

SCIENCE

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THE GROWTH OF SCIENCE is well illustrated in the recent appearance in the *Century* of the series of articles on the new astronomy by Prof. S. P. Langley. These have been republished in book form by Messrs. Ticknor & Co. of Boston. We now have a new chemistry, a new physics, and a new astronomy; and, owing to the way in which the older brothers or older sisters have been endowed, these new-born sciences find themselves without the pecuniary means for their proper support. To quote from Professor Langley's preface, it is not generally understood that among us not only the support of the government, but with scarcely an exception every new private benefaction, is devoted to the old astronomy, which is relatively munificently endowed already, while that which he has called the new, so fruitful in results of interest and importance, struggles almost unaided. The great national observatories, like Greenwich or Washington, are the perfected development of that kind of astronomy which was only interested in recording the movements of the solar system. From primitive times man knew where the sun would rise on a certain day; and the record of this knowledge is left us in the prehistoric buildings, if such they may be called, of Britain. At Greenwich the moon has been observed, with scarcely an intermission, for a hundred and fifty years, but not for the purpose of seeing what it was made of, but for the purpose of forming the lunar tables, which, by means of the moon's place among the stars, will give the navigator his positions. In the same way at the Washington observatory one may see a wonderfully exact instrument strongly bolted to massive piers, and so immovable that the sun can be observed by it but once daily as it crosses the meridian. This instrument is the complete attainment of that long line of progress in one direction of which the prehistoric stones at Stonehenge mark the initial step,—the attainment, that is, purely of precision of measurement. The new branch of astronomy, which has had its entire growth within a few years, studies sun, moon, and stars for what they are in themselves and in relation to ourselves. Its study of the sun, beginning with its external features, led to the further inquiry as to what it was made of, and then to finding the unexpected relations which it bore to the earth and our own daily lives on it. This new branch of inquiry is what Professor Langley calls the 'new astronomy;' and it is for this new astronomy—this study of the celestial bodies to find out their nature and their relation to us, rather than for the purpose of simply recording their relative motions—that Professor Langley has made so beautiful and so eloquent an appeal for the proper endowment of this new field of research. No one can read this book of Langley's without feeling that astronomy has acquired an entirely new interest for him. It now results in something more than the dry-looking pages upon pages of tables.

THAT THE ORIGIN of color-blindness lies in the brain, and not in the eye, has been suggested by Professor Ramsay. While engaged in teaching in Brooklyn some years ago, the principal of a school insisted in treating every case of the sort as dependent on the will of the pupil. His remedy was the rod. This certainly seemed a tyrannical and unwarranted treatment, but the result was favorable to his theory. Is it possible that a thorough examination will ultimately demonstrate that the fault lies very largely in the shiftless methods of observation which have grown up under the old classical system of education, and which have to a large extent

become hereditary? Professor Ramsay's suggestion and his argument deserve careful attention, and, if found correct, we have another and overwhelming reason for the newer education. At first sight, it is not perfectly clear, on the above theory, why it is that color-blindness should be more common among men than among women; yet it is possible that this will be found to bear out the suggestion made above, for, with the discontinuance of the wearing of colors by the men, their interest in colors to a large extent must have ceased; and if our old methods of education were to be continued much longer, it may be, that, with the less use of color by women in their dresses, an increase of color-blindness might result among them as well. It is doubtful, however, whether the introduction of the rod as a quick corrective will find many advocates.

VOLAPÜK.

THIS is the name of an artificial language recently devised for international use. Similar attempts have been made at various times to produce a vehicle of uniform expression for the world's speakers; but modern literature knows nothing of these efforts. All have been abortive. Will Volapük be more successful?

A universal language must have a phonetic representation—a 'real character'—that shall be easily and uniformly intelligible to all readers. The new candidate for universality is in the mean time unprovided with any international medium of writing. It cannot, therefore, while this want is unsupplied, be diffused as a spoken language. Take, for example, the title 'Volapük.' The English reader deciphers this word into the syllables 'Vol-a-puk,' with customary sounds; but the intended pronunciation is 'Voh-lah-puek.' A French or a German reader would have no difficulty with the syllable 'pük,' but the English system of letters can give our readers no idea of the sound. The employment of Roman letters, while they have such diverse phonetic values in different languages, must effectually prevent the oral use of Volapük in different countries. As a written language it might still, however, be of service.

