great abundance of eggs and spermatozoa, were noticed by the above-mentioned observer. Amongst this *débris*, however, certain living organisms are always met with, often in great numbers, which may be regarded as parasites, or at least as commensals, inhabiting the digestive canal of the animal.

In the stomachs of specimens of O. edulis, from Cancale and Marennes, the author discovered Hexamita inflata Duj., which was also observed in the act of division in this unusual position; and, as it is also found in infusions and stagnant water, it is proved that it is a true commensal under certain circumstances.

Another organism was observed amongst the contents of the stomach, principally at its anterior part, which might at first be regarded as a Spirillum of relatively large size. It varied in length from 0.04 to 0.12 mm., and in thickness, from 0.001 to 0.003 mm. It was found to have a vibratile frill attached, which was arranged spirally on the body, making two, three, rarely eight or ten, turns around it. This thin vibratile film was demonstrated in the living specimens by the use of aniline colors, dahlia, and methyle blue, and also by killing the creatures with the fumes of osmic acid, and afterwards staining with the colors named. M. Certes regards this organism as related to Trypanosoma sanguinis, — described and figured in 1843 by Gruber as a parasite of the blood of the frog, and rediscovered by Ray Lankester, and named Undulina ranarum, — and Trypanosoma Eberthii of Saville Kent, found in the intestine of the duck. For the parasite found in the oyster, M. Certes proposes the name of Trypanosoma Balbianii.

Besides the foregoing, a small species of Enchelyodon was found in the liquor which had been kept covered for some days from Marennes oysters, as well as in the fresh juices which escaped when the shell was opened. Prorocentrum micans Ehr. was also noticed. A plate containing twelve figures accompanies the paper noticed (*Bull. soc. zool. France*, vii. 1882).

