Except for the first edition it is very clear that for both groups the average age of receiving a star is increasing at an alarming rate, much faster than the physicians are raising the life span and on the average the non-teachers receive a star at an age nearly eight years under that for teachers. While these statistics are not suitable for drawing any very definite conclusions, it is worth pointing out that: (1) While the number engaged in mineralogy-petrology is constantly and very rapidly increasing[3] the total number receiving stars is more or less static: (2) that during the specialization which has been most pronounced in the geological sciences since the war it may have been impossible for geologists in general (outside of the relatively coherent Washington group) to vote intelligently on all the individuals in all the different sciences involved; (3) although the average age at which geologists received a star (49.4 in the last edition) is higher than that in any other science recognized by the editor, it is nearly 5 years under that applying to the mineralogist-petrologists; and (4) crystallography-mineralogy is such a highly specialized field that it is well-nigh impossible to receive recognition by outsiders for work done in it.[4]

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MORE BRAINS AND LESS MONEY

How many people to-day, even those pursuing the higher curricula of learning, students of science in general and those studying psychology in particular, understand the mechanics of the very laboratory apparatus they use daily?

That the layman regards the science laboratory as a place where wonders and miracles are wrought is a known fact. Those who have observed groups of people viewing a laboratory know with what awe and reverence the apparatus is looked upon. This is like hero-worship, like the superstitious regard primitive people hold for the natural events of the universe.

I recall, in this instance, my own experience in the eighth grade, where physics of a kind was taught under the heading of "general science." The event that stands out clearly in my mind is a demonstration of electricity with the Wimshurst machine. Truly, I had never been so impressed, so mystified and awed at the spectacle. To the entire class the demonstration was an exhibition in magic. Our curiosity was challenged; nevertheless, we could not fathom how the contraption produced electricity. Our notes told us something of brushes rubbing each other, thus producing sparks, but we felt the explanation inadequate if not incomprehensible.

As a student I had similar experiences with my classmates and found the same true of my own students in the psychology laboratory. It seems to me that students, in general, have two major intellectual fears—the fear of mathematics and of laboratory apparatus. Both of these items are little understood and mastered only by a few. The rest of the students carry away with them a feeling of inadequacy or inferiority, even dislike for these tasks, because they do not—not that they can not—master them.

The pursuit of science to-day, even in an elementary course, is a very complicated task. Our derived data must come out through a highly technical complex process which is far removed from the meaning of the actual results obtained. For example, many people know how to "snap" pictures, but this does not mean they can explain the process of photography from its physics and chemistry point of view, which is the true explanation. Similarly, students learn operations and manipulations of complex apparatus but do not know the significance of their work. Therefore, the benefit derived from a laboratory course is very much reduced. The educational world seems to be interested in data and not in how the data are secured. This is a decided handicap to clear and effective thinking, as I see the problem. I am inclined to the view that by this means of a synthetic laboratory training we tend to inculcate into the student mind a superficiality as regards the critical examination of phenomena. Decidedly, we steer the student away from the *cause* of events and insist, indirectly, that the *effect* is all that matters—the data are what the student has to examine and not the means of securing the data.

Circumstances have arisen which forced upon us the opportunity to redirect the emphasis on laboratory study. With little or no apparatus available we were asked to teach psychology as a laboratory science. True, we could have borrowed apparatus, but such was not our purpose. The simple and obvious plan was to make apparatus-construction a part of the laboratory procedure. Consequently, I asked for volunteers to construct mazes, mirror-drawing apparatus, tachistoscopes, apparatus for conditioning sight and sound to electric shock, coordination boards, which registered the number of contacts by means of a door-bell buzzer, weights to be used for the size-weight illusion experiment and many other pieces of apparatus needed in a laboratory of general psychology, as a color-wheel, etc.

While I acted as adviser, the students really built the apparatus with their own ingenuity. I would refer them to text-book plates and laboratory manuals; at the same time I was cautious not to do the thinking

[3] Well shown by the graph on page 201 of the March, 1937, number of *The American Mineralogist.*

[4] F. B. Littell (SCIENCE, May 14, 1937, 477) finds that international "Who's Who" for 1937 lists 6 British mineralogists (among 336 scientists) but only 3 from the U. S. (of 605 scientists).

for the students. When the apparatus was handed in the student would also submit a diagram and a report on how he mastered the problem and what difficulties he encountered in the construction. The application of the apparatus was left for laboratory experimentation.