Is Volapük the best language that science can create for this ideographic purpose? Is it superior to previous essays of the same kind? The most elaborate and complete of all earlier schemes for a universal language is undoubtedly that of Bishop John Wilkins. This system was printed for the Royal Society in 1668. The analysis and the classification of ideas, on which the 'Philosophical Language' is founded, are beautifully ingenious. A similar principle of arrangement was afterwards adopted by Dr. Roget in his well-known 'Thesaurus of English Words and Phrases,'—a book, by the way, which owes its existence to the labors of Bishop Wilkins, although no acknowledgment of such indebtedness is to be found within its pages. The bishop's scheme for a universal language is indeed referred to, but only as having been "soon found to be far too abstruse and recondit for practical application;" while no mention is made of the grand feature of the work, on which the whole scheme is based,—the fundamental grouping of thoughts and expressions. This feature is simply, silently appropriated in the 'Thesaurus.' The latter is a very cleverly executed work; but the credit of its plan, however improved by Dr. Roget, should have been ascribed to the original designer, Bishop Wilkins.

Before examining the details of Volapük, let us look at some of the characteristics of the older scheme. The complete categories of ideas are comprised under forty 'genuses or heads,' to each of which a radical sign is appropriated. This sign is susceptible of the addition of subordinate marks, which, on defined principles, signify species, differences, etc. The resulting geometrical figures make up the 'real character.'

The application of the system is illustrated in the Lord's Prayer

and the Creed. The signs for the ideas 'heaven' and 'earth' are thus explained:—

"[*Heaven*] This Generical Character is assigned to signifye World, the right angled affix on the left side, denoting the second Difference under that Genus, namely Heaven; and because there is no affix at the other end, therefore doth it signifye the Difference itself, and not any Species."

"[*Earth*] The same Generical Character signifyng World, the affix making a right Angle, doth denote the second difference under that Genus, namely the Celestial parts of it in general, amongst which, this Globe of Sea and Land whereon we live, is reckoned as the seventh Species, denoted by the affix at the other end."

These examples suffice to show the nature of the 'real character,' which is obviously adapted for universal writing, because the ideas expressed by the signs are translatable into the words of any language.

The Roman alphabet (with additional letters) is also made use of in application of the system to individual languages. The same forty 'genuses' are expressed by simple syllables, such as *ba, be, bi,* etc.; the differences under each genus being denoted by sequent consonants, as in *bab, bag, bad,* etc.; and the species by putting a vowel after the consonant, as in *deba, deta, gade, pida,* etc.

A few words may be quoted to show the nature of the verbal forms in this 'philosophical language':—

<i>al</i> = 'the'	<i>lal</i> = 'from'	<i>odab</i> = 'body'
<i>coba</i> = 'father'	<i>lil</i> = 'at'	<i>odad</i> = 'hell'
<i>cobas</i> = 'son'	<i>me</i> = 'as'	<i>foto</i> = 'day'
<i>Dab</i> = 'God'	<i>mi</i> = 'no'	<i>Saba</i> = 'Lord'
<i>dad</i> = 'heaven'	<i>na</i> = 'and'	<i>salba</i> = 'kingdom'
<i>e</i> = 'he'	<i>nil</i> = 'but'	<i>tado</i> = 'power'
<i>he</i> = 'his'	<i>nor</i> = 'for'	<i>velco</i> = 'lead'
	<i>velpi</i> = 'give'	

The principle on which these words are constructed may be understood from the author's explanation of the four following:—

"[*Coba*] Co doth denote the Genus of Oeconomical Relation; the letter [b] signifyng the first difference under that Genus, which is Relation of Consanguinity; the vowel [a] the second Species, which is direct ascending; namely, Parent."

"[*Cobas*] The syllable [co] is assigned to the Genus of Oeconomical Relation, the letter [b] to the first difference, and the vowel [a] for the second species, the Letter [s] denoting the word hereby signified, to be an Opposite, viz. Son."

"[*Dad*] Da the Genus of World, and [d] the second difference, which is Heaven."

"[*Odad*] [Da] is the Genus of world, [d] is the second difference, which is Heaven, the vowel [o] which is opposite to [a] being prefixt, denotes this to be the word opposite to Heaven, viz. Hell."

In this way all thoughts find expression in fit words deduced from the associated meanings of their component letters. "Every Word being a description of the thing signified by it; Every Letter being significant, either as to the Nature of the Thing, or the Grammatical Variations of the Word; besides the constant Analogy observed in all kinds of Derivations and Inflexions." With all these advantages, however, the philosophical language would need a philosopher to use it.

