

gested the possibility of a positive isotope effect with the electron-phonon interaction.

It is not surprising that the present Search and Discovery report does not acknowledge my earlier work, since it is not referred to in either of the June 1987 *Physical Review Letters* articles reporting on the zero isotope effect in Y-Ba-Cu-O. Marvin Cohen (a co-author of one of the articles) did, however, in his summarizing remarks at the June 1987 Berkeley Conference on Novel Mechanisms in Superconductivity, refer to my work.

This brings me to the second point I want to make concerning the 1987 Search and Discovery report. I believe the statement that the discovery of the isotope effect in 1950 "provided the first hint of the importance of phonons in the formation of the superconducting state" is misleading. Actually, Herbert Fröhlich proposed the electron-phonon mechanism for superconductivity before the results of the isotope experiments were known, at least to him. In his famous 1950 *Physical Review* article, he has a note added in proof that he had just learned about the isotope effect results and that they were consistent with his proposed mechanism. I remember well as a graduate student at Purdue in the winter of 1949-50 how Fröhlich would talk at length about superconductivity in his statistical mechanics class (much to the consternation of some of the graduate students who were more interested in learning what they thought they needed to pass the preliminary exam).

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KHURANA REPLIES: I thank James Swihart for stating so clearly that Herbert Fröhlich had proposed, even before the isotope effect experiments were done, a mechanism for superconductivity based on electron-phonon interactions. In my news story, I wished merely to point out the importance of the isotope effect experiments; I could not discuss in detail the various steps in the development of the theory of superconductivity. As for the omission: Unfortunately, not only did the reports of isotope effect experiments on the 90-K materials not mention Swihart's contribution, but a review article I consulted did not refer to his 1959 paper.

The discovery of new high-temperature superconductors has created a

tremendous resurgence of interest in superconductivity. It is generally accepted that superconductivity arises from Bose condensation of electron pairs that are effectively bound together. It is not widely realized that this suggestion was first made by Richard A. Ogg Jr in the mid-1940s.¹ According to John M. Blatt, Ogg was outside the tradition of solid-state physics and his suggestion was strongly discounted and was not taken up by theorists to develop a theory of superconductivity.² Later, the BCS and related theories were developed. These theories use the idea that electron-phonon interactions may cause electrons to become effectively bound in pairs. It seems clear that BCS-like theories were developed without conscious borrowing from Ogg's ideas, and these theories go far beyond Ogg's suggestion. It is equally clear, however, that Ogg has priority for the electron pair-Bose condensation idea, and this should be recognized. One way would be to use the term "Ogg pairs" to mean any electron pairing scheme leading to superconductivity through Bose condensation. The term "Cooper pair" (or preferably "Ogg-Cooper pair") could be reserved to denote specifically pairing arising from electron-phonon interactions.

References

1. R. A. Ogg Jr, *Phys. Rev.* **69**, 243 (1946).
2. J. M. Blatt, *Theory of Superconductivity*, Academic, New York (1964), pp. 86-88.

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Mendel and the SSC: Two p's in a Pod

Our traditions provide different models of progress. On the one hand, the "great American genius syndrome" encourages one to seek technological progress in the work of isolated genius. The conflicting virtue of "thriving American free enterprise," which harnesses organizational skills to create progress, seems to better fit World War II Liberty Ships than it does our concept of scientific progress. Even though my training denies the myth, I still find it unsettling to argue for a \$4 billion SSC project, which expects scientific progress from a planned group effort rather than individual genius.

During a vacation visit to Brno, Czechoslovakia, I was afforded the opportunity to visit the Mende-

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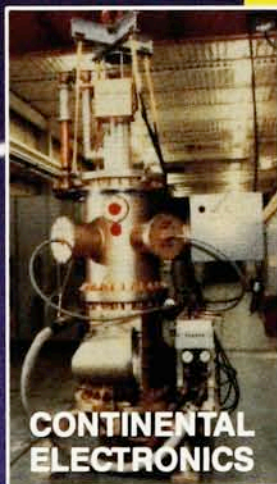
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lium, a museum devoted to the history of the discovery of the laws of heredity by Gregor Mendel. My host, Jiří Farský, introduced me to the head of the Mendelianum, Vitězslav Orel. The museum dispelled a misconception I had shared with many people concerning the history of Mendel's discovery. Orel showed me the displays and explained to me the history of the discovery. When I finished, I felt very excited by the implications I find in this history for our efforts to develop the SSC.

My misconception was that Mendel was an isolated genius who worked out the laws of heredity in isolation in a monastery in Moravia. On the contrary, Orel has shown that this work was the result of a line of scientific progress going back more than 50 years before Mendel. Breeding work on both sheep and fruit had been actively pursued in Moravia since before 1820. The basic problem of inheritance was posed by C. F. Napp, who was the abbot of the Augustinian monastery in Brno. He recruited Mendel to the monastery, provided him with training, including sending him to study physics in Vienna with Christian Doppler, and provided him with the resources to carry out the research. This culminated with publication of his decisive work in 1866. That the world did not know more of this for the next 40 years can likely be traced to the further development of Mendel's career. Whereas he had a good start at presenting his work in scientific meetings in Moravia, this effort was somewhat cut short by his elevation as abbot of the monastery in 1868. The duties of that office in a time of turmoil cut short his efforts to communicate his scientific results.

I found it exciting that this central discovery of biology was a culmination of a series of steps taken with due deliberation in 19th-century Moravia. The building of a scientific culture in the Augustinian monastery of Old Brno was undertaken against clerical opposition and with substantial investment of resources. Without in any way discounting the genius of Mendel, it is important to recognize that the basic formulation of the problem was laid out by his predecessors. To lay out a program of investigation for a coming generation and to commit the necessary investment of financial, political and intellectual resources is not untried. Great science has flowed from such efforts in the past.

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Clearing Up Soap Film History

Pierre-Gilles de Gennes showed his usual deft touch in condensing so much of the history of soap films into a short Reference Frame (July 1987, page 7). We should add to his list of pioneering contributions the heroic studies of minimum-area surfaces undertaken by the blind Belgian physicist Joseph Antoine Ferdinand Plateau (1801-83) using soap films formed on wire frames corresponding to a wide variety of boundary conditions. The use of this type of simulation has since expanded into a variety of other areas. Lawrence Bragg and W. M. Lomer used bubble rafts to study many of the features of dislocations and grain growth in crystals.¹ More recently, black soap films have even been used as the beam splitter in neutron optical interferometry experiments.²

References

1. W. L. Bragg, W. M. Lomer, *Proc. R. Soc. London, Ser. A* **196**, 171 (1949).
2. R. R. Highfield *et al.*, *J. Colloid Interface Sci.* **97**, 367 (1984).

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Michelson's Middle Moniker

Lloyd Swenson's article "Michelson and Measurement" (May 1987, page 24) is so good that it is worth correcting, or commenting on, a very minor point. I quote: "After President Lincoln's assassination Albert assumed the middle name of Abraham." This is indeed the story as told (to the best of her knowledge) by Albert Michelson's daughter Dorothy Michelson Livingston in her biography of her father, *The Master of Light* (Scribner's, New York, 1973).

Let me explain a point that may not be known outside the circle of students of Jewish social history. It had always been the custom of Jews to give both a Hebrew (biblical) name and a "gentile" name fitting their respective country of exile. (Even in Judea, in Hellenistic and Roman times, there would be a Greek name in addition to the Jewish one.) The only exceptions are the First Temple era and modern Israel, plus the period in Europe in which the Jews were segregated and did not form a part of the "regular" society. With the emancipations in Europe after 1789 and 1848, the custom of two names

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