a brief stroboscopic illusion was noted on the revolving fan blades. This was more clearly seen with the room lights turned off. Every stroke did not produce exactly the same illusion on the fan blades. A number of flashes caused the revolving blades to appear practically motionless; with others they seemed to revolve slowly in the direction of their original rotation. Some flashes produced no effects. During the present observations it was estimated that at least 80 per cent. of the flashes created a stroboscopic illusion upon the whirling fan blades. Noticeable flickering of the flash frequently characterized those strokes creating this illusion. No flashes were observed that caused the fan blades to appear to revolve backwards.

Recent researches upon lightning by McEachron and McMorris[1] have demonstrated that what appears to be a single stroke is often a series of flashes, spaced a fraction of a second apart. Such multiple strokes may consist of as many as 40 separate discharges, the interval between them varying from 0.0006 to 0.53 second. Their observations have indicated that about 90 per cent. of the strokes in some storms were multiple. This paper should be consulted for details impossible to cite in a short note.

These researches have clearly indicated that certain bolts of lightning are made up of a rapidly occurring series of separate flashes. A multiple stroke of lightning may, therefore, create the same type of illusion upon the revolving blades of an electric fan as do the intermittent light flashes produced by a stroboscope.

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ADVANTAGES OF $F_g = kma$

THE much-debated and troublesome gravitational measure of force can be handled in only two essentially different ways. These are $F_g = kma$ and $F_g = \frac{wa}{g}$. Each has its advantages and each has its ardent advocates, so that further discussion may be a waste of time. However, I should like to point out one or two possibly new reasons which seem to me to give the weight of argument in favor of *kma*.

In this method k is a numerical constant which, in the metric system, converts dynes to grams of force (F_g). In the form $F_g = kma$, it equals approximately 1/980 and is exactly analogous to the number 12, which converts a length measured in feet to the same length measured in inches. Such a number has no dimension as the word is usually understood. It is simply the quotient of one foot divided by one inch. The result is twelve, not 12 *in/ft*. If you ask how many quarters make a dollar, the answer is four, not 4 quarters/dollar. The latter would amount to saying: "four quarters per dollar quarters make a dollar"; which is certainly redundant. Thus we may write $L_{in} = 12L_{ft}$, or $F = 980\ F_g$, where 12 and 980 are numerical ratios of the same physical quantity, and are therefore numbers having no dimensions.

The other method is based on a force-length-time system of units instead of a mass-length-time system. The force (weight) w is converted to a mass by dividing by g, and this new mass, measured in units of 980 grams, gives force in grams when multiplied by the acceleration measured as usual. The numerical labor involved is identical in both methods, so the only question is as to which makes for the least confusion. It seems to me that *kma* is the least confusing, since it does not depart from the c.g.s. system in calculating the non-c.g.s. quantity, force measured in grams. The trouble with $F_g = \frac{wa}{g}$ is that it introduces practically two non-c.g.s. quantities, namely the weight w, and the mass w/g measured in 980-gm units. Possibly this system would be preferable if we always used gravitational units and nothing else. That is why it appeals to the engineer, who clings to the good old pound weight and ignores the possibility of a pound mass. But the use of the metric system either with c.g.s. or m.k.s. units is certainly increasing. So it seems to me that since we can not yet ignore force pounds and force grams, we should use that method of dealing with them which is the least confusing and which deviates as little as possible from the concept of force expressed by $F = ma$.

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QUOTATIONS

THE PHYSIOLOGICAL CONGRESS AT ZURICH

AMID auspicious surroundings the International Physiological Congress had its sixteenth, or jubilee, meeting at Zurich from August 14th to 19th. The president, Professor W. R. Hess, in a happy address of welcome, pointed out that the congress had been conceived in England in 1888, but was born at Basel in September of 1889 when a group of 129 physiologists met to hold their first congress. It was highly fitting, therefore, that the congress should return to Switzerland to celebrate its fiftieth anniversary; this time with a registration of more than 1,600 members.

[1] K. B. McEachron and W. A. McMorris, *General Electric Review*, 39: 487–496, 1938.

