ries, to the south of Newfoundland, between Porto Rico and the Bermudas, and to the right of the Isle of Marten-Vaz.

The great depths of the Pacific are differently distributed. Between Japan and California, between 40° and 50° north latitude, there is the Tuscarora depression, which has depths of from 6,000 to 8,000 metres. Parallel to Japan and the Kuriles there is a depression in which has been found the greatest known depth, — 8,513 metres.

We see, therefore, that any new great submarine line, having to extend into another zone than that which has received the present Atlantic cables, must traverse depressions in which the bottom reaches a maximum depth of 4,000 metres. The possibility of raising a damaged cable would be very problematical under such conditions, and it would become certainly impossible in case of a cable from San Francisco to Japan.

Under these conditions, we are forced to conclude that the use of the present cables limits strikingly the progress of submarine telegraphy, which must remain confined to certain zones of the Atlantic, to inland seas, and to lines along the coasts. But if we consider the daily progress of applied science, and the constantly increasing demand for rapid communication between nations, it is certain that we must shortly undertake the study of new cables intended to traverse the greatest depths of the ocean for long distances. Necessity, therefore, compels us to investigate the new solutions of the problem, which may furnish us with light cables, easy to lay, and possible to repair.

A cable made by Mr. J. Richard is composed as follows: core of silicium bronze equal in weight to that of the 'Pouyer-Quertier' cable, or, per nautical mile, 220 kilos.; gutta-percha, 180 kilos.; layer of hemp, 80 kilos. The sheathing is formed of 28 wires of galvanized iron of 1.25 millimetres in diameter, each covered with hemp, and all twisted into a rope around the dielectric; the wires, 500 kilos.; the hemp covering them, 250 kilos. The weight of the cable is, therefore, 1,230 kilos. in the air, and 320 kilos. in the water. Its diameter is 25 centimetres, and its resistance to fracture, 2,800 kilos., of which the core supports one-half. Under these conditions, the cable can support from eight to nine nautical miles of its length, and can be raised from the greatest depths. The results of this comparative examination are self-evident.

For an equal conductivity and an approximately equal mechanical strength, the new cable is in weight and bulk equal to about two-thirds of the Pouyer-Quertier cable. It would cost about $165 less per mile, and would require, for laying, a ship and engines of less power, and therefore cheaper. The reduced armature will suffice to resist friction and the attacks of animal life in the deep sea but for the shore ends we must keep to the types generally employed. Such as it is, and although it may undergo modifications in detail from a more complete study and from experience, it merits the attention of competent engineers.

THE AMERICAN PUBLIC HEALTH ASSOCIATION.

The twelfth annual meeting of this association, held at St. Louis from Oct. 14 to Oct. 17, was one of the most successful in the series. The number of members present was large; and it is a matter of great promise for the association, that state and municipal boards of health were more fully represented than at any previous meeting.

These occasions have a value far beyond the intrinsic merit of the papers presented. The discussions are always instructive, often valuable. The sanitary questions of municipal life vary essentially in the different cities of the Union, and are answered in as many ways; and every public-health officer will find something to learn, as well as instruction to give.

Several threadbare topics, which have occupied the attention of this body for years, have disappeared from the programme, such as vaccination, yellow-fever, and malaria.

The order of exercises, as arranged by the executive committee, included the following subjects: Hygiene of occupations, Hygiene of the habitations of the poor, School hygiene, Adulteration of food, Water-pollution, Disposal of sewage by chemical action or irrigation, The observable effects upon the public health of official sanitary supervision, The work of state and municipal boards of health, Disease-germs, Cremation as a sanitary measure in times of great epidemics, Survey of present sanitary situation in St. Louis.

Nearly forty papers upon these topics were submitted. By far the larger number were of more than average merit, giving rise to interesting and instructive debate. The following-named papers contained more, perhaps, than the others upon the newer subjects in sanitary work.

Dr. Sternberg's paper upon disease-germs, read at the evening meeting of the third day, attracted the largest audience of the convention. This paper, which was illustrated by a collection of remarkably good microphotographs projected upon a screen, was substantially a re-statement of observations already made, and fortified by additional research. His statement that he was still at work upon the study of yellow-fever, by means of an abundant material furnished him from Havana, is a source of much satisfaction, somewhat diminished by the fact that this indefatigable and competent investigator carries on his work at his own expense. How long will the people of this country be willing to accept from the well-appointed laboratories of the old world the researches of Koch, Pasteur, and Klein, — investigations into diseases of as much importance to one side of the Atlantic as to the other, — and still hesitate to properly study the one disease peculiar to our own continent — yellow-fever?

Dr. Sternberg's assertion that he has demonstrated the non-existence of a yellow-fever germ in the blood cannot be strictly accurate. At this day one cannot exclude the possibility of making visible, by some at present unknown methods, organisms not yet recog-

nized. His own belief as to yellow-fever appears to be, that the habitat of the possible germ is in the digestive tract, as in cholera.

