

science, teachers with better training. There is, of course, a certain difficulty in attracting able men into a low-paid, if stable, profession. More serious, probably, is the schism which is developing between teaching and the modern, specialized, high-pressure research in science. These two activities, teaching and research, which had long been considered necessary concomitants in academic tradition, have recently been separated to such an extent that graduate students now feel they have to make a *choice* between an academic career of research and one of teaching. In several large physics departments, it was reported, only two or three per cent of the graduate students have any interest in teaching. In contrast to this diminishing supply of teachers, Professor Lark-Horowitz of Purdue reported an increase from ten thousand students in college general-education science courses, to thirty-nine thousand in the United States over the years 1944 to 1947. It is painfully apparent that more interest must be aroused if this teaching of science is to be done adequately.

If there is any popular misconception that the teaching of natural science to nonscientist undergraduates is easy, Professor Philipp Frank of Harvard gave evidence to remove it. In the first place, the general-education course in science generally draws from several fields—usually physics and chemistry, sometimes also astronomy, geology, and biology. Secondly, the ideal course goes deeply into the methodology, philosophy, and history of the scientific problems dealt with. And thirdly, the majority of students in such courses are concentrating on other disciplines. To keep their respect and their interest, the instructor cannot be completely ignorant of his students' fields of specialization. In short, the teachers needed for this effort must have a broad background and a thorough grasp of several fields of science. Graduate students and young PhD's, on whom much of the conventional elementary teaching has been unloaded in the past, are not normally equipped for teaching these courses. However, where a staff of several experienced teachers have organized such a course, some graduate students are reportedly learning as they teach with the group, and gaining a great deal from the experience.

The conference left most of us with the conviction that there is room for considerable improvement in the teaching of science, probably in elementary courses for specialists as well as courses for nonscientists. The growing importance of the natural sciences in our civilization has made it more important than ever before to insure that both the budding scientists and the mass of the population have a balanced idea of what science really is.

—Thornton Page

HEAT RESISTANT PORCELAINS

BUREAU OF STANDARDS REPORTS PROGRESS

The National Bureau of Standards has found that several of its previously developed porcelains behave in a more satisfactory manner in tests of bending at high temperatures and of resistance to thermal shock than do the best available high-temperature metal alloys. In response to a request made in 1944 by the National Advisory Committee for Aeronautics, the Bureau has con-

ducted a study of materials for use under conditions involving temperatures of eighteen hundred degrees Fahrenheit and above. An experimental gas turbine, using blades fabricated from the ceramic body of the most promising strength and creep characteristics, has been operated successfully in the Cleveland Laboratory of the National Advisory Committee for Aeronautics.

HEARING SURVEY

SAN DIEGO TEST

Psychologists at the U. S. Navy Electronics Laboratory have tabulated results of the hearing survey of thirty-seven hundred people at the 1948 San Diego County Fair. The investigators found that men who work in noisy areas show greater than normal hearing losses to high frequency sounds but gain slightly in their ability to distinguish low frequency sounds. Investigators also found that musically trained persons had an above-average ability to hear weak sounds of various pitches at various levels as opposed to those who had no musical training. The tests also confirmed that women are able to distinguish high-pitched sounds with greater ease than men of the same age group.

QUARTZ CRYSTALS TREATMENT

NEW PROCESS SLOWS AGING

The Signal Corps Laboratories at Fort Monmouth, New Jersey have developed a process for treating quartz crystals which, according to the announcement, "virtually eliminates the aging characteristics of quartz crystals." Quartz crystals, used to stabilize frequencies in electronics, begin to drift off when they deteriorate with age, which impairs their usefulness and eventually forces their replacement. Under the new process the crystals are superheated to approximately nine hundred degrees Fahrenheit and then cooled slowly. Three Signal Corps physicists, Arthur C. Prichard, Maurice A. A. Druessne, and David G. McCaa, are credited with developing the new process.

FLORENCE IN MAY

SYMPOSIUM ON STATISTICAL MECHANICS

At the invitation of the Italian Physical Society a symposium on statistical mechanics, arranged by the committee of thermodynamics and statistical mechanics of the International Union of Physics, was held in Florence, Italy from the seventeenth of May to the twentieth of May, inclusive.

No more pleasant season or place for a meeting can be found than Florence in May. Indeed, Casimir proposed in the interest of undivided scientific attention that the next symposium choose Gander Airport as its locale. However, in spite of the diversions, a scientifically useful and profitable meeting was held.

After a formal opening Tuesday morning at the Villa Favard, situated on the banks of the Arno, the first scientific meeting was held on the same afternoon (May 17) at the Museo Nazionale, next to the famous Uffizi Galleries. A reception at the Hotel Majestic concluded the day's program. On Wednesday there were sessions morn-

ing and afternoon. Then there was an evening discussion of some quantum electrodynamical problems at which Pauli (Zurich) and Born spoke.