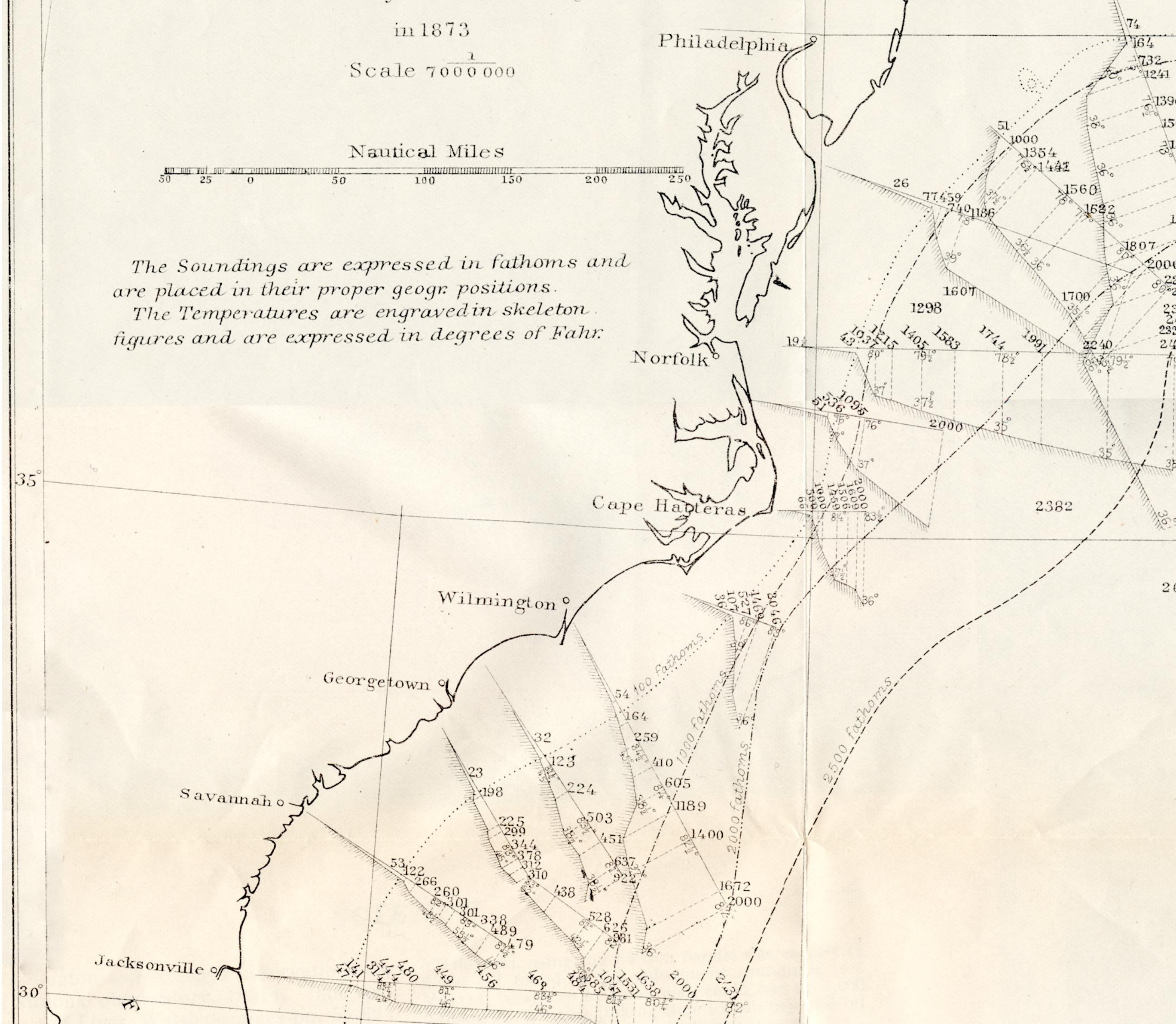
The organism which M. Certes has described as Trypanosoma Balbianii is probably the same as that commonly met with in the stomach of Ostrea virginica, and which I had proposed to call Spirillum ostrearum in a paper prepared last September for the census report. Its behavior was so like that of a Spirillum which I have at times found in the foul, stagnant waters of the gutters in the streets of towns, that it seemed to me that it was a vegetable organism belonging to the schizomycetous fungi. The French naturalist is probably right, however, as to its systematic position, unless the form found in Ostrea virginica is entirely different, which I think altogether unlikely. Sachs (Text-book of botany, 2d ed., 1882, p. 248) says, "The Schizomycetes live in fluids which contain organic substances (albuminoids) liable to putrefaction, from which they obtain their nutriment, and of the putrefaction of which they are the cause." While it is hardly fair to say that putridity characterizes the contents of the alimentary canal of the oyster, yet the conditions favorable to the growth and multiplication of low organic forms are probably present. We usually found this organism present in oysters examined by us: in fact, sometimes countless multitudes were present, especially in the stomach and around the crystalline style and the intestinal pouch or fold in which the latter is lodged. Yet, upon eating these same individuals known to be infested with parasites, no inconvenience was experienced, showing that these organisms, whatever they may be, are probably harmless to man.

I have alluded to a singular association of messmates, found inhabiting the cavity of the mantle of the American oyster, in my report to the Maryland commissioner for 1881 (Appendix A, pp. 24–25). The little oyster-crab Pinnotheres ostreum Say was found to support colonies of the vorticellid Zoothamnium on its back and legs. The infusorian, in its turn, supported on its stalks very minute Bacteria and Vibriones. In such a case, the colonies of infusorians may be of actual benefit to the oyster, since many of the zoöids thrown off doubtless become food for the host.

