Forty-five minutes after decapitation the intestines were perfectly free from motion, and the access of air to the abdominal cavity did not excite it. On excitation of the two vagus nerves, movement of the stomach and intestines was very evident, extending as far as the transverse colon. Longet had supposed that this action of the stomach took place only when it was filled, but in the present case it was entirely empty. On re-excitation, the walls of the stomach folded in plications, and drops of gastric fluid were visible over almost the whole of its surface. The heart beat at the rate of fifty-one pulsations per minute twelve minutes after execution: it ceased entirely at the end of the twentieth minute. These experiments bring nothing unexpected, but they give final confirmation to theories hitherto based only on vivisection of animals, and extended to man by hypothesis. They may also re-assure those physiologists who have feared that conscious life might exist after decapitation by the guillotine.

— The utilization of scrap tin has exercised the minds of many inventors who have seen a fortune in it, if they could only separate the covering metal from the sheet of iron beneath it. It is estimated, says *Engineering*, that the supply of old and scrap tin at London, Birmingham, Swansea, Wolverhampton, Truro, Liverpool, and Glasgow, amounts to 30,000 tons per year, and that this can be obtained at 5s. per ton, or less. Of this weight, five per cent is pure tin, which, in ingot form, is worth £95 to £100 per ton; while the iron, separated from the tin, is worth about 40s. per ton. Hence 20 tons of scrap, which can be bought for £5, would realize, when the two metals are separated, at least £130, a sum which allows a very good margin to cover the cost of the manufacturing operations. A company, called the Electro metal extracting, refining, and plating company, of 76 Finsbury Pavement, E.C., has been formed to carry out a new process by which the tin is stripped from the iron in a perfectly pure form, while the foundation plate is unattacked. The scrap is placed in a series of baths, through which a current from a dynamo is sent; and while there the white metal is dissolved, and is afterwards recovered in metallic state. It is said that the operations are so inexpensive that a profit of £79 is realized from the treatment of every 20 tons of scrap. The process is also set forth as being applicable to mining refuse, tailings, and slags containing gold, silver, copper, tin, etc., as well as to plating metals with zinc.

— All of the original coast survey plain table sheets of the water-front of New York, Brooklyn, and Jersey City, have been published by photo-lithography on the full scale of the surveys, and are now ready for use. A chart has been prepared, and is now ready for publication, which will fill a long-felt want by supplying in one sheet all of the waters of Washington Territory north of Gray's Harbor. This chart covers the coast from Tacoma to Nanimo.

— Professor Baird and the usual complement of officials composing the summer force of the fish commission left Washington on Tuesday last, July 6, for Wood's Holl, Mass., to be absent till October.

— The second number of the *Political science quarterly*, edited by the faculty of political science of Columbia college, contains the following articles: Andrew Jackson, by Anson D. Morse; The Constitution in civil war, by William A. Dunning, Ph.D.; Ambiguous citizenship, by Hon. William L. Scruggs; The Christian socialist, by Edwin R. A. Seligman, Ph.D.; The legal tender question, by Harry Harmon Neill; Constitutional crisis in Norway, by Prof. John W. Burgess; The conflict in Egypt, I., by John Eliot Bowen, Ph.D.

— The passage of the Suez Canal, which until recently occupied from thirty-six to forty-eight hours, can be made, now that navigation during the night is possible, in sixteen hours for vessels fitted with the electric light apparatus. This important advance is the result of a very interesting report by Commander Hector, of the steamer Carthage, belonging to the Peninsular and oriental company, and addressed to the directors. This report was written after the Carthage made the first continuous passage, under the authorization of the Canal company, given the 1st of December, 1885. The Carthage arrived at Suez after a run from Port Said of eighteen hours. The actual running time was sixteen hours. there having been two delays caused by impediments in the channel: the mean speed made was 5.43 miles per hour. The passage as far as Ismailia was the most interesting, because it was the first attempt to take a large vessel through at night, with the aid of the electric light.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The new school of economists and the history of economics.

PERMIT me to make a correction of a misstatement, no doubt inadvertent, in Professor Ely's article in the last issue of *Science*, on the economic discussion. He says that the 'new school' of economists "were the first in America to give a proper position to Adam Smith, Ricardo, and Malthus, by the introduction of

courses in the history of political economy into our colleges." And yet, at least as early as 1878, and I believe for several years before that date, Professor Dunbar gave at Harvard university an advanced course in political economy, in which a large part of the time was occupied with a careful examination of the history and development of economic doctrines. The writings of Adam Smith, Ricardo, and Malthus were naturally given especial attention. The course of which this historical study was a part has continued to be given from year to year since it was first instituted. Other institutions may also have offered courses of the same kind; but certainly in this instance the history and literature of political economy were studied before the new school had entered the field.