The Thursday program consisted of a morning scientific session followed by an arranged bus tour in the afternoon to visit some of the many beauties of Florence, including a drive through the hills on the left bank of the Arno, and a visit to the observatory and physical laboratory of the University. The tour included a visit to Michelangelo's beautiful cave of the Medici, the churches San Croce and the graceful Romanesque San Miniato at Monte on the left bank. At cocktail time the party returned to the Palazzo Vecchio, the fourteenth century city hall of Florence, for a reception to which Medici guards dressed in red and white pantaloons and medieval armor added picturesque color. In the evening the members of the symposium were invited to a performance of "Orfeo," the old opera of Monteverdi, held at the opera house.

Friday's morning scientific session was held again in the Museo Nazionale, as were all the previous ones, but the afternoon session was held in the City Hall of the hill town of Fiesole. After a visit to the town the meeting was concluded by dinner and wine at Fiesole.

The delegates and visitors were all greatly indebted to the hospitality of the Italian Physical Society and particularly to their charming host, Professor Polvani, the president of the Society, whose constant care and kindness contributed enormously to the enjoyment of the meeting.

The scientific meetings were valuable. As usual, probably more benefit was derived from the informal personal discussions and arguments than from the formal talks. These were, however, of considerable interest. The speakers were Born of Edinburgh, Klein of Stockholm, Guggenheim of Reading, Yvon of Strasbourg, De Boer of Amsterdam, Kirkwood of Pasadena, Casimir of Philips Eindhoven, Wataghin of Turin, Gorter of Leiden, Rushbrooke of Oxford, Montroll of Pittsburgh, Onsager of Yale, Prigogine of Brussels, and Mayer of Chicago.

Probably the main themes of the conference could be classified as those following idealizations and those attempting to find exact general relationships.

In general there has been considerable interest in finding idealized models of systems which bear some, although not necessarily too great, resemblance to actual physical systems, but which lend themselves to exact mathematical treatment. The nature of phase transitions and critical phenomena of such idealizations can then be investigated with some certainty, and compared to the experimental findings in physical systems which they are supposed to simulate. This procedure has been stimulated by Onsager's exact solution in the two dimensional case of the so-called Ising model of ferromagnetism.

Montroll spoke of some idealizations similar to that of Ising which lend themselves more readily to exact mathematical solution in the three dimensional case. Rushbrooke pointed out that the Ising model was applicable to a two component liquid solution, and described cer-

tain approximate methods for obtaining the properties of the phase transitions in the three dimensional case.

There was also considerable discussion of the use of distribution functions in the interpretation of statistical mechanical equations. Kirkwood and his co-workers, Born and Green, and Mayer with collaborators have been using this approach.

This general method may be characterized as permitting considerable manipulation and reduction of the equations predicting the properties of real systems without introducing approximations of any kind. Of course the end equations are incapable of any numerical solutions without the introduction of approximation but certain conclusions can be drawn, and relations demonstrated, before such approximations become necessary.

In addition to the discussions following these two general trends there were a number of papers on subjects that could be less easily classified. Klein spoke of the application of statistical methods to the study of nuclear equilibria in stars and showed that the distribution of elements in the cosmos could, at least in some features, be accounted for by the assumption of equilibrium. Onsager spoke about some relations in turbulent flow that could be treated by generalizations of statistical methods.

It is intended that the talks and the main parts of the discussion will be published in a special number of the review of the Italian Physical Society, *Il Nuovo Cimento*.

—Joseph E. Mayer

MISCELLANY

ECLECTIC

Pomona College of California and Wesleyan University in Connecticut have joined the Massachusetts Institute of Technology in a plan for combined liberal arts and technological study which now includes fourteen liberal arts colleges. Under the arrangement, students of high academic standing may pursue a specially planned course for three years in any of the participating liberal arts colleges and then complete the requirements for a science, engineering, or city planning degree in two years at the Institute. Both a B.S. degree from the Institute and a B.A. degree from the liberal arts college are awarded on completion of the program. Other institutions participating in the combined plan include Amherst College of Massachusetts, Bowdoin College of Maine, Miami University of Ohio, Middlebury College of Vermont, Ohio Wesleyan University, Reed College of Oregon, Ripon College of Wisconsin, St. Lawrence University of New York, Washington and Jefferson College of Pennsylvania, College of William and Mary of Virginia, Williams College of Massachusetts, and the College of Wooster, Ohio.

NEW DUTCH JOURNAL

First publication of an international journal which will print reports under the auspices of the Central National Council for Applied Scientific Research in the Nether-