its conversion into lactic acid, but since the amounts of lactic acid in the muscle of haddock taken on the "trawls" was little if any greater than those of haddock taken by hand lines, it is inferred that the lactic acid was being removed by the blood. Buddenbrock[3] finds that there is a high concentration of lactic acid in the blood of cod that have been captured and placed in an aquarium, and that, both directly and through its effect on the cell membrane and shape of the erythrocytes, lactic acid reduces the oxygen-carrying power of the blood. This causes a vicious circle, since the oxygen is required to remove the lactic acid, and its lack results in a further increase in the lactic acid.

It can now be readily understood why very nervous fish, such as herring and haddock, die so quickly when captured, and sluggish fish, such as the eel and the catfish, live so much longer under similar conditions. The rapidity of death seems definitely related to the degree of struggling or muscle activity on capture. It is evident that overexertion of the fish converts all the glycogen of the muscle into lactic acid, which passes into the blood and reduces the oxygen-carrying capacity of the latter. This results in asphyxiation of the cells of the nervous system, which undergo irreversible changes. At the Atlantic Biological Station, St. Andrews, New Brunswick, success was achieved in keeping herring and haddock alive in aquaria, when on capture their struggling was reduced to a minimum.

A. G. HUNTSMAN

UNIVERSITY OF TORONTO

SCIENTIFIC BOOKS

MEN OF MATHEMATICS

Men of Mathematics. By E. T. BELL. Simon and Schuster, New York, 1937. xxi + 592 pp. $5.00.

IF one thumbs the numerous cards for Eric Temple Bell in the Harvard College Library, one finds intermingled with those representing his mathematical work some endorsed "John Taine, pseud." and representing something else—"thrillers." Thus does a great library override the author's modest pseudonymity. The Jekyll-Hyde characteristics of the Bell-Taine contributions are both present in Bell's "Men of Mathematics," but what part of the work will be attributed to Jekyll and what to Hyde will vary with the reader. For that large number of the somewhat general public to which Simon and Schuster cater in some of their publications it will be Dr. Jekyll who writes the "heart-interest" material and the glittering generalities in an often loose style and it will be Mr. Hyde who tries to expound the theory of algebraic ideals or of transfinite numbers or of symbolic logic, whereas for the professional mathematician the attribution for these respective parts will be inverted. As the book has been widely read and perhaps not always discriminatingly reviewed, it may be permitted that I concentrate unduly upon some of the things on which I would raise questions.

Of Poincaré it is written (p. 546): "He had the misfortune to be in his prime just when physics had reached one of its recurrent periods of senility, and he was so thoroughly saturated with nineteenth century theories when physics began to recover its youth—after Planck, in 1900, and Einstein, in 1905, had performed the difficult and delicate operation of endowing the decrepit roué with its first pair of new glands—that he had barely time to digest the miracle before his death in 1912."

Passing over the use of "recurrent" with so progressive a condition as "senility," one may raise a question as to the jump from that to "roué," and the further question as to who were the women in the case—was the "queen of the sciences among them? Then with respect to the medical or surgical references, is it an accepted fact that the Steinach or similar operations do renew the youth of decrepit roué's? Or is this just "fine writing"? Furthermore, when was Poincaré in his prime and what was physics doing around that time? He was not thirty when Gibbs's thermodynamic papers, over which Maxwell was enthusiastic, were published. He was in his thirties when Arrhenius and Oswald were establishing important results in the same field, when Heaviside's best work on telephony was done and Hertz discovered his wireless waves. He was barely forty when x-rays, electrons and radioactivity came actively on the scene and Lorentz was making great contributions. The author does not seem to realize that it was such high activity and buoyant youth in physics which made Planck and Einstein possible as Faraday's work had made Maxwell possible.

On p. 168: "Without the science of chemistry soap is impossible." As my maternal grandmother used to say—I want to know! Page 24: "For penetrating subtlety of thought we shall not meet his (Zeno's) equal till we reach the twentieth century and encounter Brouwer." There were some pretty subtle thinkers in between. Page 108: "Mathematics, dynamics, and celestial mechanics were in fact—we may as well admit it—secondary interests with Newton. His heart was in his alchemy, his researches in chronology, and his theological studies." It is said that when a complaint was made to Lincoln that Grant drank whiskey, Lincoln asked that the brand be ascertained so that he could get some of the same for his other generals. Page 95: "For in Newton's day alchemy *was* chem-

[3] W. v. Buddenbrock, *Cons. Int. Explor. Mer. Rapp. Proc.-Verb.*, 101 (IV_2): 1–7, 1938.