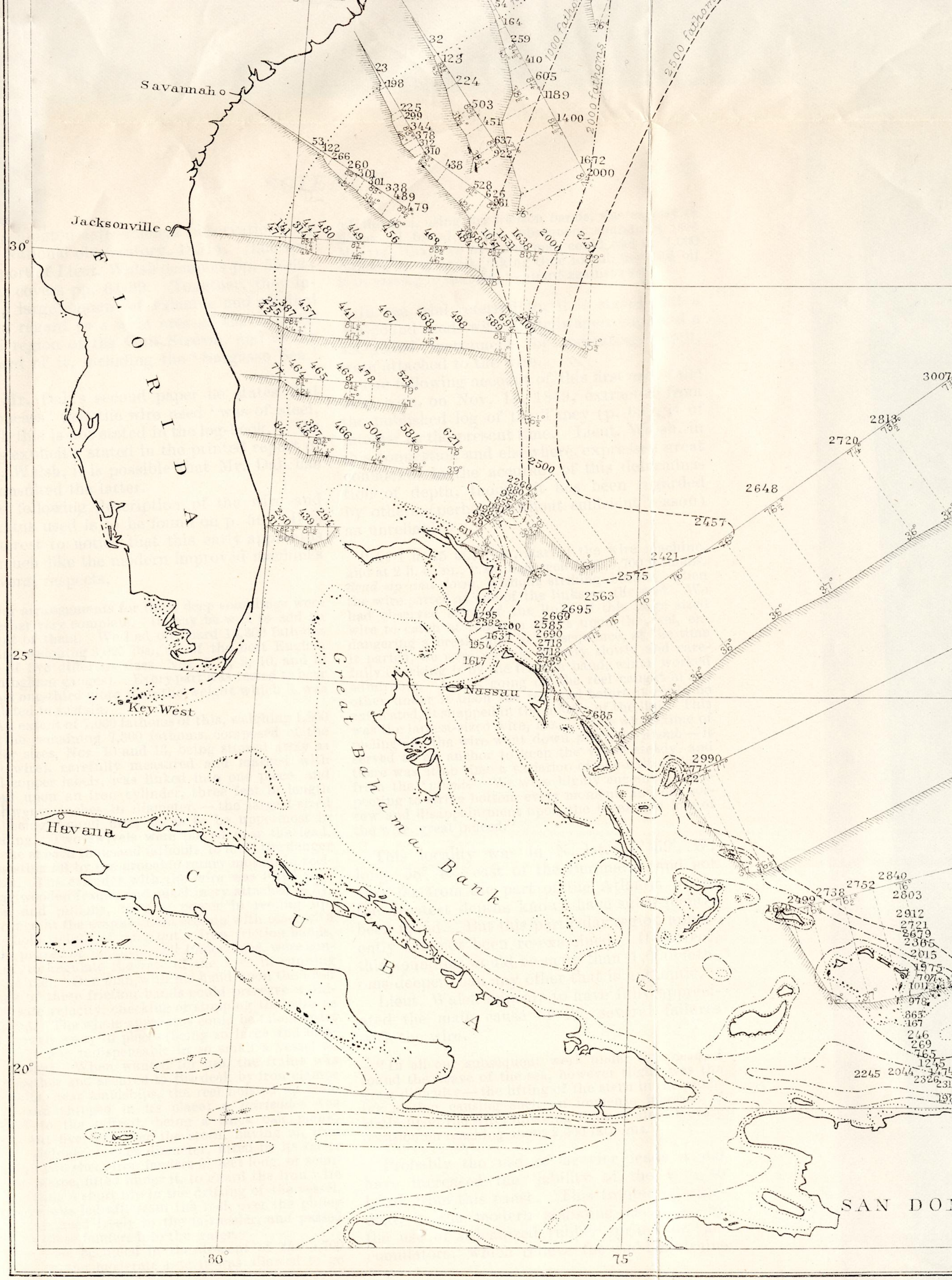
J. A. RYDER.

THE USE OF STEEL SOUNDING-WIRE BY LIEUT. J. C. WALSH, U.S N., ON THE TANEY, IN 1849-50.

Two notes on this subject have been published by Mr. W. H. Dall in SCIENCE (No. 3, p. 65; and No. 7, p. 191). In these, Mr. Dall refers to the log-book of Lieut. Walsh, when in command of the Taney, as if it were still unpublished. Nor does he give any references to the detailed report of the expedition, made by Lieut. Walsh to Lieut. Maury, as ordered by the secretary of the navy. This report was dated Aug. 15, 1850, and was printed in 1851 in connection with the 'Abstract log of the Taney,' which includes all the observations in tabular form, with a column of remarks, as a part of 'Lieut. Maury's Investigations of the winds and currents of the sea,' Appendix to


