

and output as well as by its staining reactions. Both in structure and in behavior the ectoplasm of animal eggs is a diagnostic of specificity. In addition, it is a diagnostic of the successive stages in the embryonic development of any animal egg.

Evidence can be adduced to show that nucleus, cytoplasmic inclusions and ectoplasm should be considered as derivatives of the ground-substance of the cell. During several years I have accumulated evidence which convinces me that in the ground-substance one can detect specificity. By methods inspired by Reichert and Brown's² I have succeeded in demonstrating specificity in the ground-substance of eggs. A method of my own, which allows very rapid precipitation, likewise demonstrates specificity. Further, thanks to a suggestion given me by Dr. A. P. Mathews while I was a student of his, I have used dyes to show progressive changes in the ground-substance during development. In this manner I have studied the actual time and place both of the loss of embryonic potency and of the building up of nuclear stuff out of the cytoplasm. Finally, by methods of spectroscopy also I can show specificity in the ground-substance.³

A detailed report giving methods will follow. It is also hoped that it will be possible to extend these investigations.

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THE AUDIBILITY OF ESPERANTO

THE article in the Supplement in SCIENCE for June 12, on "The Audibility of Language," contained certain allusions to Esperanto (and to the problem of an international language which it essays to solve) which would appear to justify a few additional comments.

The original creator of Esperanto, Dr. L. L. Zamenhof, was not guided in his choice and treatment of material by any one single objective; since the ease of learning, ease of utterance, ease of auditory perception and adequacy for expressing a wide range of ideas had to be considered jointly, and each in proper proportion to the others. But in the matter of acoustic quality it is now interesting to note that Esperanto as actually created does appear to conform more closely than our English to those phonetic requirements for audibility which were discussed in your previous article.

For example, you pointed out that words ending in "ng" were especially subject to misunderstanding during the Los Angeles tests. But no Esperanto word

can possibly end in "ng," since that nasal sound is not employed at all in Esperanto.

You also noted that words ending in a vowel have been found in general to be more readily understood than those ending in consonants. Actual count has shown that on an average Esperanto page five eighths of the words end in vowels, against only two eighths on an average page of English. Moreover, only two Esperanto words (the prepositions "trans" and "post") end in more than a single consonant.

Of course, audibility does not depend on final syllables alone. The consonantal combinations which form the joints between the vowels have an important influence on the sound effects. This opens up a wide and complicated field. From a member of the Esperanto Association comes a query whether the family of four "explosives" (the *ch* in "chairman," the *dg* in "badger," the *ts* in "tse-tse," and the *dz* in "Kedzie") may not be among the highest of sound combinations in ear-catching power, because in each of them a breath-stoppage and a sibilant or buzzing dénouement are welded into what is practically a single sound of explosive quality. This may be a good field for further experimental research. At any rate, a recent count in the first 2,000 syllables of the book of Ruth in our English Bible finds the sounds of this quartette occurring only 30 times in all. While in the first 2,000 syllables of Ruth in the Esperanto Bible these sounds are employed 83 times.

Esperantists often mention with satisfaction that on one occasion when a broadcast by the late King George V failed to be audible in Geneva because of unfavorable atmospheric conditions, the Esperanto translation of the address which immediately followed was understood clearly and was the sole source of the first reports in the Swiss newspapers.

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THE PHILOSOPHY OF PHYSICS

IN his latest book, "The Philosophy of Physics," Planck refers to the theory of relativity on five different occasions without once mentioning Einstein's name. Planck's quantum is referred to six times, but Planck's name appears each time.

On page 35 there appears this statement: "Every science, like every act and every religion, has grown up on a national foundation. It was the misfortune of the German people that this was forgotten for many years."

I wonder. Just precisely what has happened to the Grand Old Man of Science in Germany?

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² Publication No. 116, Carnegie Inst. Washington, 1909.

³ My first studies with the spectroscope on this problem were made as early as 1923. It gives me great pleasure to acknowledge my indebtedness to my colleague, Professor Frank Coleman, department of physics, Howard University, for his valuable aid.