prolonged trill resembling the characteristic song of the common toad.

While living at Clarendon, Va., near Vinson Station, the writer every spring has heard the steady, trilling monotone of a toad which he believed to be the common toad, *Bufo americanus*. These notes were among the first batrachian voices to be noted in springtime and were uttered more or less intermittently throughout the greater part of May. On May 2, 1916, the writer established the identity of the toad producing these trilling notes. Several[2] of these toads were captured in the filthy stream just north of Steele's Barn, near Vinson Station; others were captured in the stagnant pools along Fort Avenue, near Maple Street. These toads produced the steady, trilling monotone resembling the song of *Bufo americanus* as it is heard in New England. Although the trill of *Bufo americanus* sometimes continues for 30 seconds or longer, the trill of the toads captured near Vinson Station lasts only from 10 to 20 seconds. Although very variable in size, markings and general coloration, these toads are unquestionably Fowler's toads and can not be distinguished from individuals producing the typical, droning scream which lasts only for 2 to 3 seconds. Individuals producing these notes were captured at the same time and in the same localities.

The iris of both forms is bronze. Although Miller and Chapin[3] are of the opinion that the iris of *Bufo americanus* is bronze and the iris of *Bufo fowleri* is silvery in color, it is evident that such distinctions can not be relied upon in the diagnosis of the two toads.

It is hard to explain why some individuals of *Bufo fowleri* produce a steady, trilling note while others produce a brief, droning scream. These vocal differences, however, are in some manner correlated with fundamental differences of physiology and habit, since the trilling form is first to appear in spring and is rarely heard when the typical mating song of *Bufo fowleri* begins. In 1915, the brief, droning scream of *Bufo fowleri* was not heard at Clarendon, Va., until May 2. The trilling form is always heard early in April, several weeks before this period. After May 15 the trilling form is rarely heard, while the form with the brief, droning scream is heard until August.

The range of Fowler's toad has yet to be clearly established. The writer found this toad extremely common at Thompson's Mills, in northern Georgia. Whether or not this toad occurs in the Coastal Plain region of this state, or extends its range into the Gulf States, is not known. The westward distribution of Fowler's toad has also to be determined. Nothing definite is known concerning the relationship of this toad to *Bufo americanus* in the north, or to *Bufo lentiginosus* in the south.

H. A. Allard

Washington, D. C.

[2] These toads are now in the collection of the U. S. National Museum under accession number 59692.

[3] Miller, W. De W., and Chapin, James, "The Frogs of the Northeastern United States," Science, N. S., Vol. 32, No. 818, September 2, 1910.

Better Coordination of Undergraduate Courses

To the Editor of Science: A questionnaire recently circulated among alumni by the University of Minnesota (J. B. Johnson, dean), includes a call for suggestions as to the better preparation of students for public service. As the following proposal is not really limited to that application, but appears to be of a character to which the columns of Science have been open, I respectfully submit it for publication or other disposition as may to you seem fit:

Provide, in undergraduate courses and even at great expense, for "*laboratory*" *use* of that modern language elected by any group of students carrying at the same time (say) French or German and (say) physics, chemistry, animal biology, or history of European diplomacy.

When in college, the undersigned was not alone in wishing that the assistants in charge of laboratory hours would give their directions in, *e. g., French*—resorting to English only as might be rendered necessary by a student's failure otherwise to comprehend. The carrying out of this proposal would of course re-

quire that pamphlets of laboratory instructions be in general published in *three languages,* and it would appear that the most advantageous plan would be to use a *three-column page* —with a polyglot repetition of all material always before each student. This program (as to the absolute novelty of which no adequate investigation has been made) would at least soon enable the men to *use* one selected foreign language for scientific purposes, and it would at the same time invite a cursory acquaintance with another.

Those students taking, *e. g.,* French and physics, would, of course, on this basis, meet for laboratory work in physics separately from those taking German and physics; but the plan would seem worthy of trial even if it were found impracticable to hire as laboratory assistants in all the respective sciences mainly men capable of fluently speaking French or German. The plan could of course be introduced in an experimental way in connection with but one science and but one of the modern languages.

BERT RUSSELL

WASHINGTON, D. C.

SYLVESTER AND CAYLEY

ON page 484 of the third edition of Ball's "Short Account of the History of Mathematics" occurs the sentence:

> He [Sylvester] too was educated at Cambridge, and while there formed a life-long friendship with Cayley.

The two words "while there" seem inadvertently to have slipped in. Without them, Ball's sentence states two facts. With them, it seems capable of the paraphrase,

> Cayley and Sylvester were students at Cambridge at the same time and formed then a lifelong friendship.

Both of these statements are errors, and readily proved erroneous. Thus in the *Proceedings of the Royal Society,* May 9, 1898, page xii, we read:

> In 1831, at the age of seventeen, Sylvester was entered at St. John's College, Cambridge. He came out first in his first year.

In the same *Proceedings,* July 13, 1895, page ii, we read of Cayley:

> Accordingly, he went to Cambridge. He was entered at Trinity College on 2d May, 1838, as a pensioner, and began residence in the succeeding October at the unusually early age of seventeen.

He thus entered Cambridge at the same age as Sylvester, seventeen, but seven long years after him, and Sylvester had previously departed forever, never again to reside in Cambridge.

In the *Proceedings of the Royal Society,* Vol. LXIII., No. 393, page xii, we read of Sylvester:

> He pursued his studies till January, 1837, when he came out Second Wrangler. Being unwilling to sign the Thirty-nine Articles, he was unable to take a degree, to obtain a Fellowship, or to compete for one of the Smith's prizes. On the death of Dr. Ritchie in the same year he became a candidate for the Chair of Natural Philosophy in the London University College. He was appointed to the Chair at University College in the session 1837–38. He had some difficulty in drawing diagrams on the black-board to illustrate his lectures.

Sylvester left London for America to accept a professorship in the University of Virginia, but in 1844, when the foundations of the theory of invariants had been laid by Boole, Sylvester was back in London. For years he resided at 28 Lincoln's Inn Fields.

In the *Proceedings,* LVIII., No. 347, p. vi, we read of Cayley:

> He was unwilling to take holy orders. In consequence, it became necessary to choose some profession. Cayley selected the law, left Cambridge in 1846, entered at Lincoln's Inn.

And on page viii:

> It can hardly be that 2, Stone Court, proved an inspiration to mathematical research.

Thus separately thrown upon the rocky courts of the law, and by the same cause, the religious disbarments of Cambridge, the two were brought together. The biography in Sylvester's Collected Works feelingly refers to their fateful meeting. The ensuing union of their congenial and complementary minds endured without break.

Sylvester presented the first of Cayley's series of Royal Society Papers, and, inversely, Sylvester told me that if he wanted to know anything, he asked Cayley. In the *Proceed-*