U. S. COAST SURVEY
J. E. Hilgard, Supt.
DEPTHS AND TEMPERATURES
observed in the
WESTERN PART OF THE NORTH ATLANTIC OCEAN
by the U. S. Coast Survey S. S. Blake
between 1881 & '83
including also
the lines run by H.M.S. Challenger
in 1873
Scale 1/7000000
Nautical Miles
50 25 0 50 100 150 200 250
The Soundings are expressed in fathoms and are placed in their proper geogr. positions.
The Temperatures are engraved in skeleton figures and are expressed in degrees of Fahr.
85°
80°
75°
45°
40°
35°
30°
Portland
Boston
New York
Philadelphia
Norfolk
Cape Hatteras
Wilmington
Georgetown
Savannah
Jacksonville
100 fathoms
1000 fathoms
2000 fathoms
2500 fathoms

70°
65°
60°
45°
40°
35°
30°
N
Portland
Boston
Cape Cod
York
Halifax
Sable I.
Cape Sable
George's Bank
100 fathoms
1000 fathoms
2000 fathoms
2500 fathoms
3000 fms.
2500 fms.
Bermuda Ids.


Savannah
Jacksonville
F L O R I D A
Key West
Havana
C U B A
Great Bahama Bank
Nassau
SAN DOM
1000 fathoms
2000 fathoms
2500 fathoms
30°
25°
20°
80°
75°


Bermuda Ids.
2500 fms.
3000 fathoms
SAN DOMINGO
Porto Rico
St Thomas
30°
25°
20°
70°
66°

the Washington astronomical observations for 1846 (National observatory, 1851). The special report of Lieut. Walsh occupies pp. 55-62; the log covers pp. 64-99. Together, they include a large amount of valuable and original data in regard to a wide area of the Atlantic in the region of the Gulf Stream, and to the eastward of it, including the 'Sargasso Sea,' etc.

In Mr. Dall's second paper he states that 'it appears' that the wire used 'was of steel, though this is not stated in the log-book.' As this is explicitly stated in the printed report of Lieut. Walsh, it is possible that Mr. Dall has not consulted the latter.

The following description of the wire and apparatus used is to be found on p. 56. It is of interest to notice that this early apparatus was much like the modern improved machines in several respects.

"Our arrangements for these deep soundings were altogether very complete. It may be well to add an account of them. We had on board 14,300 fathoms of wire, weighing 3,025 lbs., all of the best English steel, of five different sizes, Nos. 5, 7, 8, 10, and 13 (Birmingham gauges). Every part was tested to bear at least one-third more than the weight which it was calculated to sustain.

"An extent of 7,000 fathoms of this, weighing 1,800 lbs. (the remaining 7,300 fathoms, composed of the smaller sizes, Nos. 10 and 13, being stowed away as spare wire), carefully measured and marked with small copper labels, was linked into one piece, and wound upon an iron cylinder, three feet in length and twenty inches in diameter, — the largest-sized wire being wound first, so as to be uppermost in sounding. Two swivels were placed near the lead, and one at each thousand fathoms, to meet the danger of twisting off by the probable rotary motion in reeling up. The cylinder with the wire was fitted to a strong wooden frame, and machinery attached — fly-wheel and pinions, to give power in reeling up. Four men at the cranks could reel up with ease, with the whole weight of wire out. Iron friction bands, which proved of indispensable importance, were connected to regulate the rate of the wire in running off the reel. One man with his hand upon the lever of one of these friction bands could preserve a uniform, safe velocity, checking or stopping the wire as required. The whole apparatus could be taken apart and stowed away in pieces (being so large and massive, this was indispensable in so small a vessel as the Taney). When wanted for use, the frame was put together and secured to the deck by iron clamps and bolts, near amidships, the reel hoisted up from below and shipped in its place; a *fairleader* was secured to the taffrail, being a thick oak plank, rigged out five feet over the stern, having an iron pulley, eighteen inches diameter, fitted in its outer end, and two sheet iron fenders 3½ feet long, of semicircular shape, fitted under it, to guard the iron wire from getting a short nip in the drifting of the vessel. The wire was led aft, from the reel, over the pulley which traversed freely in the fairleader, and passed between these fenders into the water.