Professor Vaughan's paper on poisonous cheese treated a subject that has for a long time been under investigation, with no very satisfactory result. He has not been able to isolate the poison, which appears to be soluble in alcohol, but found it to be constantly associated with a very decided acid reaction of the cheese. In this view of the case, we have, then, a test of easy application in any hand.

Dr. B. F. Davenport, inspector of drugs for the State board of health, lunacy, and charity, of Massachusetts, and milk-inspector of Boston, read a paper descriptive of the work done in his laboratory, which, with the work of the state inspectors and analysts, has produced a very marked improvement in the milk-supply of Massachusetts.

Surgeon C. Smart, U.S.A., in a paper upon water-analysis, present and future, called attention to the necessary limitations of a merely chemical analysis of water. The determination of the amount of organic matter is, after all, not of definite value, unless the living organisms that may furnish it can be shown to be innocuous.

Dr. F. R. Fry of St. Louis presented the results of an examination into the artificial mineral waters of St. Louis, notably soda-water, which appears to be generally made with water from polluted wells. This is the danger that also attends the watering of milk. The loss in nutriment is often of far less consequence than the polluted water of the barnyard or other source used.

A paper upon cremation as a safeguard against epidemics, by Rev. G. A. Beugless of Brooklyn, and another by Hon. G. M. Keating of Memphis, on sanitation by fire, were the occasion for the appointment of a special committee to consider the whole subject of the disposal of the dead.

Three conferences of representatives of twenty state boards of health were held during the same week. At these meetings a representative of the Dominion of Canada, and one from the Province of Ontario, were present. This assembly was one of unusual importance, since, in the absence of an effective national organization, the country must look to these bodies for any concerted action in case of the appearence of cholera in this country.

Dr. Rauch of Illinois brought before the conference a carefully prepared statement of his views upon the value of a proper quarantine, and the claims of the states to a protection at the hands of the national government, and, failing this, the obligation to protect their own borders from invasion by contagious disease. His own experience had taught him that cholera in this country had invariably accompanied the infected person, and the person alone, generally an emigrant, surrounded by all the depressing conditions of his journey. He regarded the disinfection of rags, baggage, etc., as of minor importance. He concluded by urging upon congress the rehabilitation of the National board of health, or the formation of some stronger and more largely representative substitute, with power and funds sufficient to maintain a sanitary quarantine on the seaboard, and official inspection of the lines of travel by river and rail in the interior, and to assist states and municipalities in their efforts to prevent the introduction of disease, or to remove it when introduced.

Dr. Chancellor of Maryland presented his views, differing apparently very widely from those brought forward by Dr. Rauch. He did not accept the contagiousness of cholera; did not believe in the value of quarantine, which was always attended by the danger that a false sense of security was engendered, and other necessary sanitary precautions were neglected.

Dr. Holt, chairman of the Board of health of Louisiana, urged a quarantine in the newer and better sense of the word, — a detention of passengers and ships long enough to secure thorough inspection and disinfection; the shorter the period, the better.

A committee of five, consisting of Drs. Baker of Michigan, Walcott of Massachusetts, Herrick of Louisiana, Rauch of Illinois, and Bryce of Ontario, to whom were referred all the papers read, reported certain recommendations which were adopted by the conference, receiving the votes of all the states except Minnesota; she voting 'no' by reason of insufficient time to consider so important a subject.

The main points of this report are the following: —

That the factors essential to the disease are, —

1°. The importation of the disease by ships more or less directly from its only place of origin, in the delta of the Ganges.

2°. Local unsanitary conditions favorable to the reception and development of the disease.

3°. Persons sick with the disease, or things infected by such sick persons.

In view of the possible and probable introduction of cholera in the coming year, and the constant danger from other communicable diseases at foreign ports, it was the sense of the committee that the national government should maintain a national health service which should establish an effective system of quarantine, the appointment of medical officers at foreign infected ports, the prevention of the landing of immigrants until the danger of the introduction of cholera by them shall have passed.

The inspection and quarantine service originally devised by the National board was approved. It was recommended that congress be urged to appropriate five hundred thousand dollars, to be used, the whole or as much as necessary, in case of cholera, for the purpose of removing the disease and of preventing its spread from state to state. A vigorous prosecution of the work of local preparation, by cleaning foul localities and removing unsanitary conditions in anticipation of disease, was insisted upon. The concluding sentences of the report are, —

"The cause of cholera is contained in the discharges of persons affected by the disease or in things infected by such discharges. Should the disease reach this country, the first case, and after this the first case which reaches any given community, should be strictly isolated. All infective material from these and

from any subsequent cases should be destroyed in such manner as to stamp out the disease."

The conference adjourned, to meet in Washington on the second Tuesday of December.

EUCLID AS A TEXT-BOOK OF GEOMETRY.

