In low-tension secondary distribution, the direct current from the converter being introduced at the neutral points of the two distributing-circuit coils, the passage or interruption of the current thus introduced has no effect upon the action of the alternating system. A considerable variety of distribution, in detail, has been found practicable with this system, and the outcome of its adoption is expected to be a very considerable saving in cost of line and in expense of both light and power production.* It lends itself equally to distributions in light and power systems and to simultaneous operation of arc and incandescent lamps, giving a gain, often large, in the cost of copper and of line, and simplifying the whole scheme of transmission of electrical energy to multiple forms of work.

R. H. THURSTON.

BRAIN-WEIGHTS OF BROTHERS AND SISTERS.

Brain-weights of brothers and sisters are not often obtained. When Professor Joseph Leidy and his brother, Dr. Philip Leidy, died within a few hours of each other, their brains, examined under similar circumstances and by the same observer (Professor Harrison Allen), were found to weigh exactly the same, 45.5 ounces troy weight, or 1,415 grams. The more distinguished of the two, Professor Joseph Leidy, was also fourteen years older than his brother. Marchand, in his recent work on brain-weights, cites some interesting figures from Professor Kockel, who had the opportunity to remove and weigh the brains of three brothers and of a brother and two sisters. The figures follow:

A. BROTHER AND TWO SISTERS, DROWNED TOGETHER.

Boy, age 4½ years	88 cm.	1292 gms.
Girl, age 3½ years	83 "	950 "
Girl, age 2 years	67 "	960 "

B. THREE BROTHERS, SUFFOCATED BY ILLUMINATING GAS.

Boy, age 12½ years	133 cm.	1400 gms.
Boy, age 8 years	121 "	1460 "
Boy, age 4¾ years	100 "	1400 "

* For descriptions of some of these features and of illustrative distributions see *Trans. M. E. and E. E. Assoc. of Cornell University*, February 2, 1903; *Elect. World and Engineer*, February 28, 1903; *Electrical Age*, March, 1903.

It may be noted in the first instance that the brain-weight of the two-year-old girl exceeds that of the older sister by 10 grams, while the brother's, who was only 5 cm. taller than the elder sister, exceeds her brain-weight by 342 grams. In the second instance the brain of the eight-year-old boy is 60 grams heavier than that of the older brother, while the latter's brain-weight is equaled by that of the youngest brother. It should be added that all three brains were exceedingly hyperæmic, the venous channels were filled with much blood, and the brain-substance generally was moist and soft. The brains of adult brothers and sisters are more desirable for comparison.

E. A. S.

*HARVARD METHOD OF TEACHING PHYSIOLOGY.**

THE new method of teaching physiology proposed in the *Boston Medical and Surgical Journal*, December 29, 1898, and more fully explained in the *Philadelphia Medical Journal*, September 1, 1900, was adopted by the Harvard Medical School in 1899.

The traditional method of teaching physiology consists of a systematic course of lectures illustrated by occasional demonstrations. For thirty years or more, especially in England, this didactic teaching has been further illustrated by certain experiments performed by the students themselves. Laboratory experiments, therefore, have long been a valued part of the instruction in physiology in many universities. When the new method of teaching was introduced in the Harvard Medical School, and two hundred students worked daily in the physiological laboratories, it was said that this was only doing in a large way that which had been done in a small way for many years. The enterprise was held to be valuable because it showed that large numbers of first-year medical students could be carried simultaneously through a long series of experiments, many of which had been thought beyond their powers; it was a lesson in faith and an example of administration, but nothing more.

* From 'Physiology at Harvard,' by W. T. Porter, second edition, January, 1903.

It will be obvious that this criticism is based upon a misapprehension. The new method is not an extension of the old. It is a fundamentally different process. The old method is chiefly didactic. The new is a systematic course of experiment and observation by the student himself. In the old the student rests upon the dictum of the professor and the text-book. In the new he relies upon the fundamental experiments done with his own hands. In the old his experiments follow the lecture and attempt to verify its statements. In the new the lecture follows his experiments and discusses them in relation to the work of other observers. In the old the stress is upon the didactic teaching. In the new the stress is upon observation. Under the old method, students in the Harvard Medical School used to ask, 'Who is the authority for that statement?' Under the new, they ask, 'What is the experimental evidence?' The old method insensibly teaches men to depend upon authority, but the new directs them to nature.

In the old method the experiments performed by the students are almost exclusively such as are quickly and easily done; for example, the simpler experiments in the physiology of muscle and of the circulation of the blood. They are intended to illustrate physiological experimentation rather than to disclose step by step the groundwork of the science of physiology.

In the new method, on the contrary, the fundamental experiments and observations which form the solid ground in every field of physiology are divided into sufficiently small groups and arranged in the most instructive sequence. With the fundamental experiment of each group are placed the accessory data. The meaning of this term will be clear from the following example. Consider the function of the roots of spinal nerves. The fundamental experiment here is Johannes Müller's well-known section and stimulation of the nerve-roots. The accessory data are such of the observations and opinions of his successors as are necessary to give a clear picture of the present state of knowledge of this subject. The student makes for himself the fundamental observation, and immediately afterward considers the accessory data provided in text-book and lecture. He proceeds systematically from the fundamental experiment and accessory data of one group to those of the next, in an ordered and logical series.

The fundamental experiment and the accessory data are taken as directly as possible from the original sources, and the reference is given in each case.

It should be observed that this new method serves for the instruction of all students, from beginners to those engaged in research. The beginner performs the fundamental experiment in each group and studies the accessory data. The advanced student performs the fundamental experiments and as many of the accessory experiments as may give him the special training he desires. The research student has before him the classical observations and the original sources of the problem he has chosen.

It should be noticed also that the new need not violently push aside the old method of instruction, but may replace it chapter by chapter as the means and the energy of the instructors shall permit.

It has been urged against the new method that there are fundamental experiments which require more time than the student can possibly give, or which are too complicated to be successfully performed by him. The number of these has certainly been much exaggerated, and is daily lessened by inventions that secure simplicity without loss of accuracy. Pending such labor-saving inventions, the experiments which consume much time may well be done by committees of students, and the results reported to the entire class, who will compare them with the account given by the original discoverers.

SCIENTIFIC NOTES AND NEWS.

THE council of the British Association for the Advancement of Science has nominated the Right Hon. Arthur James Balfour to the office of president for the Cambridge meeting in 1904. They further agreed to recommend to the association the acceptance of the invitation to South Africa for the year 1905.