"The time occupied in the descent of *the* 5,700 *fathoms*, at the moderate rate it was allowed to go off the reel, using the friction bands, was exactly 1½ hours. I found in the subsequent soundings [see May 14], that two or three men could reel up 1,000 fathoms in 2½ hours, taking time to rub dry and oil it in passing to the reel, to guard against rust."

In the trial referred to, it is stated that a ten-pound lead, with a Stellwagen cup, and a six-pound instrument for indicating depth, were attached to the wire.

The following account of this first use of the steel wire, on Nov. 14, 1849, extracted from the published log of the Taney (p. 69), is of interest at the present time. Lieut. Walsh, in this connection and elsewhere, expressed great confidence in the accuracy of this determination of depth, though it has been regarded by others (perhaps without sufficient reason) as unreliable.

"At 1 h. 25 m., P.M., started the wire machine, and at 2 h. 55 m., P.M., had reeled off 5,700 fathoms, *dead up and down*, without striking bottom, when the wire parted at one of the links on the reel. We had observed some of the links of this large sized wire to catch at times on others upon the reel, endangering a break, and in consequence, at the time it parted, we were reeling off very slowly and carefully checking it by the friction band, which worked admirably. A link going off the reel caught in another under it upon the reel and before it could be extricated, it snapped in the middle of the link. This was the largest-sized wire, No. 7. The whole time of reeling off, the wire went down *perfectly plumb* — it served as an anchor to keep the vessel steady, and there was at no time a variation of one-half a degree from the '*plumb*.' We were highly encouraged, expecting to strike bottom every moment, and our sorrow and disappointment upon the break and loss of the wire, great indeed."

This locality was in N. lat. 31° 59′, W. long. 58° 43′, east of the Bermudas, and not very far from the part of the Atlantic where the greatest depths known have subsequently been found. But this particular region apparently has not been re-examined. If correct, this sounding would be more than 1,000 fathoms deeper than any other that is authentic.

Lieut. Walsh appears to have fully appreciated the main cause of the several failures with the wire.

"In all our subsequent work under this head, I found the heave of the sea, however slight, was the great difficulty — the lifting of the stern in the pitching motion causing such an immense increase of strain upon the wire, breaking it upon almost every occasion on reaching about 2,000 fathoms."

Probably the use of heavier leads would have increased the liability of the wire to break from this cause. This trouble is remedied, in the modern sounding-machines, by the use of vulcanized rubber springs or 'accumulators,' which relieve the sudden strains upon the wire. Therefore there is no good reason to think that any thing would have been gained at that time by the use of heavy leads, though Mr. Dall thinks it strange that they were not tried. In some of the trials a twelve-pound lead was used, and, in the last attempt, one of eight pounds, together with a thermometer, with the usual result, — a breakage of the wire.

Mr. Dall's note implies that no successful trials were made with the steel wire; but, according to the *published* log (p. 93, May 14, 1850), at least *one* sounding was made (1,050 fathoms, no bottom) when the wire was successfully recovered.

A. E. VERRILL.

LAKE BONNEVILLE.

