

not even the Himalayas interrupt the progress of a pleion or an antipleion. This demonstrates the fact that the thermopleions and antipleions are products of temporary alterations of the general circulation of our atmosphere. A full discussion of the question of which this is but a short summary is to be found in my memoir "L'Enchaînement des Variations Climatiques," published recently by the Belgian Astronomical Society. I am working at present on the dynamical problems connected with the results I have already obtained and hope to be able, in a short time, to propose a method of research by which it will be possible to successfully predict, several months in advance, the climatic anomalies of the different seasons of the year. In connection with this study I intend to examine the yield of cotton and grain.

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THE EFFECTS OF PROLONGED RAPID AND DEEP BREATHING

IN SCIENCE, December 3, D. F. Comstock calls attention to certain phenomena that follow upon a few minutes of enforced deep breathing. These phenomena, as he reports them, are in brief: (1) an apnoeic pause, (2) mental stimulation, (3) increased physical endurance and (4) increased pulse rate.

Several years ago I published¹ the results of fairly extensive experiments upon the effects of forced respiration. A comparison of my results with those of Comstock may not be without interest.

In the first place, the apnoeic pause is unquestioned. Some of my observers, without endeavoring to hold the breath at all, as did Comstock, furnished respiratory tracings in which two minutes of forced breathing was followed by two minutes of complete apnoea. A very common result was, however, not a pure apnoea, but a period of slow, shallow respiration with long expiratory phases.

Second, the immediate subjective effects of forced breathing were more or less dizziness,

¹*American Journal of Psychology*, IX., July, 1898, 560-571.

tingling and prickling sensations in the hands and feet, blackness before the eyes, and a feeling of confusion coupled with energy. There was often, too, a secondary experience of exhilaration.

Third, immediately after the cessation of forced breathing there was a noticeable improvement in strength and endurance of grip.

Fourth, a slight quickening of pulse occurred during the breathing, though not by any means so pronounced as that reported by Comstock.

Fifth, and most interesting: actual tests of reaction time, discrimination time, memory-span, visual discrimination of forms and precision of movement, all showed more or less impairment when administered immediately after forced respiration.

It is commonly stated that, while alcohol produces for a time distinct exhilaration and a feeling of exceptional mental readiness and fluency of thought, the actual performance under these conditions does not measure up to one's subjective estimate of it. I suggest, therefore, that, contrary to Comstock's view, forced breathing is probably not so valuable as a mental stimulant as it may appear on the strength of the feeling of exhilaration which it develops. My experiments, however, have no bearing upon the effect of forced breathing during longer intervals of time after normal breathing has been resumed.

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December 6, 1909

QUOTATIONS

THE ANTIVIVISECTION CAMPAIGN

THE antivivisectionists so-called, that is, the misguided, ignorant, and the fanatics who have no objection to live-broiled lobsters, "live feather" pillows, spring traps for mice, sticky fly paper and other forms innumerable of torture of the brute creation, but shudder at the use of animals for the manufacture of vaccine and antitoxins or for the gaining of knowledge that will aid in saving human life, have opened their annual campaign by an attack on the Rockefeller Institute. A newspaper of this city, whose proprietor is said to have a