Another part of Bishop Wilkins's work ought not to pass unnoticed; namely, his analysis of English sounds. This is far superior to that of any preceding writer, and also more complete than the schemes of the majority of subsequent phoneticians. If the bishop's scheme for a universal language must be set aside as being beyond the ability of average learners, the logical, grammatical, and phonetic principles evolved in its development must always command the admiration of students.

The new claimant for adoption as an international language proceeds on the principle of selecting roots of words from the vocables of existing languages; but the relation of the Volapük words to the English, German, French, and other words from which they are derived, is so far from obvious, that the learner is not assisted by it to remember the meanings associated with the roots. English is said to have furnished about forty per cent of the adopted roots, yet, in a vocabulary extending over upwards of forty pages, only twelve of the roots exactly correspond with their English proto-

types. The roots might, indeed, just as well have been entirely arbitrary as to have been arbitrarily chosen in this fashion from existing words. The method of root-building proposed by Bishop Wilkins seems greatly preferable.

Root-words having been selected, they are provided with a very complete and on the whole simple category of definitive letters and syllables, for prefixing or suffixing, to show number, gender, case, tense, mood, etc. The simple grammar of English has not been taken as the model in this department, but the complex arrangements of highly inflected languages. This is unfortunate; for we may safely assume that the universal language to be some time adopted will express all verbal relations by separate words, and not by root-inflection. The student will then need only to memorize words, and he will not require to know any thing of case-endings and other grammatical subtleties. On the other hand, if these matters are considered essentials of a language, the inflective scheme of Volapük could hardly be improved on. For example: all plurals end in *s*; final *-a* denotes the possessive case, final *-e* the dative, and final *-z* the objective; masculine genders end in *om*, and feminine in *ji* (pronounced 'she'); adjective terminations are *ik* and *id*, adverbial *o* and *na*, degrees of comparison being *um ün*, and *umo üno*; active and passive verbs have their appropriate signs, as have also all persons, tenses, and moods; prepositions end in *ü*, interjections in *ö*, etc. The grammatical particulars to be attended to are very numerous, but the rules have the advantage of being absolute, and unburdened with exceptions. The inflective feature of the language must, however, present an unsurmountable obstacle to its popular employment.

We cannot think that Volapük solves the problem of a universal language. The system will naturally meet with the largest acceptance in countries which already possess an inflected language; for the manifest superiority of the Volapük inflections, in regularity and simplicity, cannot but impress those accustomed to the complexities and anomalies of inflection. Speakers of English are happily free from this source of difficulty, and to them Volapük cannot be acceptable. The English language is itself reaching out towards universality, under the influence of commercial and social necessities. The present form of the language may be considered as classical, and must be allowed to remain substantially what it is. But English is undoubtedly susceptible of modifying simplifications which would easily and perfectly fit it for international use. Let a committee be appointed, consisting of one British and one American member, to investigate the subject, and suggest such changes as would remove anomalies, and I feel convinced that they would readily create a new and simple tongue in the form of what may be called 'world English.' This seems to be the most hopeful direction in which to look for universal language.

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THE PEOPLES OF SOUTH-EASTERN EUROPE.

At the present time, when the idea of 'nationality' rules the fates of Europe, those states have to pass through the severest struggles which have the most heterogeneous population, the parts of which gravitate to different centres. This is particularly the case in Austria, and was the case in Turkey. The latter, however, has disintegrated to such an extent that many of the peoples formerly included in its territory have gained their independence.

The accompanying map shows the distribution of the peoples and the boundaries of the states of south-eastern Europe. At the present time, when the struggles of the Bulgarians for independence and unity excite so much interest, a description of their distribution is of particular importance. The map shows that they inhabit the greater part of Bulgaria, while in the eastern part Turks are intermingled with them. Eastern Roumelia, which by the uprise of 1886 joined Bulgaria, has a Bulgarian population in its western half, while numerous Turks inhabit the east, and Greeks occupy the coast. But the territory of the Bulgarians is not confined to these two districts, which practically form one state. The south-eastern portion of Servia and ancient Macedonia is inhabited by them, and their territory extends northward to Ochrida. Their western neighbors are the Servians, of whom the Croatians and Slovenians form a branch. The map shows that they occupy the