There is a tendency in the new school to claim for itself perhaps an undue share of credit for the advances in economic thought and economic teaching which have taken place in the last ten or fifteen years,— a tendency which seems to me to be illustrated by Professor Ely's somewhat hasty remark.

F. W. TAUSSIG.

Newport, July 4.

Sea-level and ocean-currents.

In the number of *Science* of Jan. 1, I published some notes on the great equatorial westward flow of the earth's atmosphere and its influence upon oceanic circulation. I credited to this great atmospheric current the westward movement of the surface water of the ocean beneath it, and considered the friction of the winds as the most important factor in the whole system of oceanic circulation. In an interesting letter published in *Science* of Jan. 22, on sea-level and ocean-currents, Mr. William Ferrel states that the theory which attributes the movement of ocean-currents to the friction of the winds is untenable, saying, among other things, "that it is well known that ordinary winds have very little effect in changing sea-level except in very shallow water." He fortifies this assertion by quoting, from the report of the chief of engineers, observations which seem to show that the mean level of the water at either end of Lake Ontario varies but one-third of an inch with changes of wind; that the sea-level is precisely the same on both sides of the Isthmus of Darien; and that the sea-level on the coast of Ireland is the same in summer and winter, though the more violent westerly winds of winter should raise that level if winds were capable of moving and heaping up water on a coast.

Though fully appreciating the accuracy and value of Mr. Ferrel's work, and differing from so high authority with extreme reluctance, I deem it but justice to myself to say that the question is by no means so simple as he represents it, and that there are many facts which prove, beyond all argument, the power of wind to move great masses of water, and to produce all the phenomena of oceanic circulation. For example: for ten years I occupied in summer a country house on an island in Lake Erie, and I have more than once known a strong westerly wind to depress the level of the water in the west end of the lake, and raise it at Buffalo by two feet or more. This means the actual transfer, within a few hours, of a sheet of water of half the area of Lake Erie, and one foot in thickness, from the western to the eastern portion of the lake.

I was once detained at Indianola, Tex., three days by a norther, which blew the water off the coast till the harbor was almost dry land.

Again: since this discussion began, violent south-easterly gales have forced the ocean water into New York harbor, and raised the water-level six feet or more, inundating much of the lower portion of the city, and causing great destruction of property. As this rise was general along the coast, and was felt as sensibly at Sandy Hook as at the Battery, it is evident that we here have proof that wind is capable of moving vast bodies of water before it, even where the depth is considerable.

All the facts cited by Mr. Ferrel in support of his statement are of equivocal bearing on this question. The sea-level on the isthmus is still under discussion, and, if it shall be proved to be the same on both sides, that fact would be as difficult of explanation on the gravitation as the wind theory.

Capt. John Brown of Put-in-Bay Island reports to me that "a strong westerly wind sometimes depresses the water-level at Put-in-Bay four feet below the normal." And Mr. Julius Pohlman of Buffalo writes me as follows: "I learn from the records of the signal office here that the heaviest south-west storms on record raised the waters at this end of the lake between eight and nine feet above the ordinary level.

It is true that more violent winds are encountered on the Atlantic in winter than in summer, but almost none of these are continuous across the ocean. All the cyclones are rotary, and the storms not such are local and temporary. A change or reversal of direction of the wind would soon neutralize its effect, and in winter the antagonistic easterly winds are correspondingly violent on the European coast. On the whole, it is doubtful whether the sum of the impulses of the westerly wind is much greater in winter than in summer.

Since the atmosphere presses on the ocean with a weight of nearly fifteen pounds to the square inch, it is evident that when the air is moved the friction must be great. This is demonstrated by the rapid raising of ridges of water before a strong wind; and these ridges are all waves of translation. Waves of oscillation occur, but they are rare; and the apparatus so frequently employed for illustrating wave-motion by vertical rods successively lifted is misleading.

Mr. Ferrel says, in conclusion, "A continuous wind for some time in any direction causes merely surface currents of considerable velocity;" but it requires no argument to show that such surface currents, if continuous, would infallibly produce a movement of the deeper strata of water in the same direction.

The time estimated by Zöppritz for the transmission of surface motion to the depth of a hundred metres seems to me grossly exaggerated: but even if ten times longer than his estimates, the great equatorial wind, which has doubtless been blowing from east to west since the ocean has had an existence, would be amply sufficient to establish a movement that would form a *primum mobile* for the whole system of oceanic circulation.

That gravitation is a factor in oceanic circulation is proven by the presence of ice-cold water in the abysses of the ocean under the equator, — water that must have flowed in from the polar regions, — but it has seemed to me, and to many others whose opinions are worth more than mine, that it is a much