

important branch of composition, I would advise the occasional writing by each pupil of a "letter of criticism" addressed to the teacher, in which letter he criticizes a composition of some other pupil. To prepare the pupil for this, the teacher shows the class the usual forms of letters, as to date, heading, address, subscription, &c., and also writes one or two on the blackboard. These should be marked in the same manner as compositions, and correctly rewritten. The pupil may also be required to write letters to friends on familiar subjects, such as "How they spent some holiday," an account of some visit to a place of amusement, such as the park, gardens, &c., and what they saw there.

In addition to regular composition, there are some very profitable exercises in connection with the grammar lessons of the pupils. A number of simple statements written on the blackboard may be combined into one simple sentence, as in the following: John Smith lost some pencils. They were long pencils. They were slate pencils. Combined, these become: John Smith lost some long slate pencils. Short sentences containing adverbial phrases may be combined in the same manner, as—Columbus sailed from Spain. He sailed in 1492. He sailed across the Atlantic Ocean. When the pupils are acquainted with the Relative pronouns, they may combine sentences similar to the following into a complex sentence containing a relative clause: Milton was blind. Milton wrote "Paradise Lost." Milton who wrote "Paradise Lost" was blind. As soon as they know the kinds of verbs, require the pupils to form sentences containing Tran. Act. verbs, and then change to sentences containing Tran. Pass. verbs. When the pupils understand the participles, which will probably be in the fourth division, they may be practised in combining several short statements by the use of the participles.

The converse of this exercise may be employed with advantage, viz., the breaking up of a sentence containing several attributes into simple statements. In order to teach the pupils the important art of making compound sentences, and not short abrupt statements, as children are so apt to do at first, a number of simple sentences connected in sense may be written on the blackboard, and combined into one compound sentence by the pupils, using appropriate conjunctions. Similarly, the formation of complex sentences may be taught, as in the following: Shakespeare flourished in the sixteenth century. Elizabeth was then Queen of England. One simple sentence containing attributes may be changed to a complex sentence by changing adjectives and adverbs into clauses. The complex sentence I have just read may be obtained from this simple one: Shakespeare flourished in the sixteenth century during the reign of Elizabeth, Queen of England. Again, these and similar complex sentences may be changed to one or more simple ones.

Another useful exercise is the change of direct to indirect narrative, and vice versa. All exercises similar to those I have mentioned, requiring the pupil to apply his knowledge of the principles of grammar in the formation and change of sentences, are I think very valuable. And now I will suggest a want in the matter of text-books, notwithstanding the number we already have, viz., a book of exercises similar to those I have indicated. In my opinion such a book would very materially aid the teacher in teaching composition.

I do not venture on any suggestions with respect to higher forms of composition, requiring a knowledge of figures of speech, &c., neither have I made many suggestions on teaching composition in the higher classes, although no doubt the same methods may be adopted as in the lower, with the exception of exacting a higher standard of excellence.

In concluding these remarks, I cannot refrain from saying that

composition depends, after all, on the intelligence of the reader. If a pupil understands the exact force of the words and phrases he reads, very little teaching will enable him to write well; if not, no amount of teaching the forms of sentences, &c., will make him even a passable writer. I would therefore recommend, as a direct aid to the teaching of composition, careful attention to the understanding of the meaning of words by the pupils.

Mathematical Department.

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ALFRED BAKER, M.A., Editor.

SOME FACTS IN THE HISTORY OF ALGEBRA.

Almost all authorities agree that the word 'algebra' is Arabic in its origin. De Burgo—one of the earliest European writers on the subject—derives it from Arabic words signifying restitution and comparison; others obtain it from Geber, a celebrated Arabian philosopher, to whom the invention of this department of knowledge is ascribed. As would naturally be supposed, the first steps in the science were due to attempts to extend and generalize ordinary arithmetic. In the earliest works the two subjects were mixed in such a way as plainly to indicate the intimate relation in which they were supposed to stand to one another. De Burgo calls algebra the greater art, to distinguish it from ordinary arithmetic, which is called the lesser art; and much later, Newton defines algebra as universal arithmetic, for which, however, he is taken to task by Comte, who considers that the two subjects differ in the point of view from which they regard quantities, which in algebra are considered as to their *relations*, in arithmetic as to their *values*. Algebra is the calculus of *functions*; arithmetic the calculus of *values*. In a philosophic view of mathematics, aided by advances made since Newton's time, we can scarcely hesitate to agree with Comte; but it is equally true that Newton expressed not only the view entertained in his time, but also the then position of the sciences.

At first the characters used were mere abbreviations of words. Thus, *p* and *m* denoted *plus* and *minus*. Says Playfair, "The first appearance of algebra is merely that of a system of short-hand writing, or an abbreviation of common language applied to the solution of arithmetical problems. It was a contrivance to save trouble. The scientific language, therefore, has grown up slowly from a very weak and imperfect state."

The oldest work extant is that of Diophantus, of Alexandria, who flourished about 150 years after Christ. His book is a collection of problems relating to square and cube numbers, with their solutions. His investigations do not extend beyond quadratic equations. He denotes the powers of quantities by the initials of their names. Thus *x* denotes the cube (*кубос*), and *xx* the sixth power. The rule is laid down that minus multiplied by minus gives plus, but minus multiplied by plus gives minus. Minus (*λιν*, *↓*) is denoted by *↓* inverted, but no special sign is used for plus.

Hutton, who gave much attention to the early history of algebra, and careful consideration to the respective claims of Hindoos, Arabians, and Greeks, to being the first inventors of the science, expresses the opinion that the algebra of the Arabs is quite different from that of Diophantus, and not taken the one from the other: that if the Arabs did learn from the Hindoos, as is most probable, they did not borrow largely from them; and that the Hindoos were further advanced in some branches of this science than the modern Europeans, with all their improvements, till the middle of the eighteenth century. It is certain that the Italians