Comments like these were to be found in the student reports: "I really enjoyed making the apparatus, since it provided enjoyment and a realization that the finished product was of my creation and was to be used for the benefit of the present and future psychology classes."

Again, the student would report difficulty in construction and how he solved the problem: "The difficulty I encountered was the method of raising and lowering the drop (of the tachistoscope), which I finally solved by using the strings as I explained."

By this means the students gained insight into the purpose of laboratory apparatus. As well, the effect on the mind of the student and upon the learning activity as a whole was a highly desirable one. The students felt an intimate acquaintance if not kinship in using apparatus which they constructed and knew how to use.

Even if I had all the laboratory apparatus at my disposal I would still favor a plan whereby the apparatus should be disassembled in order to allow the students to reassemble the parts for each experiment.

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MICROPHOTOGRAPHS AND PHOTOMICROGRAPHS

IN regard to the controversy over the correct usage of "microphotograph" and "photomicrograph," I have found the following notation in the Oxford Dictionary (1928), under Photomicrograph: "In 1858 G. Shadbolt in 'Sutton's photographic notes' says: 'The word microphotograph originated, I believe, with myself and is applied, I think correctly, to very small photographs, not to photographs of very small objects which would more correctly be photomicrographs.'" However, by 1860 microphotograph was used incorrectly (according to the Oxford Dictionary) and since then seems to have been used rather loosely by all.

Since it would seem that the originator of a word should have the authority to interpret its meaning, it follows that microphotograph should indicate a microscopic photograph, and photomicrograph a photograph of a microscopic object.

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SCRIPTA MATHEMATICA

THE article "Dinner of the Society of Friends of *Scripta Mathematica*" (SCIENCE, No. 2212, p. 492) contains several inaccuracies due to errors inadvertently committed in the office of Scripta.

(1) The dinner was held in honor of Professors Eric Temple Bell, Cassius Jackson Keyser, David Eugene Smith and Mr. M. Lincoln Schuster for their contributions to public enlightenment regarding mathematics as an essential means to general culture. The opening address was made by Professor William P. Montague.

(2) *Scripta Mathematica* is a quarterly journal devoted to history and philosophy of mathematics published by Yeshiva College, and is edited by Jekuthiel Ginsburg with the cooperation of Raymond Clare Archibald, Adolph Frankel, Sir Thomas Little Heath, Louis Charles Karpinski, Cassius Jackson Keyser, Gino Loria, Vera Sanford, Joseph J. Schwartz, Lao Genevra Simons and David Eugene Smith.

(3) Among the Scripta publications in preparation are a volume entitled "Fabre and Mathematics," by Professor Lao G. Simons, and a volume entitled "Forum Lectures," being addresses given before the Forum of *Scripta Mathematica* by Professors Cassius Jackson Keyser, David Eugene Smith, Edward Kasner and Walter Rautenstrauch.

JEKUTHIEL GINSBURG

SCIENTIFIC BOOKS

REMINISCENCES OF J. J. THOMSON

Recollections and Reflections. By SIR J. J. THOMSON. New York: The Macmillan Company. Pp. v + 451. $4.00. 1937.

OF the many delightful characteristics of this most fascinating book, not the least is inherent in the simplicity and informal type of presentation. In many cases the author writes as though he were speaking to us, and we are brought into a very close personal touch with those situations which have marked the milestones in his life. When he informs us that "the examination for the Mathematical Tripos was an arduous, anxious, and very uncomfortable experience," and that it was "held in a room in which there were no heating appliances of any kind," and as we follow him through the description of the examination, we find ourselves transported in mind through more than half a century, and feel a real sympathy with that young man about to take the examination which means so much in his life. We are worried when we read that he suffers an attack of insomnia five days before the examination. We sincerely hope he will recover. On the morning of the examination we are quite nervous, but are relieved