as the young men who have passed through a gymnasium. In the earlier years (to age fifteen or sixteen) the commission recommends somewhat more emphasis upon intuition and practical exercises, especially the making of models, than in corresponding work in the boys' schools, where the logical element must be brought more freely into play. The avoidance of pedantic proofs of statements that are intuitionally evident is particularly important in teaching girls, special emphasis should be laid on the esthetic side of mathematics, while the logical side should not be neglected; the instruction as a whole must have its own peculiar character, and be based upon textbooks specially prepared therefor.

In the later years of the course no special differences in the instruction of young men and women are recommended, since the very fact that the women go on into the later years is of itself sufficient evidence to the commission of a somewhat mannish type of mind that may reasonably be expected to prove equal to the logical demands made on it by the mathematics to be given, extending perhaps as far as the elements of analytic geometry.

J. W. A. YOUNG.

N.-H. Abel, sa Vie et son Oeuvre. Par CH. LUCAS DE PESLOÜAN. Paris, Gauthier-Villars, 1906. Pp. xiii + 168.

No pretension is made in this biography to add to the facts previously published relating to Abel. It will not supersede the biography written by C.-A. Bjerknes and brought out in 1885 by the same publishers. The aim of De Pesloüan is to put the story of the short life of the gifted Norwegian in attractive form for scientific readers who are not specialists along the lines of Abel's researches. The idea is a commendable one and should be carried out more frequently in biographies of scientists. The author exhibits great sympathy and admiration for Abel. In the preface he goes so far as to call Abel's researches "l' oeuvre du plus grand mathématicien du XIX^{e} siècle." More judicious and suggestive is a remark which is attributed by the author to Hermite (page 136), by some others to Sylvester: "Abel a laissé aux mathématiciens de quoi travailler pendant cent cinquante ans."

It is well known that Abel, in his twenty-third year, started

upon a journey to continue his studies and meet the mathematicians of his day, that this diffident and sensitive youth was cordially received by Crelle in Berlin, that he went to Paris without stopping on the way to see Gauss at Göttingen, who he imagined had slighted him by paying no attention to his first draft of the proof of the impossibility of an algebraic solution of the quintic, and that in Paris he failed to receive appreciation and stimulus from Cauchy, Dirichlet, Poisson, Legendre, Fourier, Arago, Ampère and others. An article which Abel submitted to the French academy, containing what is known now as "Abel's theorem" on "abelian functions," was lost sight of, and not published until twelve years after his death. De Pesloüan discusses at length the causes of this lack of recognition. He holds (page 130) that at this period French mathematicians had quite generally abandoned the cultivation of pure mathematics, to take up applications to heat, elasticity and electricity, that the failure to appreciate the importance of the paper was not, as charged in a sketch of Abel in Michaud's Biographical Dictionary, due to indifference, nor to egoism. "Si les savants furent coupables envers lui, ce fut par suite de leur ignorance ou plutôt de leur incompréhension."

When Abel was in Paris, Galois was sixteen years old and had not yet made his début in mathematics. Had the lives of these two men of genius been spared longer to science, what further revelations might they not have made!

De Pesloüan says, page 109, that Abel's second paper on "Recherches sur les fonctions elliptiques" is lost. He does not seem to be aware that it was found by G. Mittag-Leffler in 1894 and published in the *Acta Mathematica* (volume 26, pages 1–42).*

Some errors in the spelling of proper names and in the statement of theorems might have been avoided by greater care in the reading of the proofs.

FLORIAN CAJORI.

* G. Eneström in *Bibliotheca Mathematica*, ser. 3, vol. 7 (1906), page 217.