MR. G. K. GILBERT'S report (*Ann. rep. U. S. geol. surv.*, 1881, 169), preliminary to the monograph (in preparation) he promises on the Great Basin, shows the following history for its old lake. The lake-deposits are chiefly a yellow clay of unknown depth, covered by a white marl ten to twenty feet thick, the two being separated at certain points along the old shore-lines by wedges of subaerial gravel-deposits, and some exposures showing erosion of the clay surface before the marl was laid on it. These deposits mark two periods of high water, separated by a time of low water, or dryness. As no cause is found in the surrounding country to account for the change from clay to marl deposit, its explanation is sought in a change from salt water of the first lake period to fresh water in the second, for which a theoretic explanation is given; but the evidence for this is not considered final. From a critical study of the superposition of many shore terraces (see the plate opposite), it is shown that the first lake did not rise high enough to reach an overflow outlet; that the greater number of terraces now visible were formed during halts in the rise of the second great lake; that the highest or Bonneville terrace, nine hundred or more feet above the present Great Salt Lake, marks a stand at the level of overflow northward to Snake River; that the next most pronounced terrace, known as the Provo, four hundred feet lower, marks a halt in the drainage of the waters when the outlet had been cut down through softer rocks to a hard limestone sill. The reduction of the lake-surface to a still lower level, as in the present shallow sheet of water, has been effected entirely by climatic change, by which the ratio of precipitation to evaporation has been decreased. When at its highest level, Lake Bonneville was three hundred miles long between latitudes 37° 40′ and 42° 20′, and one hundred and seventy miles broad between the meridians 111° 35′ and 114° 15′ of west longitude. Its shore-line was very irregular, advancing around broken promontories, and retreating into fiord-like bays. Numerous islands stood above its broad, deep, fresh waters, and from its shores the enclosing mountains rose five to eight thousand feet. Now it is represented by a mere film of brine on the borders of a desert plain. Previous to the rise of the first lake, the base-level of the basin drainage was low for a long period, as is proved by the distinct overlap of the lacustrine deposits on the eroded mountain-slopes, as shown in the second plate here copied on p. 573, or on the alluvial cones built by old streams flowing from the mountain valleys; but the conclusion that this long period had a dry climate is not fully proved. For if, as is mentioned below, a considerable tilting has already deformed the recently made Bonneville terrace, one may fairly suppose a much greater distortion in the long time since the beginning of the first lake; and this distortion may have been sufficient to raise a barrier behind which the lake-waters accumulated. The change from the prelacustrine condition would then have been orographic rather than climatic. The relation of the glaciation of the neighboring ranges to the lakes is not shown directly, although three old moraines are found within the terrace limits; for none of these give good opportunity for observation, and the one at the mouth of Little Cottonwood cañon is so dislocated by recent faulting that its attitude with relation to the terraces cannot be deciphered. Recent discoveries by Mr. I. C. Russell in the western part of the Great Basin may throw further light on this question. Volcanic eruption took place in the basin during the disappearance of Lake Bonneville; and both the Bonneville and Provo terraces have been warped from their originally level plains, and by different amounts. From measures taken along the eastern shore-lines, lines of equal deformation are constructed; and these show very clearly a relative elevation of the centre, or south-western part, of the old lake-bottom of as much as three hundred feet since the Bonneville terrace was made, and a hundred and twenty-six since the Provo. This tilting accounts for the eccentric position of the present shallow lake-remnant at the north-eastern margin of its flat desert. A fault of fifty to seventy-five feet has been made along the foot of the Wahsatch range, between Willard and Levan, since the lake lost its outlet. The author therefore concludes that volcanic activity and mountain growth have not yet ceased in this neighborhood.

Special interest is attached to this investigation, as it is the first detailed study of an example of those great interior lakes so numerous at a comparatively recent period of the earth's history, and now so greatly reduced in area, or even converted into saline or sandy deserts. The largest of these was probably the one that united the Aral and the Caspian; another vast interior sea occupied much of what is now the desert of Gobi; and smaller examples could be named in the Argentine Republic and in northern Mexico. Central Africa, lying within the belt of heavy equatorial rains, still preserves a climate moist enough to fill its lakes to overflowing; but the recent drying-up of the outlet of Tanganyika shows that the change so distinct elsewhere is beginning to make itself felt even there. It will be long before any of these other great basins is known as well as that one so carefully studied by our government surveyors.

W. M. DAVIS.

CHEMICAL AND PHYSIOLOGICAL RESEARCHES ON THE PTOMAÏNES.

DURING the last few years much attention has been directed to the study of the chemical nature and physiological action of the so-called *post-mortem* alkaloids (or ptomaïnes). These mysterious bodies, which are apparently formed in such small quantities as to make their detection and separation an extremely difficult operation, were originally regarded by both Selmi[1] and Schwanert[2] (1874) as exclusively

[1] Abstract in *Berichte deutsch. chem. gesellsch.*, vi. 142.
[2] *Berichte deutsch. chem. gesellsch*, vii. 1332.