ALTHOUGH Euclid has long since been superseded in the schools of this country, the following statistical notes on the extent to which Euclid's 'Elements' are still used in other countries may prove of some interest to the readers of *Science*. The figures are derived from a list of editions of Euclid's 'Elements' and 'Data' up to the year 1879, contained in a new Russian school edition of the 'Elements' by Professor Vâshchenko-Zakhàrchenko.[1] This is a noteworthy work in several other respects. Besides numerous and extensive notes, and additions to the text, designed to render Euclid's treatment of geometry more palatable to modern taste, and to fill up some lacunae in the old work, the author has prefixed to his translation a valuable dissertation on the axioms and postulates and on the so-called non-Euclidean geometry of Bolyai and Lobachèfsky, of which a sufficiently full sketch is presented. That a man so well acquainted with modern investigations of the principles of the science of space as Mr. Vàshchenko-Zakhàrchenko (a bibliography of this subject is also appended to the volume) should prove such an ardent adherent of Euclid, pure and simple, for the schools, is a truly remarkable fact. A closer inspection of his own list of editions of Euclid might have shown him that the modern mind does not tend at all in the direction of a revival of Euclid's system and methods in geometry.

This list has 455 entries, of which 2 belong to the fifteenth, 84 to the sixteenth, 92 to the seventeenth, 118 to the eighteenth, and 159 to the nineteenth century. This enumeration includes reprints. Of really different editions there were, according to the author's count, 80 in the sixteenth, 59 in the seventeenth, 50 in the eighteenth, and 115 in the nineteenth century.

Mr. Vàshchenko-Zakhàrchenko, however, does not pretend that his list is complete: indeed, he has not attempted to present a full and correct bibliography of all editions of Euclid. The titles are given in such an abridged form as to make identification in some cases difficult; and typographical errors abound. No American edition appears in Mr. Zakhàrchenko's list, although several have been published in the United States.[2] Still, for our purpose the list, as it is, will yield some interesting results. We have only to group its data so as to show the distribution of the various editions among different nations and by centuries. This is done in the following table:—

PERIOD.	Greek and Latin.	English.	German.	French.	Italian.	Dutch.	Spanish.	Swedish.	Russian.	Polish.	Danish.	Portuguese.	Modern Greek.	Finnish.	Arabian.	Chinese.	Total.
15th century .	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
16th " . .	60	1	2	4	12	–	2	–	–	–	–	–	–	–	3	–	84
17th " . .	43	3	9	16	10	7	2	–	–	–	–	–	–	–	1	1	92
18th " . .	31	26	17	18	11	5	3	3	3	–	–	1	–	–	–	–	118
1800 to 1839 . .	9	15	21	1	1	–	–	1	2	2	1	–	1	–	2	–	56
1840 to 1879 . .	0	95	1	–	3	–	–	2	–	–	–	–	–	1	–	1	103
Total . . .	145	140	50	39	37	12	7	6	5	2	1	1	1	1	6	2	455

There can be only one interpretation of these figures. They illustrate in a striking way the fact that at present Euclid is used as a text-book in the schools in no country but England.

The English editions constitute thirty-one per cent of the whole number in the list, and fifty-three per cent of those in the four principal living languages (English, French, German, Italian). But this disproportion only appears in its full significance when we take into account the time of publication. Indeed, the table shows that up to 1840 the number of editions in the above-mentioned four languages is almost the same, — viz., 45 in English, 39 in French, 49 in German, 34 in Italian, — while, within the last forty years, 95 English editions have appeared, but only 1 German, 0 French, and 3 Italian editions.

In France the yoke of Euclid was thrown off as early as the end of the last century. The last French school edition of Euclid, according to Mr. Zakhàrchenko's list, was published in 1778. Thus, in France the end of Euclid's reign coincides with the beginning of the epoch of greatest splendor in the history of mathematical research; and, indeed, it is well known that this change is directly due to the influence of that celebrated school of French geometers who gave such lustre to the latter part of the eighteenth century, and won for France her unrivalled supremacy in mathematical science during this period. Legendre's 'Elements' took the place of Euclid's, until he, in his turn, had to yield to more modern influences. And as early as 1814, Delambre and Prony, in their report on Peyrard's critical trilingual edition of the 'Elements' and 'Data,' were justified in speaking of Euclid's method as 'une manière passée de mode,' and of his style as 'aujourd'hui peu connu.'

Italy, Spain, Russia, and other countries, soon followed suit. Everywhere the influence of the French school was felt; and, until the last quarter of a century, Legendre supplanted Euclid, when in many of these countries there arose schools of geometers who independently provided their countries with excellent text-books of their own. In Germany, Euclid held his own longer than anywhere else. But, on the other hand, opposition to the old system is nowhere so universal and uncompromising now; and nowhere has modern geometry found so many enthusiastic disciples.

A. ZIWET.

[1] "The Elements of Euclid, with an explanatory introduction and annotations, by M. E. Vàshchenko-Zakhàrchenko. Kieff, 1880." 15+747 pp.

[2] The library of congress possesses two American reprints of R. Simson's Euclid, published by Desilver of Philadelphia in 1825 and 1834 respectively, and an addition of the first three books of the 'Elements' (Playfair's text), with notes, under the title "The geometry of Euclid: with annotations by Horatio Hubbell, Phila., J. B. Lippincott & Co., 1861."