This metal has already been applied in a number of cases to commercial devices for this purpose, one of which is being manufactured at the present time by the Central Scientific Company.

Any increase of sensitiveness, or any reasonable amount of force on a given temperature change may be obtained by manipulation of the length, width and thickness of the metal. By using very thin sections extreme sensitivity may be obtained, deflections as great as one fourth inch per degree Centigrade being possible. On the other hand, by materially increasing the thickness great force can be created, in one instance approximately one fourth pound per degree Centigrade.

On account of the process of manufacture employed, the danger of permanent set has been practically eliminated, so long as the metal is not overstrained.

G. E. Thermostatic Metal, as it is known to the trade, is produced regularly in thicknesses from .015 to .25 inch; widths up to 6 inches and lengths up to 36 inches. In special cases it may be obtained in thickness as small as .005.

I feel sure that a knowledge of the characteristics and adaptability of this material will enable many experimenters to solve problems of temperature control or indication with much greater ease and accuracy than heretofore.

CHESTER I. HALL

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## COMMON NUMERALS

THE origin of our common number symbols has never been clearly established, but until recently all writers on this subject agreed that these symbols were transmitted to Europe by the Arabs who had obtained them from India. This is the view expressed in the general encyclopedias and in our mathematical histories which consider this question. For example, in the eleventh edition of the *Britannica* under the word "numeral" there appears the following statement:

> What is quite certain is that our present decimal system, in its complete form, with the zero which enables us to do without the ruled columns of the abacus, is of Indian origin. From the Indians it passed to the Arabians, probably along with the astronomical tables brought to Bagdad by an Indian ambassador in 773 A.D.

In view of these facts it is very interesting to note that during recent years available data relating to the origin of our common number symbols have been carefuly reexamined by Carra de Vaux, who published in volume 21 of *Scientia* a brief summary of his results. Among the most surprising of these results are the following: Our common number symbols originated in Europe and from there were transmitted to the Persians. Both India and Arabia received them from Persia, so that the common term *Hindu-Arabic numerals* is decidedly misleading. The common numerals did not come from letters of the alphabet, but were formed directly for the purpose of representing numbers.

It does not appear likely that all of these conclusions reached by Carra de Vaux, who has made an extensive study of the intellectual life among the Mohammedans, will be at once accepted, but they tend to exhibit the weak foundation upon which the history of our common numerals has thus far rested. In fact, the nature of this question is such that it seems likely that general agreement as regards the origin of our numerals can result only from that attitude of mind (known as philosophy) which would rather accept as facts what can not be proved than acknowledge ignorance. Conclusions similar to those of Carra de Vaux were also expressed in a Russian work by N. Bubnow (1908), which was translated into German and published in Berlin in 1914.

G. A. MILLER

## PSYCHOLOGICAL RESEARCH FOR AVIATORS

TO THE EDITOR OF SCIENCE: In his article on "Psychological Research for Aviators" in SCIENCE of January 24 Dr. Dunlap inadvertently neglects some of the most important

work on tests of flying ability. Burtt, Troland and Miles were working at Cambridge in the spring and summer of 1917, and the work of Captain Henmon at Kelly Field No. 2 in the spring of 1918 was contemporaneous with and under the same authorization as that of Professor Stratton. A prophesy based upon Captain Henmon's results was of notable influence in leading the director of military aeronautics to authorize tests of ability to learn to fly in connection with the regular work of the examining boards. E. L. THORNDIKE

TEACHERS COLLEGE,
COLUMBIA UNIVERSITY

TO THE EDITOR OF SCIENCE: Professor Thorndike has called my attention to the fact that in my article on psychological research for aviators in SCIENCE of January 24, I made no reference to the work of Burtt, Troland and Miles, and the work of Henmon, which was reported in relatively full detail in Thorndike's article in the preceding (January 17) number of SCIENCE. A footnote referring to Thorndike's report should have been inserted in my article to prevent the supposition that I was covering the work of all investigators. No detailed information concerning the work of Burtt, Troland and Miles was given me until Thorndike's address appeared, hence I should not attempt to describe it. The work started by Stratton, and subsequently developed by Stratton and Henmon, should, as I stated in my article, be reported by Stratton.

I may add that important work in aviation was done by a number of psychologists not mentioned by either Thorndike or myself: Maxfield for instance conducted a valuable piece of research which was, I believe, reported to the psychology committee.

I trust it will be understood that my report was not intended as a comprehensive account of all work in aviation by psychologists, and that if I am able, later, to give a full account of all work done under my control, I shall not attempt to relate the activities of other psychologists except in so far as those activities had direct effects in facilitating or interfering with my own work. KNIGHT DUNLAP

## QUOTATIONS

### THE HISTORY OF INFLUENZA

ALTHOUGH the term influenza was not formally adopted by the Royal College of Physicians of London till 1782, the disease was known to Hippocrates and other ancient physicians, and a formidable list of epidemics in various parts of the world between the years 1173 and 1875 is given by Hirsch in his "Handbook of Geographical and Historical Pathology." Records of outbreaks in this country between 1510 and 1837 were collected by Theophilus Thompson and published by the Sydenham Society in 1852; they were brought down to 1891 by E. Symes Thompson. Many physicians, among them such men as Sydenham (1675), Huxham of Plymouth (1729), Arbuthnot (1732), Sir George Baker (1762), and John Fothergill (1775) had written about the disease from the clinical point of view, but Immanuel Kant, who, like Bacon, took all learning for his province and was specially interested in medicine, was one of the first to direct attention to its epidemiology. Towards the end of the eighteenth century influenza swept over nearly the whole world. It reached Siberia and Russia, China and India, in the autumn of 1781, and in the following December and February it invaded successively Finland, Germany, Denmark, Sweden, England, Scotland, the Netherlands, France, Italy, and Spain. Kant, in a "Notice to Physicians" published in the lay press of Königsberg on April 18, 1782, considered the disease in its relation to physical geography. He expressed the opinion that it was spread not only by atmospheric conditions but by infection conveyed by insects. The paths of communication between Europe and other parts of the world by sea and by caravan were, he thought, the means of conveyance of many diseases, and he found reason to believe that the Russian trade route to China by land had brought several kinds of harmful insects from the farthest East. The epidemic of 1781–82 spread along the Baltic coast till it reached Königsberg; thence it travelled to Danzig and Prussia. Kant's interest in influenza is shown