In recognition of the occasion the Physiological Society had appointed Dr. K. J. Franklin to write "A Short History of the International Congresses of Physiologists." This excellent record appeared in the *Annals of Science* for July 15th and in reprint form was presented by the society to all members of the congress. The "History" is appropriately dedicated to "Charles Scott Sherrington, one of the general secretaries of the congresses from 1892 to 1907, who by his experimental demonstrations at successive meetings and by his personal encouragement of younger physiologists has for half a century put into practice the principles laid down by the founders of the congresses."

The Zurich congress was notable for its observance of the principles of simplicity which Michael Foster and others insisted upon at the early congresses: a minimum of pomp and ceremony, no official delegates, quiet entertainment, often *en famille,* and a sympathetic and well-mannered press. The scientific proceedings were marvellously organized in five simultaneous programs beginning on Monday afternoon, August 15th, and continuing twice daily (save for the excursion on Wednesday afternoon) until Friday afternoon. A new and highly successful feature of the congress were the fifteen symposia embracing set topics of current interest such as the kidney, acetylcholine, fœtal respiration, adrenal cortex and vitamin B_2, at which the major contributions and principal discussions were by invitation. There were also many demonstrations, conspicuous among which was evidence of the growing popularity of cinematographic demonstration.

Scientifically speaking, it was generally felt that the Zurich congress was the most successful of any held in recent years, and it set a standard which English members will find it difficult to equal in 1941 when the seventeenth congress is to meet in Britain. From the international standpoint there were several features worthy of note. It was a source of profound regret, after the brilliant congress at Leningrad and Moscow in 1935, that not one Russian physiologist could be present in Zurich. Professor Orbeli, however, was elected to succeed Pavlov on the international committee, and it is earnestly hoped that we shall be able to welcome him and his colleagues in England in 1941. A source of gratification to the entire congress was the large delegation of physiologists from Spain, led by Professor Negrin himself and including Professor August Pi Sunyer of Barcelona and Professor Jaime Pi Sunyer of Santiago de Galicia. The German delegation was unexpectedly large, consisting of 130 members, though many eminent physiologists of Germany (including Bethe, Warburg, von Brücke and Otto Loewi) were conspicuous by their absence. Drs. Oskar and Cecile Vogt happily were present in Zurich. Apart from several junior students from European laboratories, only one physiologist came from the Far East (Professor Yas Kuno).

For its skill in handling the problems of diplomacy with which the congress was faced the Swiss committee deserves the admiration and gratitude of all those interested in the welfare of physiology; and in this connection the names of Professor Hess and of Professor Ernst Rothlin, the general secretary, come most prominently to mind, together with that of their able assistant, Dr. Oskar Wyss. After unanimously voting to accept the invitation to meet in England in 1941, the congress responded enthusiastically to Professor Houssay's invitation to meet in Buenos Aires in 1944; the South American invitation, however, will not be voted upon until 1941.—*Correspondent of The Lancet.*

SCIENTIFIC BOOKS

PHYSICS TEACHING AND THE TEXT-BOOKS

USUALLY at the beginning of the academic year a great variety of new texts, or new editions of surviving old-established text-books, arrive in astonishingly large numbers. The diversity of objectives and expectations of a physics course is probably the main reason for this flood of texts which attempt to satisfy the great differences of conditions to be met in this country. Physics is taught as a foundation for engineering and applied sciences, as a basis for natural philosophy, and finally as a part of the general survey course on the natural sciences which is becoming increasingly popular in secondary schools and colleges.

Depending on the purposes of the course as set by the instructor, the outlook on the subject is bound to vary. But the reason for the appearance of so many different texts is due not only to the different fundamental concepts or minimum requirements of a general physics course, but also to the variety of entrance requirements into colleges which exist in different parts of the country and in different schools. From those students who have had no high-school physics at all and hear about physics for the first time in the sophomore year, to those students who have had one year or more of college work and are required to take two years of physics, all intermediate stages are encountered. It is, therefore, to be understood that no two texts are alike and that in most cases each book will appeal to some special group only. Some of the texts submitted in Table 1 are written by authors long versed in undergraduate teaching in this country, while others are of English origin. The main difference between