istry"—the historians of chemistry seem to doubt this as they do the reference to soap. Pp. 934: "In accepting the call (to Johns Hopkins in 1876) Sylvester made one curious stipulation; his salary was 'to be paid in gold.'" *Sic!* Did Sylvester perhaps know more of the current monetary situation than the author seems to? Page 27: "Apollonius is without a peer till Steiner." Some might put in a word for some intervening geometer, though, of course, all such judgments are matters of opinion rather than of fact. Page 446: "The work of Whitehead and Russell in *Principia Mathematica* (1910–1913) was the first to convince any considerable body of professional mathematicians that symbolic logic might be worth their serious attention." It is perhaps clear that the author does not hesitate to express his opinions on a wide range of subjects! I will omit reference to his equally definitely expressed social judgments (*e.g.*, p. 112, ll. 2–3; p. 131, ll. 2–4; p. 130, final ¶; p. 114, ll. 9–14 up)—I am not a competent psychoanalyst.

On pp. 209–212 the author undertakes to explain the "principle of continuity" in geometry. He has here to introduce a variety of concepts, including points at infinity and imaginary points. His illustration is to pull two intersecting real circles apart; he confuses the two finite points of intersection which persist during the process with the two imaginary points at infinity in which the circles intersect whether they cut in real or in finite imaginary points. It is just too bad. While he seems to approve of the principle of continuity as of heuristic value, when he comes to the corresponding algebraic principle he writes (p. 355): "The climax of this credulity was reached in the notorious *principle of permanence of form*, . . ." Is this because he is an algebraist rather than a geometer? We have a way of tolerating suggestive heuristic methods in the matters we know not well but of detesting them in our specialities. It has always been my belief that the geometric principle of continuity and the algebraic principle of permanence of form were essentially correlative, and found a large measure of justification in certain theorems of the theory of analytic functions relating to analytic extension.

The author likes to jolly his reader along as when (p. 5): "As to the amount of mathematical knowledge necessary to understand *everything* . . . it may be said honestly that a high school course is sufficient," or (p. 444) in reference to a 30-page paper by Huntington: "The whole paper is easily understandable by anyone who has had a week of algebra." This is of course ridiculous. Omitting the fact that the author has written of many things he understood all too little himself, it may be pointed out that abstraction of thinking is difficult as one knows when he has had about a week of algebra or, later, when he has had a week or two of vector analysis, and we may well recall that Kummer, apparently one of Bell's greatest heroes, was responsible for Grassmann's not getting a university position because forsooth he did not really understand the Ausdehnunglehre, the whole of which might be said to need "only a few weeks of algebra and of geometry." Incidentally, Grassmann might have been an interesting case to include in "Men of Mathematics" —his was not the pathetic and perhaps psychopathic history of Galois, for he lived on, raised a family and became as well known for his contributions to Sanscrit and for Grassmann's law in phonetics as he later became for his earlier contributions to mathematics.

There are numerous references to Einstein. One can appreciate their "sales value." I can not comment on them all but will raise a question relative to the statements on the top of p. 256. From as early as 1907 to as late as 1912 Einstein was publishing on gravitation, formulating and using his "equivalence-principle" without giving much evidence that he was mastering the tensor calculus—that came later in a joint paper with M. Grossmann—and whether he as a theoretical physicist would have been interested in the intricacies of the tensor calculus if he had happened to hit upon the elegant direct approach of H. B. Phillips (*Jour. Math. Phys.*, 1922, p. 177) can only be left to him to answer.

There is no doubt Bell's work is readable, interesting and generally good; what it needs is some kind friend who will draw a firm blue pencil through an adjective here, a phrase there and occasionally a paragraph to the end that the work might attain that sort of precision of statement which would be in the true spirit of mathematics and to the further end that Eric Temple Bell, member of the section of mathematics of the National Academy of Sciences, might be protected from some of the cheaper vagaries of John Taine. It would be a mistake to assume that the popularity of the book need suffer thereby.

EDWIN B. WILSON
HARVARD SCHOOL OF PUBLIC HEALTH

SOCIETIES AND MEETINGS

THE ROYAL SOCIETY OF CANADA

THE annual meeting of the Royal Society of Canada took place in Ottawa from May 24 to May 27 under the presidency of Dr. A. G. Huntsman, of Toronto. The presidential address on "The Problem of Life" discussed first the life history of the salmon and went on to consider philosophically the relation between the mind and the physical universe.