretical ideas and experimental proposals. It is true that only ten of Marić's letters to Einstein from 1902 or earlier have come to light, compared with 43 of his. (All of this correspondence was preserved in Einstein-Marić's papers, by the way; in general, Einstein appears to have saved practically no early letters, while other people later tended to save his, for obvious reasons.) But one could not select ten of Einstein's letters to Marić that would be as devoid of references to physics as are hers to him.

Evan Harris Walker has created a "speculative picture" that has more the flavor of a Hollywood script than of a serious evaluation. I find no evidence in his letter that he has read the 18 Marić letters (10 to Einstein, 8 to a friend), or Einstein's 43 to Marić, printed in volume 1 of the *Collected Papers of Albert Einstein*. I do find several items of misinformation in his letter. Considerations of space only permit me to list and comment very briefly on some.

According to Walker, Einstein "barely satisfied the requirements for the degree" at the ETH. There were just two sets of required examinations at the ETH. Of the five students who took the intermediate examinations in 1898, Einstein got the highest average grade (5.7 out of a possible 6). Marić, who took these examinations a year later, got an average grade of 5.05, the second lowest among students taking them that year. Einstein and Marić were the only students who took the physics final examinations in 1900. He passed with an average of 4.91; Marić failed with an average of 4.0. The following year she failed again with the same average, while two other students passed.

Walker states that Marić "never completed a thesis—at least not one that carried her name." (The implication of the last phrase is clear: Perhaps she wrote Albert's.) In fact, both Einstein and Marić completed the *Diplomarbeit*, a thesis necessary to receive a degree (*Diplom*) from the ETH. Einstein got a grade of 4.5 for his, and Marić received a 4 (again out of 6) for hers. It is true that Marić abandoned work on a doctoral thesis after her second failure to pass the ETH final examination. Einstein, on the other hand, completed a doctoral thesis during the fall of 1901 and submitted it to the University of Zurich late in 1901. Apart from a short visit, Einstein and Marić had been separated since she returned to her parents' home during the sum-

mer. From there she wrote to a friend, "I read it [the thesis] with great joy and real admiration for my darling"—curious words if she wrote it herself. Her admiration apparently was not shared by the university authorities, since Einstein's dissertation was withdrawn early in 1902. He got a doctorate in 1905 for an entirely different dissertation.

Walker states that "Mileva Einstein and Marie Curie were in fact good friends." While they met a few times, I know of no evidence of any real friendship between the two women. Their respective children, Hans Albert Einstein and Eve Curie, recollected conversations on physics between Curie and Albert Einstein during their walks in the Engadin; neither mentions any conversation at all between Curie and Einstein-Marić.

Walker states that Einstein "pursued his interest in relativity for years with no knowledge of the Michelson-Morley experiment or (until quite late) of the work Hendrik A. Lorentz had done." As I indicated in my *PHYSICS TODAY* article, the new letters prove Einstein was certainly aware of both by the beginning of the century, about five years before he published his first paper on the subject. Since he was only 21 in 1900, I don't see how he can be said to have acquired his knowledge of either "quite late."

Walker states that Einstein's and Einstein-Marić's "years together saw Einstein's greatest achievements.... After his marriage to Mileva ended, his physics became conservative." About a year after his separation from Einstein-Marić in 1914, Einstein surmounted the major conceptual difficulty that had prevented him for two years from completing the general theory of relativity—the theory that was surely his crowning intellectual achievement. Within about two years of the separation, he made one of his major contributions to the quantum theory by introducing the concept of transition probabilities between quantum states. The only conclusion that I draw from these achievements so soon after the separation is that Walker's statement is incorrect.

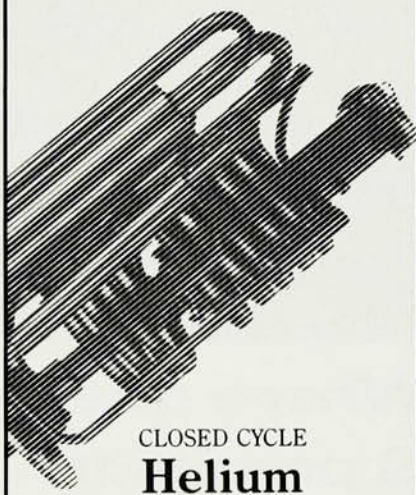
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